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Madison, Wisconsin: The Homestead Co., 1923

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ANNUAL REPORT

OF THE

**Wisconsin State Horticultural
Society**

For the Year Ending July 1, 1923

VOL. LIII

**Frederic Cranefield, Editor
Madison, Wis.**

**MADISON, WIS.
The Homestead Co.
1923**

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LETTER OF TRANSMITTAL

Madison, Wis., July 1, 1923.

To His Excellency, JOHN J. BLAINE,
Governor of Wisconsin.

Dear Sir:—I have the honor to transmit to you herewith the Fifty-third Annual Report of the Wisconsin State Horticultural Society.

Respectfully,

FREDERIC CRANFIELD,
Secretary.

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UNIVERSITY OF WISCONSIN
MADISON

OFFICERS AND COMMITTEES FOR 1923

OFFICERS

H. C. Christensen, President.....	Oshkosh
W. A. Toole, Vice-President.....	Baraboo
Frederic Cranefield, Secretary-Treasurer.....	Madison

EXECUTIVE COMMITTEE

Ex-Officio

President, Vice-President and Secretary.

For Term Ending December, 1925

M. B. Goff.....	Sturgeon Bay
M. S. Kellogg.....	Janesville
James Livingstone.....	Milwaukee
W. J. Moyle.....	Union Grove

For Term Ending December, 1924

A. K. Bassett.....	Baraboo
C. I. Brigham.....	Blue Mounds
Wm. Longland.....	Lake Geneva

For Term Ending December, 1923

Paul E. Grant.....	Menomonie
J. F. Hauser.....	Bayfield
Richard Marken.....	Gays Mills
W. E. Spreiter.....	Onalaska

BOARD OF MANAGERS

H. C. Christensen	Frederic Cranefield
W. A. Toole	

TABLE OF CONTENTS

	Page
Officers and Committees for 1923.....	6
Fruits Recommended for Culture in Wisconsin.....	7
Trees and Shrubs Recommended.....	10
Constitution and By-Laws.....	18
Outline of Work of Society.....	24
Wisconsin Horticulture.....	26

ANNUAL CONVENTION

Address of Welcome, Gov. J. J. Blaine.....	27
Better Fruit from Wisconsin Home Orchards, J. M. Coyner, R. T. Glassco, W. E. Spreiter.....	30
The Influence of Home Orchards on Commercial Fruit Grow- ing, M. B. Goff.....	36
President's Address.....	43
Report of Secretary.....	44
The Kickapoo Orchard Section, M. J. Hovey.....	51
Facts About Door County Orchards, Arno Wittich.....	51
The Home and Farm Orchard in Iowa, H. E. Nichols.....	57
Bees and Horticulture, H. F. Wilson.....	63
Small Fruit Culture in Minnesota and Wisconsin, W. J. Moyle.....	69
The Iris, Prof. Leroy Cady.....	73
City Forestry in Milwaukee, Otto W. Spidel.....	78
Relation of Wisconsin Fruit Growers to the Department of Horticulture, Prof. J. G. Moore.....	82
Variations in Native Trees, Shrubs and Plants, William Toole, Sr.....	87
Treatment of Roadside Trees from the Standpoint of the Highway Engineer, A. R. Hirst.....	94
Future Troubles, Can We Avoid Them? Dr. S. B. Fracker.....	104
European Travels of a Cereal Pathologist, Dr. E. C. Stakman.....	112
Disease Resistance as a Factor in the Control of Plant Dis- eases, James G. Dickson.....	123
Our Song Birds and Bird Songs, Mrs. E. L. Roloff.....	131
The Peony, W. A. Lawton.....	136

CONTENTS—Continued

SUMMER MEETING

Sturgeon Bay, August 16, 17, 1922

Address of Welcome, H. M. Ferguson.....	143
Late Planting of Herbaceous Perennials and Shrubs, William Toole, Sr.....	144
The Kickapoo Region, M. J. Hovey.....	146
The Fruit Industry of Door County, E. S. Reynolds.....	148

FRUITS RECOMMENDED FOR CULTURE IN WISCONSIN

The behavior of varieties of fruits is influenced very largely by their environment. The conditions of soil, exposure and latitude over such an extensive area as the state of Wisconsin vary greatly and no list can be given that will prove satisfactory in all localities. Hardiness of plant and fruit bud has been the leading thought in the selection of varieties.

APPLES, HARDIEST VARIETIES

Usually Hardy in Any Part of Wisconsin.

Duchess, Hibernial, Livland Raspberry, Longfield, Lubsk Queen, Malinda, Patten Greening, Whitney.

APPLES, GENERALLY HARDY

Astrachan (Red), Autumn Strawberry, Delicious, Dudley, Fall Orange, Fameuse (Snow), Golden Russett, Livland Raspberry, Longfield, Lubsk Queen, McIntosh, Malinda, McMahan, Newell, Northwestern Greening, Duchess, Patten Greening, Saint Lawrence, Salome, Scott, Tolman (Sweet), University, Utter, Wealthy, Westfield (Seek-no-further) Windsor, Wolf River.

APPLES

Varieties Hardy in Special Localities.

Ben Davis, Fallwater, Gano, Hubbardston, Jonathan, King, Northern Spy, Pewaukee, Sutton Beauty, Willow Twig, York Imperial, Bellflower.

APPLES (Commercial Orchard List)

It is generally conceded that a commercial orchard should consist of but few varieties; the following are suggested: Duchess, Dudley, Fameuse, McMahan, McIntosh, Northwestern Greening, Tolman, Wealthy, Windsor, Wolf River.

APPLES (Six Varieties for Farm Orchard)

Duchess, Livland Raspberry, Northwestern Greening, Tolman (Sweet), Wealthy, Windsor.

CRABS

Hyslop, Sweet Russett, Virginia, Whitney.

PLUMS

Of the classes commonly cultivated, viz.: **European, Japanese, Native or American and Hansen Hybrids**, the two last named are most likely to succeed.

NATIVE PLUMS

De Soto, Hammer, Hawkeye, Forest Garden, Surprise.

HANSEN HYBRIDS

Hanska, Opata, Sapa, Waneta.

EUROPEAN PLUMS

(Not recommended for general cultivation.) **Damson, Green Gage, Lombard, Moore's Arctic.**

JAPAN PLUMS

(Not recommended for general cultivation.) **Burbank.**

CHERRIES

Early Richmond, Montmorency.

GRAPES

Brighton (Red), Concord (Black), Delaware (Red), Diamond (Green), Moore's Early (Black), Niagara (Green), Winchell (Green), Worden (Black).

BLACKBERRIES

Eldorado, Snyder.

STRAWBERRIES

Varieties starred have imperfect flowers and must not be planted alone.

Aróma, Bubach, Dr. Burrill, Dunlap, Gandy, Glen Mary, *Haverland, *Sample, Splendid, *Warfield.

FALL BEARING STRAWBERRIES

Progressive, Superb.

TWO VARIETIES STRAWBERRIES FOR FARM GARDEN

Dunlap, *Warfield.

RASPBERRIES

Black: Conrath, Cumberland, Gregg, Plum Farmer.
Red: Cuthbert, Marlboro, King, Latham.
Purple: Columbian.

CURRANTS

Red: Red Cross, Perfection, Pomona, Wilder.
White: White Grape.
Black: Lee's Prolific, Naples.

GOOSEBERRIES

Downing.

WARNING.—Currant and Gooseberry bushes should not be planted or permitted to remain within 600 yards of white pine, especially in the northwestern counties. They spread the blister rust, a disease which kills young white pine trees. This applies to ornamental flowering currants also.—State Department of Agriculture.

PEARS

On account of the prevalence of blight and winterkilling, pears are not generally recommended for Wisconsin. Good crops are occasionally produced under favorable conditions, especially in the southeastern part of the state. The following list includes both early and late varieties:

Anjou, Bartlett, Clairgeau, Clapp Favorite, Early Bergamot, Flemish Beauty, Idaho, Kieffer, Lawrence, Louise, Seckel, Sheldon, Vermont Beauty.

TREES AND SHRUBS RECOMMENDED

LARGE DECIDUOUS TREES

Silver Maple.....	<i>Acer dasycarpum</i>
Wiers Cutleaf Maple.....	<i>Acer dasycarpum</i> var.
Norway Maple.....	<i>Acer Platanoides</i>
Scarlet Maple.....	<i>Acer rubrum</i>
Sugar Maple.....	<i>Acer saccharinum</i>
Paper Birch.....	<i>Betula papyrifera</i>
Red Birch.....	<i>Betula nigra</i>
Hackberry.....	<i>Celtis occidentalis</i>
White Ash.....	<i>Fraxinus americana</i>
Green Ash.....	<i>Fraxinus viridis</i>
Maidenhair Tree.....	<i>Ginkgo biloba</i>
Honey Locust.....	<i>Gleditsia triacanthos</i>
Kentucky Coffee Tree.....	<i>Gymnocladus canadensis</i>
Black Walnut.....	<i>Juglans nigra</i>
European Larch.....	<i>Larix europaea</i>
American Larch.....	<i>Larix laricina</i>
Bolles Poplar.....	<i>Populus Bolleana</i>
Carolina Poplar.....	<i>Populus monilifera</i>
Black Cherry.....	<i>Prunus serotina</i>
White Oak.....	<i>Quercus alba</i>
Scarlet Oak.....	<i>Quercus coccinea</i>
Bur Oak.....	<i>Quercus macrocarpa</i>
Pin Oak.....	<i>Quercus palustris</i>
Red Oak.....	<i>Quercus rubra</i>
Golden Willow.....	<i>Salix vittellina</i>
Wisconsin Weeping Willow.....	<i>Salix babylonica</i> var.
Laurel Willow.....	<i>Salix pentandra</i>
Basswood.....	<i>Tilia americana</i>
American Elm.....	<i>Ulmus americana</i>

FOR STREET PLANTING

American Elm	Basswood
Norway Maple	Pin Oak

SMALL DECIDUOUS TREES

(This class includes small deciduous trees of more value for ornament than for shade or protection.)

Tartarian Maple.....	<i>Acer tartaricum</i>
Juneberry.....	<i>Amelanchier canadensis</i>
Hawthorn.....	<i>Crataegus-Crusgalli</i>

Buckeye.....	<i>Aesculus glabra</i>
Russian Mulberry.....	<i>Morus alba</i> var. <i>tartarica</i>
Ironwood.....	<i>Ostrya virginiana</i>
Mountain Ash (native).....	<i>Pyrus americana</i>
Western Crab Apple (native).....	<i>Pyrus ioensis</i>
Bechtel's double fl. Crab.....	<i>Pyrus</i> var. <i>Bechtelii</i>

LARGE EVERGREENS

(None of the "large" evergreens should be planted on small lawns on account of their great size at maturity and dense habit of growth. A spruce or a pine may reach a height of 50 to 100 feet with a spread of 50 feet; so also may an elm but the lower branches of the elm may advantageously be removed while such pruning of an evergreen would destroy its beauty.)

Concolor Fir.....	<i>Abies concolor</i>
White Spruce.....	<i>Picea canadensis</i>
Norway Spruce.....	<i>Picea excelsa</i>
Colorado Blue Spruce.....	<i>Picea pungens</i>
Austrian Pine.....	<i>Pinus austriaca</i>
Red Pine.....	<i>Pinus resinosa</i>
Bull Pine.....	<i>Pinus ponderosa</i>
White Pine.....	<i>Pinus strobus</i>
Scotch Pine.....	<i>Pinus sylvestris</i>
Douglas Fir.....	<i>Pseudotsuga taxifolia</i>
Arbor Vitae (White Cedar).....	<i>Thuja occidentalis</i>
Hemlock Spruce.....	<i>Tsuga canadensis</i>

SMALL EVERGREENS

Dwarf Juniper.....	<i>Juniperus communis</i> var.
Waukegan Juniper.....	<i>Juniperus horizontalis</i>
Japanese Trailing Juniper.....	<i>Juniperus procumbens</i>
Sabin Juniper.....	<i>Juniperus Sabina</i>
Tamarix-leaved Juniper.....	<i>Juniperus Sabina</i> var.
Mugho Pine.....	<i>Pinus montana</i> var. <i>mughus</i>
American Yew.....	<i>Taxus canadensis</i>
Siberian Arbor Vitae.....	<i>Thuja orientalis</i> var.
Pyramidal Arbor Vitae.....	<i>Thuja pyramidalis</i>
Globe Arbor Vitae.....	<i>Thuja compacta</i>

SHRUBS

Mountain Maple.....	<i>Acer spicatum</i>
Thunberg's Barberry.....	<i>Berberis Thunbergii</i>
Weigela rosea.....	<i>Diervilla florida</i>
Weigela.....	<i>Diervilla floribunda</i>
Winged Burning Bush.....	<i>Euonymus alata</i>
Strawberry Tree.....	<i>Euonymus europaeus</i>
Silver Berry.....	<i>Eleagnus argenta</i>
Forsythia.....	<i>Forsythia intermedia</i>
Summer Snowball, Hardy Hydrangea.....	<i>Hydrangea arborescens</i>
Garden Hydrangea.....	<i>Hydrangea paniculata</i> gr.

Amur Privet.....	<i>Ligustrum amurense</i>
Regal's Privet.....	<i>Ligustrum Ibota</i> var.
Morrow's Honeysuckle.....	<i>Lonicera Morrowii</i>
Ruprecht's Honeysuckle.....	<i>Lonicera Ruprechtiana</i>
Tartarian Honeysuckle.....	<i>Lonicera tatarica</i>
Mock Orange.....	<i>Philadelphus coronarius grandiflora</i>
Mock Orange, large.....	<i>Philadelphus inodorus</i>
Lemoine's Philadelphus.....	<i>Philadelphus Lemoinei</i>
Russian Almond.....	<i>Prunus Nana</i>
Smoke Bush.....	<i>Rhus Cotinus</i>
Cutleaf Sumac.....	<i>Rhus typhina</i> and <i>glabra</i> var.
Alpine Currant.....	<i>Ribes alpinum</i>
Flowering Currant.....	<i>Ribes aureum</i>
Rose Acacia.....	<i>Robina hispida</i>
Japanese Rose.....	<i>Rosa rugosa</i>
Cutleaf Elder.....	<i>Sambucus canadensis</i> var. <i>acutiloba</i>
Golden Elder.....	<i>Sambucus nigra</i> var. <i>aurea</i>
Buffalo Berry.....	<i>Shepherdia argenta</i>
Hybrid Snow Garland.....	<i>Spirea arguta</i>
Billard's Spirea.....	<i>Spirea Billardii</i>
Bumalda Spirea.....	<i>Spirea Bumalda</i>
Callosa Spirea.....	<i>Spirea Callosa</i> <i>alba</i> and <i>rubra</i>
Douglas' Spirea.....	<i>Spirea Douglassii</i>
Van Houten's Spirea, Bridal Wreath.....	<i>Spirea Vanhouttei</i>
Persian Lilac.....	<i>Syringa persica</i>
Downy Lilac.....	<i>Syringa villosa</i>
Common Lilac.....	<i>Syringa vulgaris</i>
Wayfaring Tree.....	<i>Viburnum lantana</i>
Snowball.....	<i>Viburnum Opulus</i> var. <i>sterilis</i>
Dwarf Cranberry Tree.....	<i>Viburnum Opulus nanum</i>

ROSES

Hardy garden—*Rosa rugosa*, Harrison Yellow, Persian Yellow, Cabbage Rose, Michigan Prairie Rose, Madame Plantier, Conrad F. Meyer.

Hybrid perpetual (require winter protection)—Paul Neyron, Mrs. J. H. Laing, Gen. Jacqueminot, Marshall P. Wilder, Magna Charta, General Washington, Ulrich Brunner, John Hopper, Capt. Christy, Druschki, Baron Bonstettin.

Moss roses—Salet, Henry Martin, Crested Moss.

Climbers—Prairie Queen, Seven Sisters, Gem of the Prairie, Crimson Rambler, Dorothy Perkins, Excelsa, American Pillar.

COMPARATIVE HEIGHT AT MATURITY OF DIFFERENT SHRUBS

The height at maturity of the different species must be considered when planting in groups or borders. This will depend so much upon their environment that it is difficult to give the height in feet that any species may be expected to attain. When different kinds are planted under like conditions it may be assumed that relative heights will be maintained.

The following may serve as a partial guide in planting:

Dwarf, 2 to 4 feet

Alpine Currant	Callosa Spirea
Thunberg's Barberry	Meadow Sweet Spirea
Rose Acacia	Hardy Hydrangea (summer fl.)
Bumalda Spirea	

Medium, 4 to 8 feet

Japanese Rose	Mountain Maple
Silver Berry	Billard's Spirea
Garden Hydrangea	Douglas' Spirea
Morrow's Honeysuckle	Van Houten's Spirea
Missouri Currant	Persian Lilac

Tall, 8 to 12 feet, some kinds 15 feet

Weigela	Smoke Bush
Burning Bush	Buffalo Berry
Strawberry Tree	Common Lilac
Ruprecht's Honeysuckle	Snowball
Tartarian Honeysuckle	Wayfaring Tree
Mock Orange	Cutleaf Elder
Forsythia	Cutleaf Sumac

NATIVE SHRUBS SUITABLE FOR PLANTING ON HOME GROUNDS

<i>Common Name</i>	<i>Scientific Name</i>
New Jersey Tea.....	Ceanothus americanus
Button Bush.....	Cephalanthus occidentalis
Alternate Leaved Dogwood.....	Cornus alternifolia
Bailey's Dogwood.....	Cornus Baileyi
Round-leaved Dogwood.....	Cornus circinata
Grey Dogwood.....	Cornus paniculata
Red Osier Dogwood.....	Cornus stolonifera
Hazelnut.....	Corylus americana and rostrata
Leatherwood (Wickopy).....	Dirca palustris
Wahoo.....	Euonymus atropurpureus
Witch Hazel.....	Hamamelis virginiana
St. John's Wort.....	Hypericum pyramidatum
Winterberry (Holly).....	Ilex verticillata
Trailing Juniper.....	Juniperus procumbens
Ninebark.....	Physocarpus opulifolia
Hop Tree.....	Ptelea trifoliata
Dwarf Sumac.....	Rhus copalina
Smooth Sumac.....	Rhus glabra
Staghorn Sumac.....	Rhus typhina
Wild Rose (dwarf).....	Rosa blanda
Swamp Rose.....	Rosa carolina
Prairie Rose.....	Rosa setigera

Wild Rose.....	<i>Rosa humilis</i>
White-flowered Raspberry.....	<i>Rubus Nutkanus</i>
Purple-flowered Raspberry.....	<i>Rubus odoratus</i>
Common Elder.....	<i>Sambucus canadensis</i>
Scarlet Elder.....	<i>Sambucus racemosa</i>
Meadow Sweet.....	<i>Spirea salicifolia</i>
Bladder Nut.....	<i>Staphylea trifolia</i>
Snowberry.....	<i>Symphoricarpus racemosus</i>
Coral Berry, Indian Currant.....	<i>Symphoricarpus vulgaris</i>
Ground Hemlock.....	<i>Taxus canadensis</i>
Maple-leaved Viburnum.....	<i>Viburnum acerifolium</i>
Sheepberry.....	<i>Viburnum Lentago</i>
Arrow Wood.....	<i>Viburnum dentatum</i>
Bush Cranberry.....	<i>Viburnum americana</i>
Prickly Ash.....	<i>Zantoxylum americanum</i>

SIX SHRUBS FOR HOME GROUNDS

The following are all reliably hardy in any part of the state:

Common Lilac, Tartarian Honeysuckle, *Rosa Rugosa*, Mock Orange or *Syringa*, Van Houten's *Spirea* (Bridal Wreath), Thunberg's *Barberry*.

HARDY VINES

Virginia Creeper.....	<i>Ampelopsis quinquefolia</i> var.
Engleman's Ivy	<i>Ampelopsis quinquefolia</i> var. <i>Englemanii</i>
Japanese Clematis.....	<i>Clematis paniculata</i>
Native Clematis.....	<i>Clematis virginiana</i>
Trumpet Honeysuckle.....	<i>Lonicera sempervirens</i>
Wild Grape.....	<i>Vitis riparia</i>

EIGHT HARDY HERBACEOUS PERENNIALS

Phlox, Peony, Larkspur, Bleeding Heart, Lily of the Valley, Iris, Oriental Poppy, Shasta Daisy.

COMPARATIVE HEIGHT AT MATURITY OF NATIVE SHRUBS

Dwarf, 2 to 4 feet

Winterberry	Coral Berry
Trailing Juniper	Ground Hemlock
Prairie Rose	Maple leaved Viburnum
Wild Rose (dwarf)	New Jersey Tea
Snowberry	St. John's Wort
Hazelnut (<i>rostratum</i>)	Dwarf Cranberry Tree

Medium, 4 to 8 feet

Gray Dogwood	Leatherwood
Winterberry	Wild Rose (tall var.)
Swamp Rose	Arrow Wood
White fl. Raspberry	Hazelnut (<i>americanum</i>)
Purple fl. Raspberry	

Tall, 8 to 12 feet, some kinds to 20 feet

Button Bush	Ninebark
Round leaved Dogwood	Staghorn Sumac
Red Osier Dogwood	Dwarf Sumac
Bailey's Dogwood	Sheepberry
Common Elder	Bush Cranberry
Scarlet Elder	Prickly Ash
Bladder Nut	Hop Tree
Wahoo	Witch Hazel

SHRUBS REQUIRING PROTECTION

A list of shrubs all of which have been tested and found not entirely hardy without protection:

<i>Common Name</i>	<i>Scientific Name</i>
Bladder Senna.....	Colutea arborescens
Japanese Quince.....	Cydonia Japonica
Slender Deutzia.....	Deutzia gracilis
Goumi.....	Eleagnus longipes
Pearl Bush.....	Exochorda grandiflora
Golden Bell.....	Forsythia suspensa
Snowdrop Tree.....	Halesia tetraptera
Kerria.....	Kerria japonica
Common Privet.....	Ligustrum vulgare
Purple leaved Plum....	Prunus cerasifera var. (Prunus pissardi Hort.)
Flowering Almond.....	Prunus japonica
Flowering Plum (double).....	Prunus triloba
Tamarix.....	Tamarix var.
Thunberg's Spirea.....	Spirea Thunbergii

SHRUBS FOR SHADY PLACES

Alpine Currant	Flowering Currant
Elders	Privets
Ground Hemlock	Snowberry
Hydrangea (arborescens)	Viburnum (Maple leaved)
Indian Currant	Witch Hazel
Loniceras	

HARDY PERENNIALS

<i>Scientific Name</i>	<i>Common Name</i>
Achillea ptarmica, The Pearl or Boule de Nieve.....	Milfoil
Aquilegia, long spurred Hybrids and many varieties.....	Columbine
Boltonia, asteroides and latisquama.....	False Chamomile
Campanula Carpatica.....	_____
Campanula persicaefolia.....	Peach Bells
Chrysanthemum maximum.....	Shasta Daisy
Coreopsis lanceolata.....	Tickseed
Delphinium.....	Larkspur
Belladonna	Hybrids
Formosum	

Dianthus plumarius.....	Grass Pink
Gaillardia grandiflora.....	Blanket Flower
Gypsophila paniculata.....	Baby's Breath
Hemerocallis, several varieties.....	Day Lily
Iris, scores of varieties.....	Fleur-de-lis

Mad. Chereau	Queen of May
Honorabilis	pallida dalmatica
Silver King	orientalis blue

Lilium tigrinum.....	Tiger Lily
Lilium elegans.....	Garden Lily
Lilium dauricum.....	Garden Lily
Papaver Orientale.....	Oriental Poppy

Peony, many varieties—

Six good ones :

Rubra Superba, late red
Felix Crousse, Midseason red
Festiva Maxima, Early White
Grandiflora
Edulis Superba, Early pink
Officinales rubra plena

Phlox, many varieties.....Phlox

Seven good ones:

Elizabeth Campbell, Light salmon pink
Europea, White, carmine eye
Mrs. Jenkins, White
B. Compte, French purple
R. P. Struthers, Bright rosy red
Beranger, Delicate pink
Miss Lingard, Early white, pink eye

Platycodon grandiflorum.....	Balloon Flower
Pyrethrum Ulignosum.....	Giant Daisy
Pyrethrum roseum.....	Persian Daisy
Rudbeckia purpurea.....	Purple Cone Flower
Sedum spectabile.....	Stonewall
Veronica spicata.....	Speedwell

NATIVE PERENNIALS ADAPTED TO PLANTING IN HOME GROUNDS

<i>Scientific Name</i>	<i>Common Name</i>
Aster Novae Anglae.....	New England Aster
Anemone pennsylvanica.....	Prairie Anemone
Anemone Pulsatilla.....	Badger or Pasque Flower
Asclepias tuberosa.....	Butterfly Weed
Aquilegia canadensis.....	Columbine
Campanula rotundifolia.....	Harebell

Caltha palustris.....	Marsh Marigold
Dodecatheon media.....	Shooting Star
Eupatorium ageratoides.....	White Snakeroot
Euphorbia corollata.....	Flowering Spurge
Helenium autumnale.....	Sneezewort
Hydrophyllum canadense.....	Waterleaf
Liatris squarrosa.....	Blazing Star
Lilium canadense.....	Native Lily
Lilium Superbum.....	Turks Cap Lily
Lobelia cardinalis.....	Cardinal Lobelia
Mertensia Virginica.....	Lungwort
Phlox divaricata.....	Woods Phlox
Phlox pilosa.....	Prairie Phlox
Physostegia virginica.....	False Dragonhead
Polemonium reptans.....	Greek Valerian
Rudbeckia hirta.....	Black-eyed Susan
Tradescantia virginica.....	Spider Lily
Trillium grandiflorum.....	White Wake Robin
Veronica virginica.....	Speedwell
Viola pedata.....	Birdsfoot Violet

SPRING FLOWERING BULBS

Tulips, single dwarf early: Duc van Tholl, pink, scarlet and white, Tulips, medium season: Artus, red; Chrysolora, yellow; Cottage Maid, pink. Tulips, large flowering, late: Darwin, Gesneriana.

Hyacinth, single: Charles Dickens, pink; Baroness von Thuyll, white; Czar Peter, blue.

Narcissus (daffodil): Von Sion, double; Emperor, single; Poeticus and Ornatus.

Crocus: Mixed.

Tulips and other Holland bulbs for outdoor blooming planted in September or October will bloom early in spring.

BULBS FOR INDOOR CULTURE

Narcissus: Von Sion (double), Emperor, Princeps, Poeticus, Paper White, Chinese sacred lily.

Hyacinths: Any variety.

Bulbs for forcing should be potted in October or November and kept in a dark cellar for several weeks. When well rooted the pots may be brought to the light as desired for a succession of bloom. The Paper White and Chinese lily may be grown in water and do not require the "dark" treatment.

CONSTITUTION AND BY-LAWS
OF THE
WISCONSIN STATE HORTICULTURAL SOCIETY
(As amended January 13, 1921.)

With Brief Historical Outline

In November, 1853, a small group of Wisconsin fruit growers met in Whitewater and organized the Wisconsin Fruit Growers' Association. According to the scant records available this association flourished until the beginning of the Civil War.

September 29, 1865, a similar group which had been in attendance at the state fair held in Janesville met and organized the Wisconsin State Horticultural Society. The first officers were: President, B. F. Hopkins; vice presidents, one in each county named; secretary, J. C. Plumb; treasurer, F. C. Curtis; executive committee, Geo. J. Kellogg and L. P. Chandler.

For several years annual meetings were held at the same time and place as the meetings of the Agricultural Society and the proceedings printed in one volume.

In 1871 the society was granted a charter by the legislature and provision made for the publication of the reports of the society in a separate volume. From that time to the present the society has been a ward of the state, receiving state aid in return for which it has rendered a distinct service through the collection and dissemination of information on fruits, flowers and vegetables.

The society during its early years confined its efforts largely to the testing and selection of varieties suitable to our climate, an extremely important and valuable work.

The activities of the society have broadened from decade to decade through its more than half century of existence until it is now recognized as an important factor in the state's progress and as one of the most progressive and active organizations of its kind in the United States.

In 1904 the society departed from the plan followed by practically all horticultural societies of paying the secretary merely a nominal salary for nominal services and provided funds for a full time secretary and a central, permanent office. Probably no other step has exerted greater influence on the society than this.

From 1896 to 1901 the society published a monthly journal, *The Wisconsin Horticulturist*. The records fail to show why it was discontinued.

From 1906 to 1910 Bulletins were published at irregular intervals, nineteen in all, of quarto size ranging from 8 to 32 pages.

September, 1910, marked the birth of Wisconsin Horticulture, a 16-page monthly journal sent to members and exchanges only. The membership fees and advertising more than cover the expense of publication, leaving a handsome margin of profit.

Early records show that the society was active in promoting horticultural exhibits at the state fair and it appears that close relations existed between the society and the fair management until the early eighties, when a break occurred. Beginning with the 1904 state fair and to the present the society has again taken an active part in these exhibitions, expending in one year as high as one thousand dollars of its funds for an exhibit of fruit.

Relations with the Horticultural Department of the Agricultural College have been strengthened and the society and the department now work in perfect harmony.

In this brief outline much has necessarily been omitted; no mention has been made of the spirit, the soul, of the organization. A perusal of the reports of the society leaves the impression that the courage and tenacity of purpose of that little group of sturdy pioneers who met in Whitewater in 1853 has been transmitted to their followers and has been our guiding spirit until the present day. As out of the oaken glades, rich bottom lands and rolling clay terranes of our state there has been developed one of the richest agricultural domains in the world so have the men and women who have had the love of fruit and flowers in their hearts kept pace through a half century and more with the progress of events and have through the medium of the Wisconsin State Horticultural Society built up a splendid horticultural industry in our state.

FREDERIC CRANFIELD, *Secretary.*

CONSTITUTION.

Article 1. This Society shall be known as "The Wisconsin State Horticultural Society" and its location shall be at the city of Madison, Dane county, Wisconsin, where its principal office shall be maintained.

Article 2. The object of this Society shall be the advancement of the art and science of horticulture throughout the state.

Article 3. This Society is formed without capital stock.

Article 4. This Society shall consist of life members, annual members, honorary life members, and honorary annual members. The fee for membership shall be fixed by the Executive Committee.

Honorary annual members may, by vote, be elected and invited to participate in the proceedings of the Society. Honorary life members shall be elected by vote of the Society, and shall be distinguished for special merit in horticultural and kindred sciences, or shall confer some particular benefit upon the Society.

Article 5. The general officers of the Society shall be a President, Vice-President, Secretary-Treasurer to be known hereinafter as Secretary, and an Executive Committee, consisting of the foregoing officers and eleven additional members, a majority of whom shall constitute a quorum at any of its meetings.

The officers aforesaid, except the Secretary, shall be elected by ballot, at the annual meeting, and shall hold office for one year thereafter and until their respective successors are elected. The Secretary shall be appointed by the Executive Committee at its annual

meeting after the election of officers and shall hold office for one year thereafter or until his successor is appointed.

Article 6. The principal duties of the general officers shall be as follows:

The President shall preside at all meetings of the Society and of the Executive Committee, shall exercise a general supervision and control of the business and affairs of the Society, and shall sign all leases, deeds and instruments for the transfer, conveyance or assignment of the corporate property, and all contracts, papers and instruments necessary or convenient in the transaction of the business of the Society, and when necessary, acknowledge the same.

The Vice President shall act as President in case of the absence, disability or removal of the President.

The Secretary shall conduct the general correspondence of the Society and keep a record of the business and of the proceedings at all meetings of the Society and of the Executive Committee; he shall keep, safely and systematically, all books, records, papers and documents belonging or pertaining to the Society or the business thereof; he shall countersign all deeds, leases and conveyances, and, when necessary, acknowledge the same.

He shall receive and safely keep all moneys, notes, securities and property of the Society, which may come into his hands and shall pay out or dispose of the same only upon such terms and conditions as the Executive Committee may direct or the by-laws provide. He shall keep a correct account of all moneys received and disbursed and shall render such account of the same as shall be required by the Executive Committee or prescribed in the by-laws. And he shall execute a bond to the Society, in such sum, and with such sureties, as the Executive Committee shall approve, conditioned upon the faithful performance of his duties, and for the payment and delivery to his successor of all the moneys and property of the Society in his hands or under his control; which bond when approved shall be filed with the President.

The said officers shall perform such other additional duties as may be required and any of the duties and powers of said officers may be performed or exercised, as far as is lawful, by such other officers, persons or committees as the Executive Committee may provide.

Article 7. The Society shall hold its annual meeting for the election of officers, exhibition of fruits, and discussions, in the city of Madison, Wisconsin. Other meetings shall be held at such time and place as the Executive Committee may direct.

Article 8. Only persons holding memberships according to the regulations of the Society shall be members of it.

Article 9. This Constitution, with the accompanying By-Laws, may be amended, at any regular meeting of this Society by a two-thirds vote of the members present; provided that such amendment is presented in writing.

RULES AND BY-LAWS

Article I.—Membership.

Section 1. The Secretary shall decide upon all applications for membership in accordance with the Constitution and By-Laws of the Society.

Sec. 2. Any member maliciously or intentionally injuring or working in opposition to the Society or its purpose in promoting horticulture may upon return of his membership fee be summarily expelled.

Article II.—Meetings.

Section 1. The Executive Committee may fix the time and place for holding the annual meeting of the Society, if the last meeting thereof failed to do so, and may call such meeting by giving at least

thirty days' notice to each member. Such notice shall be given by the Secretary, by mailing the same, postage prepaid, to each member at his last known address.

Sec. 2. Notice of a special meeting shall be mailed to each member at his last known address by the Secretary at least six days before such meeting is to be held. Such notice shall state the business to be transacted and the date, hour and place of meeting, and no business other than that stated in the notice shall be considered at such meeting.

Article III.—Duties of Officers—The President.

Section 1. The President shall preside at all meetings of the Society and of the Executive Committee; he shall, with the advice of the Secretary, call all meetings of the Society if the Executive Committee fail so to do; he shall appoint the delegates to the meetings of the other State Horticultural Societies; he shall have a general supervision of the business and affairs of the Society, and he shall deliver an annual address upon some subject connected with horticulture.

Sec. 2. He shall sign and acknowledge all leases, deeds, and instruments for the conveyance or transfer of the Society's property; and all other contracts, papers and instruments necessary or convenient in transacting its business.

Sec. 3. In case of the absence from any cause of both the President and Vice President the members present, if a quorum, shall elect one of their number temporary president.

Article IV.—The Secretary.

Section 1. The Secretary shall attend to all the correspondence of the Society, he shall keep a correct and complete record of the business and of the proceedings at all meetings of the members and of the Executive Committee.

Sec. 2. He shall superintend the publication of the Reports of the Transactions of the Society and publish or cause to be published such special bulletins on timely and appropriate subjects and such special reports of the condition and results of experimental work in the Trial Orchards and Trial Stations as the Board of Managers may direct.

Sec. 3. He shall present a detailed report of the affairs of the Society at its annual meeting. He shall endeavor to secure reports from the various committees, and from local societies, of the condition and progress of horticulture throughout the state and report the same to the Society. It shall be his duty to make a report to the Governor of the State of the transaction of the Society according to the provisions of the statutes for state reports.

Sec. 4. He shall be superintendent of all Trial Orchards and Trial Stations. In that capacity he shall supervise the planting and cultivation of, and exercise general control over the same, subject to the directions of the Trial Orchard Committee.

Sec. 5. He shall engross in the general record book of the Society a true copy of the Constitution, Rules and By-Laws, and all amendments thereto and all resolutions of the Society and of the Executive Committee.

Sec. 6. He shall keep a record book in which shall be entered the names of all members of the Society from its organization, the place of residence, time of acquiring membership, and time of cessation of same.

Sec. 7. He shall notify all persons elected to office within ten days thereafter, if such persons were not present at the election.

Sec. 8. He shall keep a book in which a correct list of the property of the Society shall be entered. He shall draw all orders, checks, etc., ordered by the Executive Committee or Board of Managers and countersign the same when signed by the President.

Sec. 9. He shall keep a stub or record of all orders, checks, etc., drawn and delivered, showing the date and amount thereof and to whom and for what purpose the same was issued.

Sec. 10. He shall receive all fees for membership, and give proper receipts for the same.

Sec. 11. He shall, before entering upon the duties of his office, execute a bond to the Society in such sum and with such sureties as the Executive Committee may direct, conditioned as provided in the Constitution.

Sec. 12. He shall receive and be responsible for the safe keeping of all moneys, notes, securities, credits, etc., of any and every nature, belonging to the Society which shall come into his hands.

Sec. 13. He shall keep proper books of account and a true and complete record of all business transacted by him for the Society; he shall keep proper vouchers for all money disbursed and shall render such accounts and statements of the moneys received, disbursed and on hand, and generally of all matters pertaining to his office as the Executive Committee may require or the By-Laws direct.

Sec. 14. He shall disburse the money of the Society only on the written order of the President, countersigned by the Secretary, and shall make an annual report of the receipts and disbursements and furnish the President with a copy of the same on or before the first day of the annual meeting.

Article V.—The Executive Committee.

Section 1. The Executive Committee shall have the general care and management of the property, affairs, and business of the Society, and a majority of its members shall constitute a quorum. The President and Secretary of the Society shall be President and Secretary of the Executive Committee.

Sec. 2. Meetings of the Committee may be called by the President, the Secretary, or by the Secretary on the written request of five of its members.

Sec. 3. They shall fix the amount of the Secretary's bond, the number of his sureties and approve the same. They may require any other officer, agent, or employe of the Society to execute a bond and prescribe the amount and conditions thereof, and approve the same.

Sec. 4. They may prescribe such salary or compensation for any officer, agent, or employe of the Society as they may deem proper, but not for a longer term than until the next annual meeting of the members, nor shall any officer of the Society be entitled to or receive any benefit, salary or compensation for, on account of, or during the time that he may be absent beyond the boundaries of the state unless such absence was at the request and on behalf of said Society.

Sec. 5. The Executive Committee shall have the power to remove any officer for official misconduct or neglect of the duties of his office. In case of vacancy in any office, either by resignation, removal or otherwise, such vacancy shall be filled by appointment by the said Committee, but such person shall hold office only for the unexpired portion of the term.

Sec. 6. The Executive Committee shall make such rules and regulations for the conduct of the business of the Society, not inconsistent with law, the Constitution, or the Rules and By-Laws, as they shall deem expedient and for the best interests of the Society.

Article VI.—Committees.

Section 1. The President, Vice President and Secretary shall constitute a Board of Managers which may conduct any business deemed necessary for the Society in the absence of the Executive Committee.

All bills against the Society must be audited by the Board of Managers before being paid.

Sec. 2. Regular meetings of the Board of Managers, shall be held bi-monthly to audit accounts and transact other business; special meetings may be called by any member of the Board.

Sec. 3. The President shall annually appoint a Committee on Finance of three members, and one member of the committee on Trial Orchards and Trial Stations, of three members, to be appointed for a term of three years, and such other committees as may from time to time be necessary.

Sec. 4. It shall be the duty of the Finance Committee to settle with the Secretary and to examine and report upon all bills and claims against the Society which may have been presented and referred to them, provided, however, that no member of the Executive Committee shall be a member of the Finance Committee aforesaid.

Sec. 5. The Trial Orchard Committee shall have general control of the locating, planting and care of all Trial Orchards and Trial Stations, and may visit collectively each orchard and station once each year or oftener if deemed necessary. Meetings of the Committee may be called at any time by the President of the Society or by the Superintendent of Trial Orchards.

Article VII.—Miscellaneous.

Section 1. The foregoing Rules and By-Laws shall take effect and be in force from the date of their adoption.

AN OUTLINE OF THE WORK OF THE WISCONSIN STATE HORTICULTURAL SOCIETY

The Wisconsin State Horticultural Society conducts field work at eleven different points in the state as follows:

Baraboo, Holcombe, Pewaukee, Lake Geneva, Weston, Waupaca, Wisconsin Rapids, Onalaska, Milton Junction, Fort Atkinson and Menomonie.

A "Trial" Orchard is located at each of the five first-named places.

The Trial Orchard work was begun in 1897 at Wausau for the purpose of testing the hardiness and adaptability of the different varieties of tree fruits in the northern or "cut-over" regions of the state.

The orchard at Holcombe is a "Trial" Orchard, being for the purposes above indicated.

The remaining orchards are located in sections where tree fruits are known to thrive and are designed as "Model" or demonstration orchards to show the best methods of culture, best varieties for market, etc.

An account is opened with each of the "Model" orchards with the confident expectation that a decided margin of profit will be shown at the end of ten or twelve years. The orchards should then yield profitable crops for twenty years longer with but moderate expense for maintenance.

In the spring of 1921 four small fruit stations of one acre each were established. These are for the purpose of demonstrating best methods of cultivation of raspberries, blackberries, etc. The work is carried on in cooperation with the county agricultural agents. Four additional stations were established in 1922.

In these ways the Society hopes to demonstrate the possibilities of fruit growing in Wisconsin.

Additional Aims and Purposes of the Wisconsin State Horticultural Society

Organized in 1865, being the legitimate successor of the Western Fruit Growers' Association, which was organized in 1853.

Chartered by the State of Wisconsin in 1871.

Purely an educational institution.

Its purpose the advancement of every branch of horticulture throughout the state.

Aims to accomplish this through publications, individual help and conventions (two yearly).

Issues an annual report containing articles by experts on orchard culture, small fruit and vegetable gardening and the decoration of home grounds. Sent free to members.

Issues a monthly magazine, WISCONSIN HORTICULTURE, which is sent free to members.

We Answer Questions

Individual help is furnished through the Secretary who obtains from reliable sources information on any horticultural topic. No charge for such services.

Receives an annual appropriation from the state for the support of the field work and other activities.

Extends an urgent invitation, a promise of help and the hand of fellowship to all who want to learn about the growing of fruit, flowers or vegetables; to all who love the beautiful in nature a hearty welcome is assured.

Cordially invites every person in Wisconsin who wants to know something about fruit, flowers or vegetables, to become a member, as such persons are needed to help along the splendid work in which the Society is engaged.

FREDERIC CRANEFIELD,

Secretary W. S. H. S., Madison.

WISCONSIN HORTICULTURE

A **WISCONSIN MAGAZINE** published by the **WISCONSIN STATE HORTICULTURAL SOCIETY** containing each month articles on fruit, flower and vegetable growing written by **WISCONSIN** growers for **WISCONSIN** conditions.

In this respect it is in a class by itself, as horticultural papers published for profit must cover the whole country.

WISCONSIN HORTICULTURE is not published for the purpose of making money, but exclusively for the benefit of the people of Wisconsin.

It is better—for **WISCONSIN** people—than any other horticultural paper published. It tells the best varieties to plant in **WISCONSIN**, the best methods of cultivation for **WISCONSIN**. It's a paper for the home gardener and fruit grower as well as for the big grower.

"WE ANSWER QUESTIONS" is the slogan of the society. Every question answered, first by personal letter and then in the paper.

Every dollar received for fees (subscriptions) and advertising is put into the paper.

Honest nurserymen advertise in **WISCONSIN HORTICULTURE** and only that kind. The other kind cannot buy space.

The price, one dollar, includes membership in the **STATE HORTICULTURAL SOCIETY**.

No formal application necessary; send fee to secretary.

FREDERIC CRANFIELD,
Secretary W. S. H. S., Madison.

TRANSACTIONS
OF THE
WISCONSIN STATE HORTICULTURAL SOCIETY
ANNUAL CONVENTION, JANUARY, 1923

The annual convention of the Wisconsin State Horticultural Society was held in the Hearing Room of the Capitol Building, January 10, 11 and 12, 1923, President Christensen in the chair.

The meeting was called to order at 10:30 a. m. and the president introduced Governor Blaine, who spoke as follows:

ADDRESS OF WELCOME

BY GOVERNOR BLAINE

Mr. President, Ladies and Gentlemen of the Horticultural Society: I have just explained to the secretary that today is the opening of the legislative session, a very busy time, but notwithstanding that fact I am very glad to have this opportunity to come here and just briefly welcome you and wish for you and your deliberations success for yourselves, and as you gain success for yourselves, likewise credit the people of the state of Wisconsin and the state as a social organization.

There was a time before I became—I was going to say burdened, I am never burdened with anything, troubles always rest lightly on my shoulders, I try to get into that mental attitude—but before I was charged with these responsibilities the time was when I enjoyed rose culture, culture of the home yard, the culture of fruit, berries, all that is connected with your undertakings, and I think that the one thing that I regret, or, rather, the one thing that I miss most, is that opportunity to go out into the orchard and the rose garden to gather the inspiration that is bound to be gained from the culture of flowers and of fruit.

You are engaged in a splendid undertaking. I am not so familiar with the extent to which you have developed the marketing end of horticulture. I think today one of the greatest problems to be solved by those who are engaged in any horticultural

undertaking or agricultural undertaking is the question of marketing. You know the great corporations of the country, such as the steel trust, the oil trust and the machine trust, and those various monopolistic organizations have mobilized money through which they have gained the absolute monopolistic control of their output and they determine the price that will be received for their output. On the other hand, those who own as individuals, whether they are farmers in the broad sense, agriculturists in the broad sense or in some specialized sense, individually you own the farms, own the orchards, you own the individual products, that is your capital, that you cannot mobilize because of the individualistic character of the product; but when it comes to the marketing of the produce, it is possible for you to mobilize the things which you grow and which you raise through cooperative marketing and thereby gain the opportunity to determine what you shall receive as a fair price for your toil. So it has been my great desire, so far as it is within my power to assist in the mobilizing of the produce of the farm, whether it is horticulture, dairying or any other undertaking on the farm. To mobilize the products of the soil in great aggregations of cooperative marketing and thereby those who produce, will have the opportunity at least to direct marketing agencies for their products and bring about the possibility whereby you may determine, or have some decision in determining what you shall receive for your products.

Such a system will work out to the great benefit not only of the producer, but also of the consumer, because in the process of cooperative marketing you will eliminate wasteful processes that obtain in marketing, and the elimination of the waste will redound to the benefit alike of the producer and the consumer and therefore I always, at meetings such as this and of all groups where the product comes from the soil, have urged an earnest consideration of the mobilization of your products through cooperation and cooperative marketing. I trust that the fruit growers of this state will soon find themselves in a position where they will have mobilized cooperatively their products and thereby make it possible to deliver to the city dwellers the apples that now rot upon the ground, at a fair price to the men and women who are growing them and at a reasonable cost to the men, women and children, who want to eat them.

That is one of the wasteful things that we find in production today, the impossibility of finding an avenue through which these

things can be marketed. People in the cities today, men, women and children, are begging for fruit. On the other hand, we learned during the fall that much of the fruit is going to waste upon the ground, because there is no price for the product. There is no means to get it to the city consumer; there is no method by which you can market your product, except as you do it individually and that is a slow, burdensome, impossible proposition because you do not know who may be the one that wants the product, except in isolated cases, and therefore, if you are organized for your cooperative marketing, you can save to yourself all that which may be going to waste today, you can save as between you and the consumer, the wasteful agencies between you and the consumer and you could obtain a fair profit for all your produce rather than a small price for a part of your produce.

I speak of this because I am intensely interested in promoting the mobilization of the products of the soil through cooperative marketing.

BETTER FRUIT FROM WISCONSIN HOME ORCHARDS

J. M. COYNER, Jefferson County; R. T. GLASSCO, Rock County;
W. E. SPREITER, La Crosse County

MR. J. M. COYNER: After having heard the discussion by our Iowa friend on spray associations I have completely changed my subject. I take it that you men would not be interested, after hearing this good discussion of the problems of the farm orchard, as you would in the point of view of a county agent as to how the farm orchard since the coming of the spray ring is going to affect your market conditions.

We found, a year ago with four spray associations, we found ourselves with an embarrassing surplus. It seems perfectly ridiculous now, but it was not anything to laugh at then. I am going to tell you our experience in disposing of this surplus. We had 400 or 500 barrels of apples on our hands and did not know what to do with them and the merchants did not know either. Mr. Gifford said to us, "Now, you must invite your local merchants in to help you out on this proposition, because they are men in position to put this stuff over the counter to the consumers." We invited the merchants to come, sent out thirty-nine invitations. We staged what we thought was going to be a very big, spectacular grading demonstration, but not a single merchant came, and I tell you we were a pretty disappointed set of people when Mr. Gifford got there. I remember there was one old man had predicted at the farm institute when Mr. Gifford had proposed this spray association, he fairly shook his fist at Mr. Gifford and said, "Now here, we have been living here a long time and you just came to this county today, and we know well enough if we grow apples as you say we cannot sell them." This man was back again with more vehemence than ever and again shook his fist in Mr. Gifford's face, "It is just exactly what I told you if we went ahead and produced this kind of stuff, here we are and we cannot sell it."

Well, we adjourned our meeting. Mr. Gifford and I got out of there as quick as we could, while the getting was good. Going home Mr. Gifford said, "Now, look here, I am not staying here

tomorrow, but I will come back Saturday (that was about the middle of the week); you get two of our members and go to the nearest town—which happened to be Ft. Atkinson—go and see each one of these merchants and ask this question: 'Are you willing to give the Jefferson county apple growers the same chance, the same consideration that you give the Florida orange grower, the California orange grower, or the Alabama walnut grower?' We went around to every store in Ft. Atkinson and kept getting madder and madder. Finally we went to the biggest merchant, the man who handles the most fruit in town, very fine fellow, and these fellows were fighting mad and they said, "Now, look here, if you want us to buy your stuff, you must buy ours." I said, "Here, we have got to do something; these fellows are not getting a square deal in this proposition. Will you give us the same chance that you give the tropical fruit grower?" He said, "Heavens, yes, man, but what can I do?" I took Mr. Gifford's advice. I said, "Give us your best display window." He said, "You can have them all." The first thing we did was to clean that window—there were some fly specks on it—got it all ready, put in some decorations, got some signs. I said, "We will fill that window as full as we can fill it with apples, and they will not be your apples, they are ours, and if they are not out of there in a reasonable time there will be no hard feeling and those fellows will not send to Sears-Roebuck." We brought those apples in, filled the window, put up the sign; we did not put on "Jefferson county apples"—that would have been foolish—we called them "Wisconsin Sprayed and Graded Apples." We had a farmer's wife make some jelly. Somebody told us they would not make jelly, but they did; we had to put a little lemon with it, but we made the jelly just the same, and Mr. Gifford came over and all we had to do was to look on and those apples were sold before night.

Then the man that had a store in the next block called me up. He said, "Look here, are county agents hired to stand in my competitor's store and sell apples?" I said, "No, sir, not on your life. Those were not your competitor's apples, they were the farmers' apples. I will be down there right away and fix up your window and I will stand in your store and see what happens." So we fixed up his store and we fixed up another one and the news spread to Jefferson and we fixed up windows there, and it was not more than ten days until we had converted an embarrassing surplus into a shortage.

Well, you will say, that was all right two years ago, but why do not you talk about this past season? I am not talking about this past season now. We had more spray associations than we had before. We were wiser this year. After the June drop was over three of us went around and interviewed every merchant in Jefferson county, and we took samples of those small apples. We said, "Here is what is coming; what kind of service will you have to have to dispose of a big apple crop?" and they told us. We said, "Would you just as soon buy your vinegar from Wisconsin people as New York people," and they said "yes." "Where did you get your vinegar from?" They got it from New York. Now, we had a surplus three times last summer and fall. One was the first of August, when we shipped some apples to Milwaukee; we did not get much for them, but we got rid of them. We would have been better off if we had dumped them into Lake Michigan. We could have ground them up, but the cider mill men were not there to grind them, did not understand the law. We wrote to Madison, wrote the prohibition agents, even wrote to the W. C. T. U. to find an interpretation of the law on cider. We took those reports to the attorneys, and finally we decided to use a common-sense position and to go ahead and we said, "Make your cider for legitimate uses. Of course, there will come a time when that cider will have more than one-half of 1 per cent alcohol and the thing for you to do is to have good judgment and not to sell it." You will find 5 per cent alcohol in any man's cellar, but if he was quietly turning that into vinegar nobody is going to molest him. So we got the cider mills going and got rid of the surplus. You may be surprised, but it is true that along in August all that we had to wipe out in the way of surplus was about 200 bushels and we had the market stiffened up. Along the first of September there was an exhibit at the Jefferson County Fair and our market was stiffened up. Now it is the surplus that has to be wiped out.

Now I just want to sum up the things that I have been trying to say here this afternoon. The first thing is this, that it is a mistake to start out along the line of marketing and to disregard the man who is established. I think that is not only unnecessary, but it is unwise to attempt to replace a middleman who is doing an efficient and valuable marketing business. Second, I think that there ought to be a cooperation and coordination of effort all over the state, with the representatives of producers' associations and representatives of the State Horticultural Society, who know

something about the demand and probably surplus or shortage of fruit, not with the idea of establishing a monopolistic trust, but with the idea of directing that fruit to points of underconsumption and keep fruit away from points where there is a surplus and also opening up new markets for fruit.

We found this, that there are enough school children in our county to more than consume all the fruit that we can ever possibly raise, and I endeavored a few days ago to take this point up with the local merchants. I said, as to production of Jefferson county, apples decreased with the importation of outside apples and here is what they said: "So far as we can see now, the production of home-grown apples has not decreased our sales of imported apples at all, except for the poor grades of apples, but it has started a different method of buying. The consumers have been buying in bushels and in barrels, before they bought by pounds," and this man said that he thought from his experience as a grocer that the commercial grocer has been helped rather than hindered by the efforts of the cooperative spraying association.

DISCUSSION

QUESTION: We should like to know how much he got for those apples.

MR. COYNER: Year before last they averaged possibly \$2.00 a bushel; this last year they averaged pretty close to \$1.25.

QUESTION: Do you know how much it costs to do the spraying?

MR. COYNER: It costs approximately 30 cents a tree for chemicals and the labor of spraying. A year ago the expenses were practically the same as this year, for 1921 the expense for chemicals and labor was under 30 cents a tree. Our containers cost, net, all the way from 10 cents to 12 cents, using second-hand baskets, and the picking we have no figures on, nor the pruning. Eventually we must have those figures, otherwise we cannot establish any uniform cost of production.

MR. W. E. SPREITER: About two years ago we started in December organizing local horticultural clubs, the first one in La Crosse and the second one in North Ridge. We now have 10 local horticultural clubs with a total membership of 145. They consist mainly of school district organizations in the outlying districts of the county, far out from town where they really need extension work.

We feel that that is a very satisfactory beginning. We did not have quite the same trouble with our marketing that Mr. Coyner had in his county, and we did not go out in the same way to find a market for our product. Our largest orchard, which is an orchard of about 500 trees, is on a farm where they supply a hospital with their product, so there is no marketing question for those people. There is not any question in my mind but what the spraying work has done more to make the county agent solid in his county than any other thing that we have tackled. In the first place, the women are interested in the spray work, because since we have been doing that work they have good, clean fruit to use and they can see a direct benefit coming to them, which they sometimes cannot see when we are organizing cow-testing organizations and doing other live stock work. Our marketing work was not carried on according to any particular plan. We did not have much trouble, we did have some surplus, but just as soon as the fair started the people saw the difference between good, clean stock and the kind they had at home and in almost every case the farmers that had sprayed their fruit found a ready market among their neighbors. That is the way the greater part of our surplus fruit was taken care of and I do not think it has interfered one bit with any merchant's business in town or wholesale fruit dealers in the city of La Crosse, either, because the people out in the country were eating good, clean fruit that they got from their neighbors, when in other years they were picking worms out of the apples they had at home and getting along with very little fruit. I believe we have simply to build up a demand for good fruit, and I do not believe there is any organization that the county agent can use to better advantage in his county than the Horticultural Society and the local Horticultural Club, because it gets him in close contact with all the people in the community.

There is just one trouble that I have and that is keeping up with the work. I ought to be out on two or three jobs all the time to keep up with the demand. That is the biggest trouble that we have now, and there is not any question but what we can make our work in all lines mighty effective—you know the county agent is not hired to push the horticultural work any more than he is any other kind, but he is in the community to do anything he can to help all the people and I believe the local clubs are the best means through which he can work and I should like to see the State Horticultural Society push that particular kind of work, be-

cause I believe it will do more good to the people working through those local organizations than we can do by trying to work through individual efforts.

By R. T. GLASSCO: We have in La Crosse county ten local horticultural societies with a total of 145 members. Eight of these clubs staged fairs with a total of 2,834 entries and a total attendance of 1,690 people. In four other districts in which spraying and pruning had been done fairs were staged having a total of 335 entries and an attendance of 375. In seven districts where neither pruning nor spraying had been done fairs were held with a total of 580 entries and an attendance of 620.

Fourteen pruning demonstrations were held. There are ten spray rings with 74 farmers. Seven of them have power machines and three hand pumps. A total of 3,430 trees were sprayed, which produced about 2,900 bushels of apples.

I want to say Mr. Gifford is here. We owe a great deal to Mr. Gifford; he came down to Rock county two years ago. I am glad Mr. Gifford is here to hear what we have done in Rock county. We had eleven spray rings and we were warned, as Mr. Coyner was, that we would not be able to sell the fruit, but we sold it without any trouble. I remember the first spray ring member said, "I have 100 trees and I am not getting returns, what am I to do?" I had this little spray ring proposition to put up and I told him about it. Mr. Gifford came up and I told him, and he said, "I will invite twelve farmers in and organize a spray ring." I told the farmers, "You can take a spray gun and shoot up in that tree and spray it in three minutes." I put it over and I put it over so well that the farmers decided to buy a power outfit and they did, and they got results. There is a farmer in that spray ring who had 23 apple trees, rather small, and he got 300 bushels of nice apples and I went down there this summer and looked over those apples and we found 90 per cent marketable apples, we found 70 per cent of the apples were absolutely perfect, and I call that a pretty good result for one year's spraying. Another thing about these spray rings, it gives a farmer an opportunity to buy his spray material very cheaply. We bought the materials and sprayed them as cheaply as the farmer had been buying the spray before and we got lime-sulphur in barrel lots and we got arsenate of lead in big quantities and we absolutely could spray

those trees cheaper than the farmers could buy that material a year or two before.

I will say that we also fertilized the trees. You know a lot of farmers will not fertilize and we also showed them how to fertilize and how to spray. Mr. Roberts came down and we had a regular spraying jubilee, got all the farmers out and showed them how to spray trees and we were right on the job.

The first day was Friday and the question was, should we begin Friday or wait until Monday, but we decided to begin Friday, because if we waited until Monday we would not have been on time. There was one Seventh Day Adventist who sprayed on Sunday and he got his place sprayed on time. I will tell you about a merchant to whom we sold some apples. We went in to see him and he had fifteen baskets of apples that the farmers had brought in and he said, "I cannot sell those apples and here you want to sell me more apples." I said, "We will put in two baskets of our apples, sprayed and graded, and if you do not sell them we will take them back Saturday night." He called up next day and wanted more apples. We did not sell any apples for less than \$1.35 a bushel and they said they were selling those other apples at that time for 50 cents a bushel, that is, the grocery store was just loaded and that is the reason the price of our apples was lowered, not on account of having any sprayed and graded apples, because if we spray a man's orchard we intend to show him how to grade fruit at the same time. I certainly appreciate what the Horticultural Society has done for us and I certainly hope they will get more money so that they can send down more men. I put on twenty-six pruning demonstrations and fourteen to sixteen spraying demonstrations.

THE INFLUENCE OF THE HOME ORCHARDS ON COMMERCIAL FRUIT GROWING

BY M. B. GOFF

I have been asked to say something on this question this afternoon, from the standpoint of the commercial grower. I confess I do not know just where a commercial grower begins and a farm orchard man leaves off, but at any rate, from the standpoint of

grower in a commercial section where fruit growing is the principal livelihood of the man in the orchard business, some of you think that this problem may have a different appearance. I am going to express my own opinions. I am very conscious that they are not the opinions of many here today and glad of it, because there is nothing I like better than a good argument, so I trust that the other side may be brought out. I cannot take an antagonistic side to the work of the county agent; that will develop later in my talk.

Analyzing it from the standpoint of the commercial man, I am a little bit mercenary about it, I want to know what this farm orchard proposition is going to do for me and the products I have to sell; I want to know where the farm orchard is going to put me. This summer I had it rubbed in a little bit. We had a lot of apples at Sturgeon Bay, more and more as you know every year and we got into a period along the latter part of August or early September, when apples were not easy to move. I had the good fortune to spend two weeks in the upper and western part of Wisconsin and I saw more apples than I ever thought were grown in Wisconsin and I saw some good apples among them—not many, some. I was over there in the hope that possibly in some locality below Ashland and east of Minneapolis, there might be some town so unfortunate as to have no fruit, but I found every one of those towns had fruit, such as it was, and, driving in the daytime, I found the trees were loaded all through the country. In the trips that I made a little later in the fall, I found the condition was reversed, the trees were not loaded. Apparently much of the crop had fallen off and been consumed, or rotted. So the commercial man, at best, does not have much competition with the farm orchard later in the season—the competition comes early.

I was just asking one of the nurserymen who is present what per cent of sales of trees he made in the later varieties and he told me that the big sales, the biggest percentage in variety, were of the class of apples earlier than Wealthy to a considerable degree; in other words, the variety of selection is great enough in the farm orchards and the season is long enough so that when the earlier apples, earlier than Wealthy and including Wealthy, are disposed of, the competition for the commercial orchard is greatly decreased.

We come in competition with the farm orchard another way. In the first place, there are parts of Wisconsin where we never

seem to be able to ship any fruit. I found out this afternoon another reason why Rock county is one of those places where, with the exception of two or three carloads, I believe we never sent a carload of apples. We did not send them any this year. Nevertheless, I am convinced that it is not entirely Mr. Glassco's fault that we did not send them apples this year. Perhaps, as Mr. Coyner said, we will send them apples next year, following Mr. Coyner's logic on this. The commercial apple grower in Wisconsin has two markets, the market at his door, that is, his nearest neighbor and the people who stop along the road, and the people at a distance. The commercial man must sell to either one or the other or both, and it is a problem of distribution for the commercial man. If it were possible to prevent apples from being grown by anyone but myself, I could get a very satisfactory market for apples, the apples I have, but that is not possible, and as long as it is not possible I am not going to attempt it, consequently, as I see my problem, it is one of putting my apples where apples are not, as nearly as possible, and if my own local market is not big enough it is merely a problem of shipment, and as long as apples are grown it is a problem for me to find out where they are not so plentiful and ship there. I cannot see from the state of Wisconsin, judging from the shipments that we have been making from Sturgeon Bay, that the farm orchard has been any great competition to us, judging from year to year, that is, the *good* farm orchard, simply because in localities where the spray rings are operating we have never made shipments before. The apples have evidently come down there from these local orchards and the fact that they are now taking care of them does not concern me as a commercial man and does not worry me, because we have never had that market anyway. There was one thing that, I confess, stumped me a little bit. One of the objections that are sometimes offered by commercial fruit growers as a whole is this, that the ordinary farmer raising a little fruit in his door yard is not compelled to make a living cost out of that fruit and therefore sells it many times below the cost of production and makes the competition of the commercial grower impossible. That may be true, I do not know, but I have an idea that the farmer that raises a little fruit in his door yard, if he raises it well, is going to find that that fruit will bring enough to cover his cost and that cost cannot be very much below that of the commercial fruit grower.

But there is one form of competition that is serious to my mind and that does concern the commercial grower and, in so far as the farm orchard is responsible for that kind of competition, I should say this Society should use all its efforts to abolish that farm orchard and that is the competition of the inferior fruit. I do not need to dwell on it, but it is a fact, stated from the orchard standpoint, from the commercial standpoint if I can state it that way, that the poor farm fruit is the nigger in the woodpile on this proposition and that does not entirely relate to the orchard two acres in area, it relates to many of our competitors, possibly some of them in this city who, year after year, dump trainload after trainload of inferior fruit on the markets of our cities and then wonder why they do not get a living cost. I have been through fruit markets during the period when this fruit was coming in in enormous quantities, have been through warehouses from basement to garret and seen carload after carload of that stuff deteriorating, even rotting, before the commission man could get it out of the way, simply because each boatload and trainload brought more of the same fruit. Of course, people would not eat it. In so far as the farm orchard in Wisconsin is responsible for that kind of competition, I am against it. This Society should also be against that kind of orchard.

After all, the marketing of apples in this country is not a problem of overproduction. This year we had an enormous crop. It could not be consumed at a profit to many fruit growers, and yet, according to figures which I was able to secure this morning upstairs in this building, each person in the United States at present eats an apple every five days. Some of you people present eat more than an apple once in five days, so some poor fellows do not eat them that often. Then we have a problem present there, have we not, a problem that accuses us of the worst and most foolish policy. Is it not an accusation, under which we should hold our heads in shame, to think that we are complaining about our market, that we are worrying about the little farm orchard here and there, scattered all over everywhere, when the people of the United States do not eat more than an apple every five days per person? If I were not sure of those figures I would not dare give them, because I can scarcely believe them myself, but the figures I believe are very close to right—one apple for each person every five days.

Some of you are familiar with the California orange industry in its various stages and remember that about 1893 the orange industry of California was getting red ink on its freight bills, had to send money to pay up the freight bills because the fruit did not bring the cost of transportation, and you remember that at that time the California orange industry was in danger of going out of existence and the men were at the point of despair. What has happened today? Since that period the population of this country has increased just slightly less than 50 per cent and yet the consumption of oranges today is at such a point that you and I go to the store and buy them singly and by the dozen; we do not think of buying by the bushel as we do apples, and during that same period that the population has only increased 50 per cent the California production of oranges has increased 250 per cent and yet we buy them by the dozen and think that we have to buy them, and so we do. We might take a cue from the orange men, but the problem is not so easy with apples. The problems are radically different, but it is easy to the extent that it is easy to teach the public to eat fruit if they can get the fruit they want.

The other day I was riding on a railway train and I had, as I always have when traveling, apples in my grip for my own use. A traveling man saw some of the apples and he said, "Why is it I cannot get apples like that?" He told me his experience and his wife's experience; it is the same story everywhere, that his family would buy fruit and plenty of it if they could get fruit such as I had in my grip and they were just ordinary apples, such as we consider good, equal to A grade. When we can get fruit to the people of Wisconsin in the small towns, along the roadside, in the larger cities, fruit that is fit to eat, that will stand in the field of apples as oranges stand, our problem of consumption, our problem of marketing, will have vanished.

During the last ten or fifteen years, according to figures which I consider approximately correct, the commercial apple acreage of the United States has decreased something like 20 per cent, actually decreased in acreage; production meanwhile has increased somewhat, so that the decrease in acreage is approximately made up by the increase in production per tree. Notwithstanding that fact, the apple production at present is stationary, practically identical with the production through an average of a long period, even with the country growing as it is, with the consuming and spending power of the population increasing as it

is—then we wonder why apples cannot be marketed at a profit and are worrying about the little farm orchard of which we were speaking this afternoon. What should be the attitude of the fruit grower toward this problem and what should be the attitude of the commercial man toward an industry which seems to have in prospect a large number of new members?

Familiar with the county agent's efforts, as you are this afternoon, you can see that they are not going to stop; they are going ahead; they have heard of something that is a real live animal and they are not going to let go of it until they have it paying and that means that, whether we will or no, the fruit industry in Wisconsin is now in a position where it is going to see rapid expansion. I believe that we are coming to the time when the state of Wisconsin will rank among fruit growing states, when the vast western wilderness of which the old settlers used to tell and of which we see descriptions in their diaries, when that vast western wilderness will have become a part in the United States equal in ability as a fruit-producing section with that of the older eastern portion.

The other day I was reading a manuscript of my father's—I think, from the text, it must have been delivered as an address about 1892 in this Society. At that time he mentioned the thing which, it seems to me, has perhaps been responsible for a great many of the woes of the fruit grower—that today is responsible for the inefficiency of the orchard industry—it was this: That he was satisfied, after seeing the fruit growing sections, or sections containing fruit growing possibilities in many parts of this state, that Wisconsin could absolutely become a great fruit growing state, where fruit might be grown with as great profit as in many eastern parts of the country, but so far the industry had been retarded, due to the fact that it was thought necessary to experiment with an infinite number of inferior varieties, with the result that the industry as a whole had not achieved results in any one variety or any one field. I believe that sums up the whole thing. There is no responsibility on the part of the consuming public to buy any fool variety that you and I may want to plant. If they do not get something that they want we have no right to expect them to pay out good money to buy it. If we put on the market an acceptable product which the people want and then tell them about it, the people will buy it. It is merely to get at what the public

wants and the grower has himself to thank because the dear public will not buy the stuff that he produces. The commercial man, instead of being afraid of the small farm orchard, should in time welcome to the ranks these men who want to take care of their trees and to spray and prune them. The time is coming when the commercial man will be important enough to the fruit industry of Wisconsin practically to have taught the people everywhere that good apples can be had, so why buy poor ones? Then the cull market will take care of itself. Then repressive measures can be had, if necessary, to see that good fruit gets on the market and poor fruit is eliminated. A strongly organized horticultural industry in Wisconsin can do for those who are in the industry exactly what Professor Moore suggested this morning; that he would like to have this Society accomplish, what every industry in the state is doing, which does not gather its forces together and work for those things which will bring it benefit, whether it is legislation, whether more money expended by agencies for research, whether it is better trade practice, whatever it is.

The fruit growers, for the first time, I believe, in the history of this state, are opening a program which has been made very greatly in their behalf, more than I believe is fair to the rest of the horticultural industry. This is the very thing that has been brought out this afternoon, and shows the situation of the fruit industry in Wisconsin. It is coming, it is growing, it is not centralized in one place, it is bound to become an important element in our production and we, as commercial men, should maintain the integrity of proper fruit production, teaching the public that good fruit can be had and that good fruit is the only fruit that it pays to grow.

PRESIDENT'S ADDRESS

H. C. CHRISTENSEN

We are met in our annual convention—1922 has passed into history and 1923 is in the making. By a thorough discussion of the experiences and problems of the past year, we hope to make 1923 a better year in horticulture than the preceding one.

Because of favorable weather conditions, 1922 was a bounteous year as far as crops were concerned but prices were comparatively low, lower in fact than production warranted. A glut in both the fruit and vegetable markets in early summer gave many the impression that such a condition would continue and consequently, fall crops were disposed of early at a lower price than the later market should have commanded.

As "No man liveth unto himself," so no organization can live unto itself and wholly fulfill its mission. We as horticulturalists have interests that are common to all and these interests can best be served by our Society. Then there is the large non-professional class whose interest in horticulture is no small asset in its development and whose needs should be met.

So let us work for a larger and more efficient Wisconsin State Horticultural Society which shall make for the future, as it has in the past, a high standard for horticulture in our favored state. Our secretary in his report will give you a summary of the work done through the Society during the past year and will outline the work for the coming year.

Our apple growers have learned that with quality fruit and the present high freight rates, they do not need to fear the competition of the eastern or western grower. While there may be a surplus of early apples, the time is still distant when we shall be able even to supply our own needs in the way of late fall and early winter apples. Of late years the methods of culture and the list of commercial varieties has been pretty well standardized and information along this line is available to all who desire it. In the matter of marketing we are still in the experimental stage but our experts are tackling this problem and will discover better methods of disposing of our crops. We have

at least arrived at the stage where we realize that it is only through cooperation that we can attain the greatest efficiency in marketing.

In view of the great growth of the various horticultural interests of our state, what relation shall our Society sustain to these interests? The florists already have a large organization, the commercial fruit growers are perfecting their organization at this meeting; the nurserymen are discussing a like action and I hope the time is not far distant when the vegetable growers will be fully organized. Other states have their peony, iris, rose and other societies.

Some may say, what further need is there of a State Horticultural Society with all these different organizations to care for their various needs. It seems to me that our Society has a large place to fill as a sort of clearing house. We are talking cooperation and organization of growers in the different sections of the state, according to their needs and close cooperation of these organizations that success may be attained.

Looking backward we see that our Society has always changed to meet changing conditions in horticulture in the state without in any way sacrificing our cherished principles or our determination to keep the State Horticultural Society a common meeting ground for all who are working to advance horticultural interests. I see no reason why we cannot continue along the broad lines we have laid down and stand in the future as we have in the past serving alike all horticultural interests to the benefit of all.

Thursday Morning Session

REPORT OF SECRETARY

(From Reporter's Transcript.)

I think you will agree with me that in the eighteen years that I have been able to serve you as secretary I have not done much boasting about our Society, but it has been urged upon me for the past year or two that we should say more about what has been accomplished; that we should be better advertisers, I am not sure but that is right, but I will tell you more or less briefly some of the things that we have done in the last twenty years, although my connection extends through but eighteen

years. If I make rash statements, those that will not hold up, I want you to correct me.

This Society has been responsible for the development of commercial horticulture in Wisconsin, with the exception of the beginning in Door county. Door county stands in a class by itself so far as the development of commercial horticulture is concerned, and we lay no great claims to the development there. Twenty years ago, aside from the mere beginning in Door county, there was no commercial horticulture in Wisconsin. It is wholly through the influence of this Society that it has developed. I am not going into figures of acreage, or anything of that sort; those are on record in other departments, but will rely on general statements.

Twenty years ago the state of Wisconsin was overrun with fakers and humbugs, crooked nursery agents and other crooks preying on the people. We were infested with a class of people who were out to get the people's money. Today Wisconsin is clear of that sort of thing. If you know of any such work, bring it to our attention. That clean-up work was initiated and carried through by this Society. I have here a bundle of papers not designed for public inspection that have been held in my desk for years; they relate to fraudulent orchard sale practices, to fraudulent nursery practices, fraudulent insecticides, here in this envelope—it is getting yellow with age, it has been in my desk since 1910. These documents represent but a small part of the fraud uncovered. We began to investigate and we found conditions worse than we at first realized. We could not understand how a reputable nurseryman could stay in business in the state. These fraudulent nursery companies were not Wisconsin companies, with three exceptions; there were three firms operating as Wisconsin nurserymen who have since been driven out of the state. We prosecuted, we brought them before the courts; one man, by the turn of my hand, I could have sent to state's prison for ten years. His attorney asked me what to do with that man. I replied that I wanted him to get out of the state of Wisconsin and keep out forever, and he did.

We have not told you about these things, we have not boasted about them, we have kept on quietly sawing wood, as the saying is, and doing the work that was to be done. Among the big things we encountered was the seedless apple fakers and I want to warn the people of the state that that fake is about due again.

The seedless apple was being exploited in the west and companies were being organized in the state of Wisconsin to sell the seedless apple. A bigger humbug never appeared on the horizon. We swept it out of the state. It is due again. About every twenty years the seedless apple comes in. These were fraudulent contracts, and we annulled them and we compelled the promoters to get out of the state. Here are the documents, if anyone questions my statements.

From 1906 to 1912 came to us Professor Sanders who took up that work and finished it. I want to give Professor Sanders full credit for the follow-up work he did on that line, but keep in mind that this Society opened the ball. In 1908 we found there was no horticultural work worth mentioning being done in the farm institutes. The farm institutes pleaded lack of trained men to do the work. We said, "We will give you both the funds and men." We gave the money and trained the men for horticulture in the farm institutes. For three years we donated to the farm institute department \$500 a year. We got together a group of young men and trained them as speakers and put them in the farm institutes, and then we said to the farm institute manager, "If you cannot stand on your own feet you will have to fall down." The management did not fall down and as a result we have a place in institute work.

In 1908 we found the county fair premium lists in the state of Wisconsin in a wretched condition. We found an apple with a white skin listed in more than one county fair as the Snow apple because it was "white as snow" on the outside. I simply cite this one absurdity. We collected premium lists from all the county fairs in the state of Wisconsin and we had a committee sitting in my office for days at a time revising these lists. We sent them back to the counties and over half the counties adopted the revised lists. Our board of managers appointed a set of judges in 1909, and twenty-six fairs were supplied with judges by the State Horticultural Society without any expense to the fairs. For three years following the same work was done. Then we said to the county fairs, "If you cannot walk alone, you must fall."

These are only a few of the things we have done.

In 1909 we attempted the gigantic task of improving the public school grounds of Wisconsin. They were and are yet in a deplorable condition. We attempted improvement by prepar-

ing planting plans for school grounds and in many cases furnished trees and shrubs free to the schools. We failed, because we did not tackle the problem from the right end. The work has not been done yet, we hope that it will not be left to us to do, we want to appoint others who are better equipped with money and men to do that work, but we made an attempt.

In 1910, or even as late as 1911, nothing was known of the country north of Sturgeon Bay. Orchards were clustered around the city of Sturgeon Bay, but in 1911 we went north of Sturgeon Bay. A group of twelve including university professors and fruit growers from the southern as well as northern Wisconsin traveled by motor truck from Sturgeon Bay to Ellison Bay. Until that time Egg Harbor was the northern limit of orchard planting. After that, not wholly but largely as the result of that visit, fruit growing north of Sturgeon Bay developed rapidly. We showed a few people of the state that there was fruit land north of Sturgeon Bay and there is still available fruit land there. In 1912 we undertook an orchard survey but with limited funds. We were fortunate in securing the services of a man fully capable of doing that work, and he did splendid work, but with the amount of money we had on hand at the time we could only touch the high spots, but before the end of the year we knew more about the orchards of Door, Sauk, Manitowoc, and Bayfield counties than the owners themselves. We had every tree tagged and numbered, the age of the tree, the variety, etcetera, both apples and cherries, distance from market, whether or not there was a spray pump in the orchard, and various other facts which have been of valuable assistance to us in our work. In 1917 this Society was instrumental in placing on the statute books the first apple-grading law enacted in Wisconsin, and we were roundly cursed for it by farm orchard growers for the first two years. Your secretary met with a group of men of national importance in St. Louis, such men as Brand and Dunlap and others, for the purpose of framing a law which we first expected to push as a national law. Each of us went home with instructions to put that law across in his state legislature. Wisconsin was the only state of the group at St. Louis that made good. The grading law has been changed as it rightly should be changed; it has been shifted from one department to another, and it rests now in the Division of Markets. Do not forget, fellow members, that the State Horticultural Society initiated apple grading in

the state of Wisconsin. Later through our influence the chair of Plant Pathology in the University of Wisconsin was established. There was a Department of Horticulture, there was no plant pathology or entomology. We introduced a bill to establish this department and we pushed it through, enabling the university to establish the chair of plant pathology, as later we did that of state entomologist. Records prove what I say.

In 1918 the State Council of Defense delegated to this Society conduct of the garden work over the whole state of Wisconsin. It was a high compliment that we were selected to do the work.

We have done a certain amount of work in introducing small fruits. We have tried to do that in the best way we knew how. This all was in addition to our regular work, from year to year, from day to day, work of correspondence, carrying on trial orchards, the main work of our organization, and cooperation with the Division of Horticulture.

At this point I want to say, and say as emphatically as I can, none of these things that I have mentioned could have been accomplished without the hearty cooperation of such men as Professors J. G. Moore, L. R. Jones, G. W. Keitt, S. B. Fracker, and the members of these departments with whom we worked. We could not have done it alone. In legislation we have become skilled through long years of practice. No suggestion of politics or anything else. We simply know the mode of procedure and that is all there is to it, if you have got a good cause. If you have not, do not come before the state legislature of Wisconsin, now or at any other time.

We tried to keep in touch with the press, and for years sent out monthly, sometimes weekly, items to 600 newspapers in the state of Wisconsin.

Do not worry about the future of fruit growing in Wisconsin. We have fine opportunities in the state; the proof of that is down in the rotunda. In all our work we have aimed that there should be no duplication of effort. All work that has been undertaken has only been after consultation with the heads of the interested departments of the College of Agriculture.

The farm orchard presents serious problems, more perhaps than many of us realize. Some of these problems were discussed yesterday at length. Others will be discussed later in the session so that I need not say much about that except I should like to

put it somewhat on the basis of a warning that this question of the farm orchard presents one of the most serious problems that we have met in the history of our Society. Let us go to the bottom; let us do the work right and do it well. Let the horticultural societies stand foremost in the ranks of helping to solve that problem, and let it be known to all the people of the state that we are ready and willing to help and without prejudice, both the commercial fruit grower or the amateur.

We have not done much in vegetable growing. This is a difficult task. We have no large vegetable industry as they have in Minnesota or Illinois. It has been difficult to organize the vegetable growing industry because it is scattered—it is in the hands of people scattered all over the state. Our vegetable gardens range from one-eighth acre to one hundred acres, possibly more, but we have been in hopes that we would be able to organize this industry, that we would be able to do it in the same measure that we have done in apple and cherry growing. The first step is, to send a competent man to northern Illinois and southeastern Wisconsin to make a survey of vegetable growing in that region. We have millions of people in the southeastern part of the state and we have millions coming, not within my time, perhaps not within the time of any person in this room, but sooner or later the time will come when Milwaukee will extend to Chicago, and instead of ten million we will have fifty million people in that region. Let us be awake to the opportunity of feeding these people. Who will do it? Only the horticulturists.

I have spoken more or less of the amateurs. I want to say that the amateur member of the Horticultural Society is the backbone of the Society, that our amateur membership is that which we must depend upon, which we must look to for our help at all times for encouragement. There should never be a moment when we should neglect for an instant the wants and needs of the amateur, whether he be an amateur fruit grower, flower grower or vegetable grower. Ours is an educational institution, founded upon that principle. Ours is quite as fully an educational institution as the University of Wisconsin, but in a lesser degree.

Now, then, a situation has arisen, I will not say a crisis, but a situation has arisen which we are trying to face the best we can. I am sure we are big enough and strong enough to solve that question satisfactorily. It is this question, can we ride two horses at one time? I believe we can, I know we can, with the help

and consideration of all parties interested. There must be no feeling of hostility on the part of the commercial fruit growers toward the amateurs, there must be no hostile feeling on the part of the amateurs toward commercial fruit growers, each must recognize this, that their work goes hand in hand. We must all recognize that it is necessary on this program to have a place for amateurs and a place for the commercial fruit growers; we must give to the commercial fruit growers such things as they want and as they have a right to demand and as lies within our powers to give. The amateurs will always come to us. In this connection I want to say that the commercial fruit growers have not always come to this Society for the aid which we have been able to give them. I am sure they will in the future. It is not a question of money that we can give them, it is a question of the influence and prestige an association of fifty-five years' standing and a power and strength in the state of Wisconsin. Whether or not there are any who doubt the Wisconsin State Horticultural Society is in a position to exert great influence and a force and power in the state of Wisconsin in matters of legislation and in shaping public opinion.

I find in notation here to say that we should educate nurserymen, and, following it, "of other states." So the sentence reads: "Educate nurserymen of other states." I think that statement may go without further comment, except that last summer I traveled through the north end of the state, right along Lake Superior, climbed up on a haystack at the nearest settler's cabin, looked north and looked right down into Lake Superior. I found in that section several hundred farmers, not settlers, farmers, men of considerable means, who have come in there, and nurserymen, from other states, had come in and "done them good." That is a phrase I like to use, it is not good English, but they were all "done," if you want to put it that way, on the varieties of apples which they were induced to buy. Those were sold by nurserymen from outside of the state of Wisconsin. They were selling varieties that were not adapted to the region, and so we ought to educate the nurserymen of other states.

There is much else besides. I wanted to speak of the American Pomological Society, and say that it is something that we need, that we as a horticultural society must have in our work and we should give encouragement to it as far as we possibly can in the line of membership and in other ways.

I cannot close without extending to you my sincere thanks that I have had the opportunity to do this work.

THE KICKAPOO ORCHARD SECTION

M. J. HOVEY

"The Trial Orchard," now known as the "Gays Mills Fruit Farm," was started in 1908, there being three hundred seventy-five trees planted that year. The varieties being Northwestern Greenings, Newell, Mackintosh, McMann and Wealthy.

Three years later additional plantings were made and an orchard of eighty acres was completed during 1911, 1912 and 1913. During 1913 and 1914 eleven other orchard tracts were started and the planting of these tracts was completed during 1914, 1915 and 1916. Some additional plantings were made during 1920, 1921, 1922 and 1923. At the present time there are the following number of trees of the different varieties:

Mackintosh, 7571; Northwestern Greenings, 1432; Newell, 225; McMahan, 2254; Wealthy, 8291; Duchess, 340; Tetofsky, 150; Snow, 6981; Talman Sweet, 103; Raspberry, 150; Jonathan, 427; Winesap, 376; Dudley, 5404; Wolf River, 250; Delicious, 635; Salome, 1662; Hyslop Crab, 162; Wagner, 804; Ben Davis, 1060; Windsor Chief, 340; Golden Russet, 135; Cherries, 4476; Plums, 475, and Grapes two and three-quarter acres. Total, 650 acres.

Up to the present time the work has been largely that of the developing of the orchards, although some fruit has been gathered each year for the past five or six years. In 1921 there were 1,250 bushels marketed. In 1922 there were 10,580 bushels of apples marketed.

FACTS ABOUT DOOR COUNTY ORCHARDS

ARNO WITTICH

Mr. President and Members of the Wisconsin State Horticultural Society:

It is somewhat of an injustice, both toward the subject I was allotted and toward myself, to ask for the *absolute facts*

about so large an area of orchard country and from so young a fruit grower as I am. However, our secretary had set his mind on having me do this and we all know that there is no withstanding his most pleasant way of approaching us in such matters.

A bit of history concerning our orchards may be of interest. The earliest farm orchards were set out in 1862 by Joseph Zettle and Robert Laurie. At the time of the first Door County Fair, October, 1869, Mr. Laurie was able to exhibit thirteen varieties of apples from his orchard that brought him much praise.

The year 1866 marked the beginning of the first commercial orchards on a small scale. Large quantities of fruit trees were shipped into the country by J. J. Pinney and sold to various farmers, the largest investor again being Mr. Zettle. In 1892 this orchardist then harvested 3,000 bushels of apples and in 1893 displayed twenty different varieties of his apples at the Chicago World's Fair.

Mr. Zettle's achievements in fruit production soon attracted some outsiders, chief among them being A. S. Hatch, a large commercial fruit grower of Richland county, and Professor E. S. Goff, then professor of horticulture at the University of Wisconsin. These men became impressed with the favorable soil and climatic conditions as shown by small plantings and by Mr. Zettle's experience of not having suffered any losses from killing frosts in forty years. These two men then purchased eighty acres of wild land one mile north of Sturgeon Bay and by 1893 were able to set out six acres of European and Japanese plums, some mixed cherries and pears and 50,000 apple grafts.

In 1894 and 1895 they added ten acres of plums, more apple grafts and many strawberry plants, and in 1896 they began to plant the sour cherry which was to become such a famous factor in the industries of Door county. Only three acres were set out the first year; also eight acres of apples, chief among which was one, then unknown to this section, but now one of the leading varieties, namely the Wealthy.

W. I. Lawrence and A. W. Lawrence then followed with small plantings. The five acres originally set out by A. W. Lawrence, after several years of neglect and later, more systematic treatment, soon became the most profitable and famous orchard in the county.

In 1898 Professor Goff withdrew from the Goff-Hatch partnership and D. E. Bingham took up the work with Mr. Hatch, continuing to plant trees and operate the nursery from which most of the important orchards in the county got their first plantings.

The first commercial plantings in the northern part of the county were made by L. D. Thorp at Egg Harbor, in 1894, the settings being mostly summer apple trees for which there was little demand at that time. H. R. Holand set out six acres of winter apples at Ephraim in 1899 and in 1903. Dr. Eames began his plantings at Egg Harbor which soon became very extensive.

About this same time, large orchards were being set out near Sturgeon Bay by Mr. William Marshall, D. E. Bingham, N. C. Jacobs and George Christianson. This work continued for several years until the wonderful yields in the orchards of Hatch, Bingham and the two Lawrences in 1908, 1909 and 1910, resulted in the great fruit growing "boom" which began in 1908 and lasted several years. Two-year-old fruit trees were being hauled in large wagon loads to numerous newly cleared orchard sites. Large areas of wild land were rapidly cleared and planted. Here, rock ledges were blasted to make room for the tree roots and there holes were jabbed into the soil with crowbars so that trees might be set. In some cases where the prospective fruit grower was too impatient, he bought up older plantings at \$500 to \$1,000 per acre.

The larger orchard tracts were set out chiefly by large corporations, the first being the Sturgeon Bay Orchard and Nursery Company that started with forty acres of sour cherries in 1910 and by 1917 had 160 acres of cherries and apples. The second was the Cooperative Orchards Company tracts that consisted of 200 acres of sour cherries in 1911 and by 1917 had grown to 700 acres, the largest solid block of sour cherry orchard in the world. The Reynolds Preserving Company were next with sixty acres of cherries in 1911, increasing their plantings to 200 acres by 1917. The Ellison Bay Orchard Company set out fifty-six acres of cherries in 1911 and increased their acreage to 210 acres by 1917, most of the later plantings being apple trees. The Peninsula Fruit Farm started with 110 acres of cherries and apples in 1912 and by 1917 had 210 acres. The Sturgeon Bay Fruit Company and the Cady Land Company each had about eighty acres of cherries and apples and many others

had more than fifty acres, so that the totals in 1917 amounted to 2,870 acres of cherries, chiefly Montmorency and Early Richmond varieties and 1,359 acres of apples under the following varieties: Wealthy, 385.5 acres; McIntosh, 257 acres; Northwestern Greenings, 173 acres; Fameuse, 74.2 acres; Duchess, 57.3 acres; Dudley, 51.4 acres; McMahan, 48.6 acres; Wolf Rivers, 42.9 acres; Windsor, 18.6 acres, and 250 acres in other odd varieties.

Data collected from the 325 growers in the county showed a slight decrease in the acreage of cherries from 1917 to 1921, the total at this time being only 2,500 acres. This decrease was doubtless due to the destruction of some of the smaller orchards through neglect. The apple orchards, on the other hand, showed an increase of 141 acres from 1917 to 1921.

The season of 1922 marked another year of large plantings. During the spring 500 acres of young cherry trees were set out and according to purchases of nursery stock during the fall of the same year, some 700 acres will be planted to cherry trees in 1923.

Favorable soil and climatic conditions combine to give Door county marked advantages over the rest of the state for the production of fruit. The modifying influence of water and ice of Lake Michigan and Green Bay give us a backward spring, thus retarding the blossoming time until danger of heavy spring frosts is over. During the fall the surrounding waters again tend to modify the temperature so that the leaves remain on the trees longer and are better able to complete their work of ripening the new growth, hardening the buds and storing surplus food for spring use.

The soil, in all but the southern part of the county is very suitable for fruit growing, being a light sandy loam underlaid by a porous limestone. The treatment of the soil in the orchards consists mostly of thorough cultivation. Especially is this true of the orchards where the turning under of the old diseased leaves is a great factor in the control of the dreaded shot-hole fungus that annually reaps its harvest of yellow leaves, very often during the time when the fruit is about to ripen, thus causing great loss. In practically all orchards of twenty acres or more, the tractor is used as power to draw heavy double discs and spring-toothed harrows. Better work is done close to the base of the trees and with less injury to the tender growth of the lower

limbs than where horses are used. A very fine dust mulch is kept in the orchards to conserve all available moisture from the time that the soil can be worked in the spring until about the second week in August. To continue cultivation later than this is considered dangerous, as the trees may, especially in wet seasons, continue growth too long in the fall and will not be in a properly matured condition to stand a severe winter. No plowing of any kind is practiced in orchards of any size. In fact, it was found that plowing resulted in too much root pruning.

Cover crops are usually sown late in the season so as to attain a height of from ten to twelve inches. This partially aids in checking the further growth of the trees and also aids in holding the winter's snow. Buckwheat, barley and oats are the most common grains used for this purpose and in many cases a light crop of foxtail or similar weed is allowed to grow up and serve the same purpose.

In the apple orchards, especially the younger tracts, clean cultivation is practiced. In some older orchards the sod-mulch system is being started with very favorable results, principal of which is the greater color obtained on the fruit. By this system the orchard is seeded down with one of the common clovers and the grass is cut two or three times during the season, same being left where cut, to serve as a surface mulch and to gradually add organic matter to the soil. In both methods of soil culture, commercial fertilizer is being used very extensively. During the past season some 500 tons of fertilizer, principally sodium nitrate and ammonium sulphate salts were purchased by growers through our Fruit Growers' Union.

Combined with thorough soil culture is thorough spraying. The largest available power sprayers are being used very extensively. These sprayers carry six to nine barrels of spray and are equipped with four-cylinder pumps and four-cylinder motors, and deliver twenty to thirty gallons of spray per minute and at a constant pressure of from 250 to 400 pounds. These machines have done much toward solving the great spraying problems of Door county's large orchards the extent of which is realized to some degree when it is considered that all cherry orchards are sprayed at least three times and the apple orchards at least five or six times. In the orchard that I am in charge of 83,000 gallons of spray were used during the past season. This is more than twice as much as was used two years ago, and our trees are still young.

On the cherry trees, Bordeaux mixtures with lead arsenate are used most extensively and with best results. The first spray is applied when the blossom petals begin to fall; a second, about ten days after the first and the last, immediately after the fruit has been harvested.

On the apple trees various spray materials are used. The dormant spray is very seldom put on, but where applied, liquid lime and sulphur and lead arsenate are used. Some lime is usually added to this mixture to increase the adhesive quality. The first very important spray is the so-called prepink and is applied just when the cluster buds begin to separate, summer strength lime and sulphur and lead arsenate being used. A pink spray is applied when the blossom petals fall; and when the fruit is from one-half to three-quarters of an inch in diameter, a fourth spray is applied. For these latter two sprays either dry lime and sulphur and lead arsenate, or Bordeaux mixture and lead arsenate are used. The lime and sulphur is apt to cause burning of the foliage and scalding of the fruit if used at this time during hot weather. The final spray is applied by some growers just as the fruit begins to show color, Bordeaux mixture being used.

The final test, as to whether all the above mentioned treatments have been thoroughly and properly executed, is the size and quality of the resulting crop. Most of the larger commercial orchards that were set out during the "boom" of 1908 to 1912 are now coming into full bearing and the growers have, during the past two years, been most forcibly brought to realize what an enormous project they have at hand. In 1917 the Fruit Grower's Exchange shipped 103,000 crates of cherries to fresh fruit markets. Private parties shipped about 12,000 crates. No accurate figures can be found regarding the apple crop for that year, but estimates place the value of the crop at about \$30,000.

In 1921, 98,569 crates of cherries were shipped out fresh; 246,126 crates of cherries were canned by our local cannery and 18,167 bushels of apples were packed and shipped by our apple growers' organization.

During the past season, 59,042 crates of cherries were shipped fresh; 371,460 crates canned and 73,865 bushels of apples shipped. Of these latter, 13,770 bushels were packed in barrels; 21,930 bushels packed in bushel baskets and 20,625 bushels shipped in bulk.

With plantings continuing as extensively as they have been for the past two years, there is but little doubt that Door county will hold its position as foremost in the production of the sour cherry and that it will offer stiff competition with its apples.

THE HOME AND FARM ORCHARD IN IOWA

H. E. NICHOLS, IOWA

In this day and age of specialization we hear considerable discussion as to whether the average middle western farmer should have an orchard and raise his own fruit. From the farmer's standpoint, is it cheaper for him to secure his season's supply of fresh fruit by raising it himself or should he put all his energies into his principal crop, whatever it may be, and buy what fruit his family will need? From a broader point of view, is it to the advantage of all concerned, farmers, commercial fruit growers and consumers, to have a large number of small orchards scattered around on our general farms? There are certainly two sides to the question. I would like to just briefly discuss it before telling you how the problem is being worked out in Iowa.

Before going on with the discussion of this question it might be best to mention several outstanding facts. In Iowa, according to the 1920 census report, 64.8 per cent of our 213,439 farms raised some kind of fruit. This makes about 138,000 of our Iowa farmers raising some kind of tree fruits. I have not studied the census figures for Wisconsin but I can safely say that your state does not have nearly as high a percentage of its farmers raising fruit. A comparison of the census figures for the two states would show that Wisconsin farm orchards might be a trifle larger in size than those in Iowa. The size of the average farm orchard in Iowa is about thirty trees, including all tree fruits.

Another fact brought out by the census was that Iowa has lost 50 per cent of her fruit trees in the past ten years. Wisconsin orchards have not suffered such a severe loss, although there has been a slight decrease. To offset this loss in trees we find the total yield has not fallen off in proportion to the trees. Yields have been increased by better cultural practices. This

fact shows that the remaining trees are in the hands of owners who are giving them better care.

With this brief glimpse at our present conditions, what is the attitude of those most vitally interested in the subject? There are some commercial fruit growers who loudly denounce the farm orchard. They find their high quality fruit, which is their main source of income, competing with poor quality fruit from nearby farm orchards. This competition usually lowers the price for all concerned. Under these circumstances we can hardly blame the commercial grower for his objection. Where the commercial grower ships in carload lots to the large centers of distribution, he is not so much affected by the farm crop in his immediate locality as he is by the total farm crop in the country as a whole. In years such as that just passed, the exceptionally large crop of farm fruit all over the country certainly has a marked influence on prices.

I find in my work in Iowa that there is a certain class of farmers who claim they can buy their fruit cheaper than they can raise it. They are usually men who are specializing on some line of live stock or crops and are kept so busy with this specialty that they have no time for any of the so-called side lines on the farm. It has been my observation that such people do not buy nearly as much fruit as they should have, because it costs too much! Many of these farmers, after seeing the value of a little spraying on their neighbors' orchards, are now trying it out themselves.

What then is the attitude of the average general farmer? I have heard it said that the Iowa farmer is the greatest hand at setting out trees and the poorest at caring for them. There certainly is a great deal of truth in this statement. If it was not for the farm trade, how many of our nurserymen would be in business today? This attitude is rapidly changing, however. The Iowa farmer has noticed the great decrease in trees and with the excellent prices of the past four years has seen his neighbor, who gave his trees a little care, make a good income from his small orchard. These farmers are noticing that it is more economical for them to raise their fruit and have all they need than to buy it.

Census figures show that our urban population is increasing more rapidly than the rural. Many of these people, who are all large consumers of fruit, live in the small cities and towns.

Many of them own autos. In many places they are dealing direct with the producer. In Iowa we find that some of the largest orchardists are using the roadside market as a means of disposing of a part of their crop. I know one apple grower in Harrison county, one of our largest commercial sections, who has twenty-three acres of apples and who has sold practically his entire crop for the past five years to auto and local trade. Incidentally, this man sold \$13,000 worth of apples in 1920, \$6,300 worth in 1921, with a larger crop this past season. In sections where there are no large orchards, this auto trade must rely on the farm orchard for their supply.

In considering this question of the farm orchard, we must realize that a great deal depends on the region and locality where these orchards are located. In sections where there are a large number of commercial orchards, regions that we commonly term the commercial districts of the country, I believe the farm orchard to be out of place. But, in so many sections of the middle west where there are no large orchards the farm orchard certainly has a place. The practical size for these orchards will also vary in different parts of the country. In New York many of the commercial districts are made up of many orchards not over five to ten acres in extent. We consider orchards from two to eight or ten acres as a very impracticable unit for most of our Iowa farms. They are entirely too large for home production and usually too large to fit into the management of the farms on which they are located. However, with the dying out of so many trees, the proper care of such orchards is proving a profitable undertaking for the owners. But at best these orchards are not receiving the care they should have, as the owner is usually more interested in other crops.

In Iowa there are many farm orchards of from fifty to 200 trees. We consider them too large for most economical management. But, on the other hand, we can't very well, either through the State Horticultural Society or the Department of Horticulture at Ames, recommend the ax. In fact, very excellent results have been obtained by getting the owners of such orchards to care for them, and such has been our recommendation. When it comes to planting new orchards, however, we recommend to the Iowa farmer that he plant a one-acre fruit plantation. This not only includes the tree fruits but small fruits and grapes as well. We believe that such an orchard, which

is large enough to supply his own needs, will be small enough so he can easily find the little time required to properly care for it.

We are inclined to make a distinction between a home and a farm orchard. This distinction is based entirely on the size of the orchard. An orchard of from thirty to fifty trees we consider a home orchard, while one on up to 300 or 400 trees is usually considered a farm orchard. It is hard to say where to draw the line between this type and the commercial orchard as more depends on other conditions than the mere size of the planting.

With this statement of the problem I want to briefly tell you what has been done in Iowa. Ten years ago, very few farm orchards were given any care. At this time R. S. Herrick, now secretary of our Iowa society, came upon the scene as extension horticulturist. He looked over the field and saw the possibilities of the farm orchard and immediately started in to prove to our good corn and hog farmers that it would pay them to give their neglected orchards proper care. Progress was slow. Oftentimes he had to even resort to vaudeville tactics to hold the interest of his listeners. His many rebuffs doubled his efforts and it was not long until here and there over the state a grower found by actual experience that he had a good added source of income in his small orchard.

One of the first difficulties that came up was securing spray equipment and materials. About the only spray material handled in those days by local druggists was Paris green. If they did handle lime sulphur and arsenate of lead it was at a very high price. So, in 1912, the State Horticultural Society organized the Iowa Fruit Growers' Association, which was a cooperative organization through which members could purchase their orchard supplies at a reasonable cost. This association has grown from seventeen charter members to over 1,004 in 1922. This past year it sold 94,219 pounds of arsenate of lead, 36,115 pounds of dry lime sulphur, 55,453 gallons of liquid lime sulphur and \$10,143.42 worth of spray machinery, besides pruning tools, harvesting supplies and equipment and other orchard supplies, making a total of \$63,559.75 worth of business. Mr. Herrick has been secretary of this association since 1917. This association has been one of the big factors in solving this problem.

Progress was quite slow until the county agent came upon the scene. Soon after every county in Iowa hired a county

agent there was a marked increase in spraying of farm orchards. The personal contact of these agents with the farmers, and their following up of demonstrations on pruning and spraying staged by Mr. Herrick and his assistants, brought results. Five years ago, according to the reports of these agents, there were 419 orchards being sprayed in eighty-six counties or an average of 4.9 per county. This number has doubled and in some cases trebled each year since then. This past season the agents reported 12,085 orchards as receiving from one to five sprays. They estimated an average of 22.7 per cent of the orchards of the state as sprayed in 1922. I believe a more conservative estimate would be from 10 to 15 per cent. These figures, although not accurate, give the general trend and show there is still much to be done.

One of the big reasons that spraying has been popularized has been the spray ring. The cost of a spray machine and getting the work done at the proper time were two of the big objections that the farmers had to spraying after they had been shown that it paid them to care for their orchards. The cooperatively owned machine and the fact that a man was hired to do the work, as is the case in the larger rings, met their objections to a great extent. In 1919 there was one ring organized with twenty members. The next year 136 new rings were reported from twenty-six counties. In 1921, 196 new rings, making a total of 357 rings were organized in sixty-one counties. This last spring 258 new rings were organized, which makes a total of 654 in seventy-five counties. There were 3,487 members in these rings, making an average of 5.3 members per ring. Already many more new organizations are forming for next season.

Two-thirds of the rings reported in 1922 used a hand barrel sprayer. Usually from three to five neighbors went together and purchased a large barrel pump. Usually the one secured was larger than one the individual would have bought for his own use. In such a ring the members in some places help each other spray and in others merely pass the outfit around.

In the larger rings where a power sprayer is used a man is usually employed to do the spraying work with all costs prorated to the members on the basis of the number of gallons of spray material applied at each spray. It is more difficult to get these larger rings organized, but once they are started they prove very practical and popular.

Some of these spray rings have been in operation long enough to show us the weak points. A medium size ring with from ten to fifteen members, with the orchards quite close together, is proving the most successful. The size of the spray outfit must be gauged by the number of trees. A ring no larger than can be sprayed in three days should be organized. The most important factor for success is securing the right man to do the work. Experience shows that a local man who is willing to do the spraying at a reasonable wage gives the best results. In some rings outside help is hired, which oftentimes changes two or three times during the season. Such men usually know nothing about it to begin with and have no interest in the work. Good results cannot be secured under such conditions. The manager should also be a good mechanic who understands gas engines.

To give you an idea of these rings I will give you a brief report of one that operated last season in Grundy county. "The Felix Clay Spray Ring was formed late in the past winter and purchased a power outfit which cost them laid down, in Conrad, \$385. There are fifteen members in the ring and the shortest route between members covers eighteen miles. Four sprays were applied and every item of expense recorded, such as rent for the team to haul the outfit, feed for the team and board for the man operating the machine. The total expense for the season, not including the depreciation on the sprayer, was \$366.22. Depreciation figured at 20 per cent amounts to \$77, making a grand total expense of \$443.22.

Nine hundred and seventy trees were sprayed during the season. The work was done at a cost of \$.456 per tree for the four applications. A conservative estimate made by the members of the ring was that the increased value of the fruit on a sprayed, as compared to an unsprayed tree, would be \$1.00. So with \$1.00 increased value minus the \$.456 cost of spraying left a balance of \$.544 profit per tree.

The average orchard in the ring consisted of better than sixty trees, so this would amount to \$32.64 per orchard, and this with but little outlay in labor on the part of the owner, and this is work that is usually neglected on the farm. The above figures do not take into account the pleasure the wives of the members take in handling the perfect fruit. Five hundred dollars' worth of fruit was saved in this one ring, which is a very conservative estimate.

To help the county agents out in their orchard work the Agricultural Extension Service at Ames has three men who spend most of their time carrying on pruning and spraying demonstrations and other related kinds of work. Only about half of the orchards being sprayed are pruned and so one of our principal lines of work is pruning schools, where the principles of pruning are demonstrated. This spring nearly half of the counties in the state will be reached with this one line of work.

Spraying demonstrations have been carried on for the last ten years. These demonstrations have been one of the direct means of bringing about the results outlined above.

In conclusion I want to say that in Iowa we have taken the stand that a small home orchard should be on every farm to produce enough for home consumption. Moreover, the larger farm orchards, that are still in good condition, will give their owner a very good cash income if properly cared for and practical means used to dispose of the crop. We hope this program will in time rid the state of undesirable varieties and orchards, and will develop in every community some man who will supply the local demand for fresh fruit.

BEES AND HORTICULTURE

H. F. WILSON

Science tells us that all forms of plant and animal life are to a more or less degree dependent upon other plants or animals for their existence. Just why some of the forms of life now in existence should be allowed to survive may be hard to understand, but each succeeding year brings new discoveries which make known to us some of the things we do not see clearly.

The interrelations between insects and plants are of prime economic importance to the horticulturist and farmer. This, because of the part insects play in carrying pollen from one plant to another, thereby providing cross fertilization which is so essential to the production of strong, healthy plants.

Our fruit growers should take time to study the habits of insects about the blossoms in the spring, especially the honey bee. If they have a proper understanding of how plants grow and seeds and fruit are formed, it will only need a few observations to show what bees and other insects are doing for us.

Having the plants properly fertilized is just as much a part of plant growing as any other operation, and many fruit growers through actual experience have found this to be true.

Why is it that plants need outside help, do they not have the power of fertilization in themselves? Yes, but let me explain: In plants as well as animals there must be male and female elements. Animals are able to move about and complete the sex acts by themselves. Plants, being unable to move about, must depend upon the whims of nature for their transfer. Nature in some cases has combined the male (stamens) and female (pistil) organs in the same flower, although this does not mean that all such flowers can fertilize themselves. In other plants the female and male flowers are entirely separate from one another and depend upon the wind to blow grains of pollen from the stamens of the male flowers to the pistil of the female flowers. As with animals, cross fertilization is necessary in plants, and nature has so arranged its scheme that very few blossoms are actually fertilized within themselves. Cross pollination develops better fruits of all kinds.

In this scheme nature has provided plants with various colored flowers and nectar-secreting organs to attract bees and other insects at that particular time when the production of seed is to begin.

The petals of the flower are perhaps useful in drawing the insect near. The nectar at the base of the flower entices it deep down into the corolla, thereby causing the insect to come in contact with the pollen; some of the pollen clings to the body of the bee and is carried on to the next flower.

The honey bee does not visit flowers to cause pollination but rather to gather the nectar and pollen as food for itself and its young. The plant provides the bee with food for services rendered.

Mr. W. J. Beal in 1868 wrote as follows: "Bees are willing agents here as in other instances, lighting first on the stigma of the older flowers which are further down the stems, and then passing up to others which are younger. Besides collecting nectar at the bottom of the flower, they collect the pollen by scraping the style upon each side with their legs and when calling at the next flower first striking the exposed stigma, leaving a few little morsels as tribute for the bountiful supply."

This action of the bee, in which it unconsciously causes the fertilization of the flower is nature's agent for bringing about cross-fertilization.

BEES INSURE CROPS

Many instances have been recorded showing the value of bees for farm, garden and orchard and experiments carried on by well qualified investigators show quite conclusively that bees are a necessary adjunct to successful farming and orcharding.

In the province of Ontario, Canada, where large areas of alsike clover are grown for seed production, the farmers are glad to provide free space for beekeepers for their apiaries. In nearly every large greenhouse where cucumbers are grown bees are used to pollinate the flowers.

In the state of Washington a few years ago orchardists were renting colonies of bees at five dollars per colony to fertilize their apple crop. Every now and then very definite examples of the need of bees in pollination are shown. Mr. L. D. Stilson of Nebraska notes that in 1893 the apple trees in his orchard bloomed abundantly and the fruit set in great profusion. When the apples were about one-half to three-fourths of an inch in size they began to drop off. An examination showed that very few seeds had been formed. Mr. Stilson credits the trouble to the fact that heavy rains occurred during the blooming period which washed the flowers clean of pollen. In Mr. Stilson's orchard, where he had some bees, he noticed that of the fruit formed, most of it was on the trees in the immediate vicinity of the apiary or in line of flight of the bees on sunny days following the rain. With cherries he had had fourteen consecutive crops, while others without bees had missed three to five crops. Mr. Stilson also mentions that E. Whitcomb of Friend, Nebraska, in 1893 produced 300 bushels of cherries, while orchards equally as good, but out of line of flight of the bees produced none.

Mr. A. H. Hendrickson carried on some work for the California Experiment Station in 1915, 1916, 1917 in which he placed tents over trees and placed a colony of bees under several of the tents, while others had no bees. Observations were made on 50,000 plum and prune blossoms in 1915, on 87,000 in 1916. The trees under tents with bees set about 19 per cent, while the normal set in the field was a little less than 4 per cent. Mr. Hendrickson concludes that "both the French and Imperial prunes

may be aided in setting fruit by the use of bees in the orchard during the blossoming period, provided the trees are in a normal healthy condition. The absence of bees in the orchard may mean a low percentage of set with both of these varieties."

Prof. N. B. Waite, writing in one of the government bulletins on pollination of the pear, mentions that "the common honey bee is the most regular important and abundant visitor and probably does more good than any other species." "Pears require cross pollination, being partially or wholly incapable of setting fruit when limited to their own pollen."

Just how much good bees do in fertilizing cherries in Wisconsin is an undecided question, but on the Pacific coast bees are deemed necessary and there are printed records which indicate that some species cannot be grown without the aid of bees.

Dr. Gates, formerly with the bee department of the Massachusetts Agricultural College, reports that several growers in that state continually used bees to insure fertilization of melons. Greenhouse men who grow cucumbers are entirely dependent upon bees for fertilization of the blossoms as hand pollination is entirely too laborious. Dr. Gates reports that one grower was known in Massachusetts who used upwards of eighty colonies of bees each year in cucumber greenhouses.

There are many other examples which might be given, but these are sufficient to show the value of bees in horticulture.

INJURY TO FRUIT BY BEES

Uninformed persons who see bees feeding on punctures in fruit usually come to an immediate conclusion that the bees are responsible for the injury, but such is not the case. It is not possible for bees to puncture the skin of fruit, because their mouth parts are not sufficiently sharp. However, once the skin of a fruit is broken, the bees gather around to suck up the juices which are exposed.

If you will carefully examine grapes or other fruit upon which the bees are feeding, you will usually be able to find a discolored area, showing where the skin has decayed following injury by some other insect, or perhaps a fungus growth.

DISCUSSION

QUESTION: Is there any advantage or any benefit to a bee-keeper from an orchard that is two to four miles away?

PROFESSOR WILSON: No. Bees two to four miles away from an orchard, if there is anything else for them to get, will probably not go to that orchard. It is essential for best results to have bees within less than a quarter of a mile.

QUESTION: Is the bee the only insect that does the fertilizing?

PROFESSOR WILSON: No, there are many other insects that do that, millions of insects doing more or less of the work, but the honey bee is one of the very best of these.

A MEMBER: I think you left out the main point of the whole discussion. It seems to me, regarding the spray operation, that we should spray before the blossoms open, and spray after the petals fall. Occasionally we spray when there are a few blossoms on the trees, but it seems to me that there is cooperation needed between the bee men and the fruit growers, and one thing to do is to eliminate the man who is going around spraying commercially. He does not know a thing about the spraying game, and he is spraying only to get money from the fruit growers, and spraying during the blossom period to kill the worms. He is to be found in Dodge county, Fond du Lac county, Jefferson county and one or two other counties. They make a point of spraying during the blossom period, because they contend that is the proper time to spray, and it seems to me that cooperation is needed between our organizations to eliminate that fellow, by education; there may be some way of teaching him, some way to stop that spraying during the blossom period. Two years ago we stopped three of them, simply by getting the farmers to spray their own orchards and putting him on the job.

THE PRESIDENT: It seems that that is a problem for Mr. Cranefield to take up, educating or getting rid of these humbugs.

MR. MOYLE: Isn't it a fact that the spray man sprays absolutely from necessity, being on the job when two and a half petals drop, and two and a half are on? Isn't it a fact that you have got to put it on that minute? And if it is not put on, you are going to lose the benefit? You have got to get it on before that calyx closes.

PROFESSOR WILSON: I agree with you perfectly, because I do not think there is more than one occasion for ever spraying an apple tree, when there are any petals on, and that is because of different varieties, because a man has got to go off to some place next week and he wants to get his spraying done before he goes. I do not think so far as we are concerned in the entomological department of the university that you have ever seen such a statement made to spray when two petals are on and two off; we say to spray when the petals are all off. It is the variation of the time that the trees bloom that makes the difference of spraying, that is, when some trees are partially in bloom.

MR. M. S. KELLOGG: How many days elapse between the falling of the last petal and the absolute closing of the calyx? That tells the whole story.

PROFESSOR WILSON: That not only tells the whole story, but that is a very hard question to answer. Now, I think you will agree with me that it is a fact that same times those calyx leaves close up a whole lot faster than they do other times. I am not prepared to say what causes that difference, because I have never studied that, but if a man has in this stage that we have here so many smaller orchards or holdings, I believe they say at the time when the petals are pretty well fallen, that is, if he has quite a number to spray, the petals are beginning to sift on the ground, a little breeze breaks them all up, that if he starts spraying in one end of the orchard, it would do no damage to the bees. The calyx lobes are still open, and they will not close until he has got to the end of his orchard, and I think he might even wait until later, you cannot wait until all the petals fall, because some of them stick, that is, they do not fall for perhaps some time, simply hanging on, but all the petals can be practically fallen—that is the way I would put it—I would have to modify that statement in some way.

MR. SANDERS: The gentleman has suggested that it is a hard question to determine the exact time to spray. In the mixed orchard, we find considerable difference in the blooming period, then you will find a difference in varieties, in the length of time in which the petalage is retained on different varieties, and there is a still greater difference in varieties in regard to the time which elapses before the calyx begins to close, and further, it is really not essential that that calyx has got to be entirely open, the more open it is, the easier it is to put spray material in there, but still, if under proper spraying conditions you can force the spray into the calyx partially closed, I do not think that the bees continue to work the blossoms after the major part of the petals have dropped from the cluster; I do not think that those petals drop until the saccharine matter has either been removed by the bees or becomes inaccessible to them.

PROFESSOR WILSON: Yes, that is right, that is absolutely correct.

MR. GIFFORD: As to the man that goes around and sprays other people's orchards for pay, he is a great convenience to the farmers who have only a few trees, and there are many cases where it not for him, those trees would not be sprayed at all. What you have got to do is not to abolish him, we do not want him abolished, but teach him, if you can, to make it possible for him to spray a good many orchards; he has to spray a good many orchards in order to keep in the business and at the same time get around fast enough so that he can get through his first spraying before they are in bloom. I do not think we want to do away with him.

PROFESSOR WILSON: I do not suppose Mr. Gifford would object to giving him a little education, so that he would do the greatest amount of good.

MR. GIFFORD: Certainly. We are helping the men, we offer help to those who have outfits, whom we have never come in contact with. I mean, we are trying to help those wanting help, whereas we find in the state a great many that refuse our help, simply tell us to mind our own business. Those fellows we will probably have to deal with in some way.

SMALL FRUIT CULTURE IN MINNESOTA AND WISCONSIN

W. J. MOYLE

To do justice to a subject the extent of which is outlined as stated is rather a staggering proposition for a person of my caliber. However, as your secretary has seen fit to allot me the subject, we will go to it and you will soon find out how little I know and I'll find out what my hearers have to say in regard to my judgment.

The first thing to be considered in growing small fruits is to get results, and in order to do this you must have adapted varieties. Here is where the most of us fall down in our fruit culture.

All things considered, hardiness is the all-important factor and with this object in view the writer has been reading, writing, buying, planting and testing everything that comes along in the way of more hardy small fruits for many years, ever sticking to the proverb, "Prove all things and hold fast to that which is good."

For over forty years, until just recently, no systematic scientific efforts have been put forth to improve our small fruits along this line. Particularly has there been little progress in the western states as most of our varieties grown were of eastern origin.

We have had to content ourselves with the Cuthbert raspberry, origin New Jersey; Concord grape, Massachusetts; Eldorado blackberry, Ohio, and strawberry varieties galore from the Atlantic seaboard. But today things have changed and we find South Dakota and Minnesota actively engaged in producing varieties that will stand the rigors of a semi-arctic winter.

Of course, there are exceptions to this rule, for example, the Loudon raspberry, Dunlap and Progressive strawberries originating in the order named in Wisconsin, Illinois and Iowa. It is

well to bear in mind that these varieties have proved of incalculable value in the respective states of which they are natives.

Let us take the strawberry as the most popular of all small fruits. The winter of 1921-22 was a test winter as to the hardiness of strawberry plants, and on checking up in April, 1922, Latham raspberry, Dunlap and Splendid strawberries were the only three varieties that came through in anything like decent condition. Over a dozen other standard varieties were either killed outright or greatly devitalized, resulting in an abortive, anaemic, weakened condition. The Latham which we have now grown for several seasons while not a heavy bearer, has placed itself on record as to constitution and ironclad hardiness. Our Minnesota friends tell us that they are discarding this variety on account of diseases that it appears susceptible to in their state. But with us it is a perfect model of health and vigor.

We are growing seedlings of Latham in hopes that one will be produced with the reliability and bearing capacity of the Dunlap or Burrill—with a berry the size, color and firmness of Latham—and a plant of equal hardiness and constitution.

At present the Minnesota people are all getting back of one of the later strawberry introductions of the experimental station of their state, viz., Minnehaha. This strawberry is claimed to be a winner and we are all going to try it out.

For several years we have been growing a Minnesota everbearer, No. 1037, now going by the name of Duluth. This variety has proven the most desirable of all the sorts we have grown from the standpoint of hardiness and productiveness, yielding a walloping old crop in June and then coming on in September and October with an abundance of fine large marketable berries. It is rather a shy plant maker and for that reason is not looked upon with much favor by the plant-growing strawberry people.

Again our Minnesota strawberry breeders have come to our rescue with a new everbearer with the unique and euphonious name of "Deep Haven," for which they claim all the good qualities of the Duluth with the addition of great plant production. We will certainly give Deep Haven a trial.

Twenty years ago the writer had occasion to stop over night with a settler in the wilds of Manitoba, and in going into the garden we were surprised to find the Loudon raspberry growing to perfection. The good old lady of the home said she had brought the plants with her from Wisconsin when she moved.

This red raspberry originated with F. W. Loudon, of Janesville, Wisconsin, and it was transplanted to its Canadian home with success.

At that time Brandon, Canada, was considered just a stone's throw from the North Pole—

"It was a childish ignorance
And now 'tis little joy,
To know I am farther from heaven
Than when I was a boy."

Professor Hansen of South Dakota, realizing the value of a hardy red raspberry, produced the Sunbeam from the wild plants of the Dakotas. This proved valuable, but the fruit was not large enough to compete with standard varieties, so the Minnesota Fruit Breeding Farm got busy with the result that they introduced Latham or Minnesota No. 4, being the production of a scientific cross of Loudon and King. The plant resembles the King in growth with the smooth glossy bark similar to the Loudon. The cane is upright and stiff, of medium height and very hardy. The past season it has made the best showing of all our varieties. Berries as large or larger than the Cuthbert, good shape and very firm, a little light in color and not as good quality as Cuthbert. However, as it is twice as productive and absolutely hardy it is bound to soon supersede that standard variety. Too much credit cannot be given the Minnesota people for giving us this valuable raspberry. We predict a future for it in raspberrypdom similar to the Wealthy apple in appledom.

At the present time we need ironclad black and yellow raspberries. This is possible and he who originates the same will be a benefactor to fruit growers.

At present we are interested in the behavior of the Erskine Park everbearing red raspberry. It is a unique novelty and we believe it has great possibilities as a breeding plant. It is a dwarf, compact grower. Our canes were so loaded with fruit in October that some of them were broken over. The berry is pointed, fair size but soft with a sprightly acid flavor. The canes are equally as tender as the Cuthbert, its parent, or more so.

The St. Regis everbearer, on account of its vigor and hardiness, has secured for itself a permanent place in the catalog of the nurserymen as well as a warm spot in the heart of the small family gardener. It produces a heavy crop of June berries and then comes in with a very acceptable fall picking.

We find Older, Kansas and Alaska the best of the blackcaps but have had to discard Nemaha and Cumberland on account of tenderness and susceptibility to anthracnose.

The New York experiment station at Geneva are introducing a lot of new seedling raspberries. We are testing these but have not had them long enough under cultivation to pass on them.

Root gall and anthracnose are the two great drawbacks to growing the cane fruits and these we find can be largely controlled by frequent plantings on new land.

The writer while traveling through southwestern Michigan in August made a thorough study of small fruit conditions and found that our Michigan brethren, while blessed with a more equable climate, had to contend with all the diseases and pests that are going and while we saw some beautiful plantations we also realized that in Michigan, as elsewhere, eternal vigilance is the price of success.

DISCUSSION

QUESTION: I should like to ask Mr. Moyle in regard to "June"; have you had any experience with that?

MR. MOYLE: We have June, we got it from the Geneva experiment station, but I do not want to distribute it at this time, because I have had it only two seasons.

THE PRESIDENT: What do you think, Mr. Townsend, of Latham?

MR. TOWNSEND: My experience is like Mr. Moyle's. The Latham I raised is quite a dark purplish berry, is almost phenomenal in size, and, therefore, is somewhat unusual, and I assumed in the beginning that it would not be a popular berry in the matter of quality on account of a certain muskiness it has, but in hardness I found it far less hardy than King on my soil. Two years ago the spring freeze about finished up the patch, seriously damaged the canes on the south slope. My neighbor, having an acreage in sandy soil on hill slope, found the Latham succeeded better than the King. I take it that it is a berry that is less adapted to heavy soils than the King and should be planted in soil that is somewhat loamy. In so far as quality and market value is concerned, I value the King highly.

MR. LIVINGSTON: I have given the Latham a good test and I find that it is very much inferior in flavor to others. In fact, my employers gave me orders to throw it out, they did not want it, it has no flavor at all.

THE PRESIDENT: That has been my experience. It is not very high in quality, but it is phenomenal in size and beautiful in appearance, rather dark than light; it has all the characteristics of the Loudon.

MR. CADY: May I say just a word in regard to the Latham? I am interested in the remarks about that variety and also remarks about the King. I am from Minnesota and I should like to know the weaknesses of any plants that have been originated there. In the first place, you want to be sure that the plants you have are true to name. I would not be sure that this gentleman's variety is the Latham from his description. It may be a substitute. Our experience in Minnesota is just this, that Latham has taken the place of every other variety in our fruit-growing sections. We are testing a great many varieties, eliminating poor ones gradually. The Latham brings 50 cents a crate more than any other kind on either of our large markets. One word in regard to the Redpath. If you buy Redpath you will not go far wrong, I believe. Men in charge of the testing work have gone into the matter thoroughly this summer and I think they are pretty well convinced that there is no difference in the two varieties, Latham and Redpath. The only difference is in the cost. Redpath is scarce and higher in price than the Latham, but you have got a good, serviceable berry.

THE PRESIDENT: What variety of strawberry do you recommend for Wisconsin? You are a nurseryman, Mr. Moyle.

MR. MOYLE: From all I can find out, and I have been trying hard to find out, our stronghold is the Dunlap. The Dunlap is not of high quality, but it seems it has something in its make-up, that it stands all kinds of abuse and still puts out runners in the spring and puts out a lot of berries. That makes the Dunlap our best berry. That is one thing about these Minnesota seedlings that we are getting, we expect that they will stand over winter, and if they stand over winter then they will be hardy here. Several years ago I secured several varieties of small fruits from the East, and tried them out, early varieties, and invariably they would not stand the winter. I have had Success freeze out, Campbell's early also is very delicate, proved to be very tender. Now, we find the same thing in other lines. That is what I think we have got to pay more attention to. Our professional men who are in the plant breeding line have got to make more of a study of hardiness in small fruits.

QUESTION: Will Mr. Moyle tell us about blackberries?

MR. MOYLE: There are three blackberries that we grow, the Snyder, Eldorado and Briton. You will get more blackberries from the Snyder than the Eldorado or the Briton.

THE IRIS

PROF. LE ROY CADY, Minnesota

The iris is one of the oldest of the flowers. It was used by the Assyrians, Egyptians and the Greeks and later by the French.

The name probably comes from the Greek, meaning rainbow. It seems to be well named thus, as nearly all the colors of the rainbow are found in its 170 species and thousands of varieties. The Greeks used the iris as a symbol in their art work. The early flag of France carried a design that was said to be modeled after the iris. The iris is often called the poor man's orchid, probably because of its low price and hardiness. It can be grown under all sorts of conditions. It is useful in the border if planted in groups. The dwarf varieties may be used as borders to a bed or walk. It may be planted in large groups for cut flower purposes. One objection to its use in too prominent a place, such as a border, is that after its blooming season the foliage ripens and becomes more or less unsightly. This can be counteracted to some extent by planting other plants with or near the Iris to take their place when it becomes unsightly.

Its flowers are short-lived in bloom, but new ones come on each day, and by making a careful selection of varieties a succession of bloom may be had for five or six weeks. Gladioli, whose foliage is much like iris, may be planted with it and the season of bloom of a border or a bed be extended well in the fall. Iris vary in size from dwarf early sorts to the tall bearded and late sorts. As a cut flower for market they have little value because of the difficulty of shipping them. For home use or a local market they are well worth growing. Perhaps their best use is a border or for grouping among other perennials where their foliage may be hidden after they are through blooming.

Culture: The Iris has few requirements, but for best results these few should be observed. It must have plenty of sunshine if it is to give best results in flower and foliage. It will grow in a partially shaded place, but the flowers will lack quality, and in dense shade it will not produce flowers. Contrary to the ideas of many, iris will thrive in dry locations. Its ability to withstand drouth and heat is remarkable. Good drainage is always essential. Too much water causes decay. Heavy, cold and wet soil may be ridged or sloped, to aid in drainage and warming up. Coarse sand or old mortar may be added to heavy soil to lighten it. As regards soil the iris is not particular. A well-drained, heavy soil is perhaps better than too light a soil. A good garden loam will give excellent results. If the soil is reasonably rich no fertilizer need be added. Bone meal worked into the soil is desirable if any fertilizer is needed. A very rich soil will give a

rank growth of foliage and few flowers. The iris likes lime and even where lime is found in abundance in the soil it is sometimes desirable to add slaked lime. The iris thrives under adverse atmospheric conditions, as it is often found in towns or cities where there is a great deal of coal smoke and dirt.

Planting: The iris may be planted at almost any time of the year, preferably August or September after the plant has bloomed and has matured its growth for the season. It is a desirable perennial for renters to use inasmuch as it may be dug in the autumn and stored over the winter and set out in a new place in the spring. Very shortly after setting it will begin to bloom. The autumn season is the best time in which to set out the plants. If set in the spring they will sometimes sulk and not bloom until the second year. Iris give the best effects, as a rule, planted in full light. Frequently they may be planted near streams or ponds where the reflection in the water adds an attraction. Blue colors give the best effect in partial shade. There are some varieties that are more attractive planted where they will be seen close at hand, while there are others of a solid color which give a better appearance at a distance. More delicate varieties should have a background; in fact, all flowers show up better if planted against a background. Varieties that are very free flowering often do not produce large flowers and some of the large flowering sorts produce only a few flowers. Some come into bloom all at one time and others come on slowly.

How to Plant: The iris has a fleshy root stock or rhizome. It is propagated by dividing this rhizome and, in fact, it should be divided every three to five years whether the divisions are used or not if we would keep the plant healthy and flowering freely. We can often get one or two dozen new plants from the plant we set out in three or four years. Its rate of increase is so rapid that one can soon increase their stock to large proportions for planting or for market.

When planting cut back foliage to 4 or 6 inches, making the outer leaves shortest. This checks top and forces root growth. Do not give any more water until growth begins and then only if you are certain the plant needs it. In very dry weather a light mulch will aid in holding the moisture until the plant is rooted. Plants may be set one foot apart each way, but better results will be obtained and there will be less danger of mixing varieties and a chance will be given for better growth if they are set further

apart, say 2x2 or 2x3 feet. Iris, of course, flower better when well established and we do not want to disturb them too often. The vacant spaces between iris may be planted with gladioli or annuals until they need the ground.

Cut out old or diseased growth and thin the root growth, if very heavy, to six or eight inches, so that it will be easy to handle and furnish more feeding roots. Remove all bruised or broken roots or branches.

Be sure the ground is well and deeply plowed or spaded and is in good physical condition. It is not well to set any plant in rough, sticky or poorly prepared soil. Be sure good drainage is provided. Dig a hole larger than is needed to set the plant, spread the roots to their full length. Some growers like to set the plant on a small mound, but this will mean more work than the ordinary method. Set the rhizome its own thickness under the soil or perhaps one to two inches deeper and firm the soil well over its roots. Water thoroughly to settle the plant in its place and provide moisture for its growth.

Cultivation and Care: Iris require little attention after planting, but will respond readily to good care. A newly planted bed should be lightly mulched the first season with straw. Do not use manure at any time on iris. Decay is very apt to set in where it comes in contact with the plant. Remove this mulch in the spring and stir the soil often enough to keep it loose and thus conserve moisture and keep weeds out. Do not plant the iris in shade, because the sun is needed to properly ripen it for growth next year.

Iris vary in size and tall sorts should be at the rear of the border. Some varieties of iris retain their foliage better than others. It is well to plant these in the more conspicuous places where iris are wanted. Iris planted in groups mixed in the border are more effective than in beds because other plants hide the dry foliage in late summer.

Since most people now like to know the names of varieties it is well to place labels with each group and also to chart the planting when first made.

Diseases: Poor drainage and manure encourage diseases, so it is well to be sure of the drainage and to keep all fresh manure away from the plantings.

Propagation: Iris are easily propagated, as has been suggested above by division of the rhizomes. They may be divided

very frequently, giving a large increase from most varieties in a very few years. New varieties are obtained by making crosses of the better sorts and sowing the seed. Occasionally grafting is resorted to, but with no great practical results.

Uses: The whole plant, rhizome, foliage and the flower may be made use of in some way as a landscape plant. Groups show off well in front of shrubbery or mixed with perennials. They may be sometimes used for borders to sidewalks and occasionally as foundation plants and sometimes they may be used for soil binding. Some of the lower growing varieties may be taken up in the fall, allowed to freeze, and planted in window boxes or pots for winter decoration. In some countries where large varieties of iris are grown the foliage is used for thatchings of buildings. The root is very commonly used in a preparation known as orris root, a kind of perfumery.

As a cut flower the iris is not adapted to shipping because of the flower being too fragile. It may be shipped short distances if cut before the flower opens. Many varieties are very serviceable for bouquet or basket work. Some very excellent baskets may be made up of iris either with their own foliage or with some of the finer perennial foliage plants.

Because of its ease of growth and wide distribution and earliness the iris deserves a place in every garden or any park in which other perennials find a place.

DISCUSSION

THE PRESIDENT: Are the iris troubled with any disease, Professor Cady?

PROFESSOR CADY: They are troubled with several diseases and I did not touch on that purposely, because I believe that, in most cases, at least pretty largely, we amateurs may avoid those diseases if we do two things: if we plant them to give good drainage to the plants and divide them occasionally. When the bloom gives out there is a place in the center that is dead and decay might start in. Do not use manure in fertilizing, or apply mulching, which is another source of danger. The best way to do when they get diseased is to dig them out and destroy them. The commercial man has a different problem when disease attacks his fields and the proper thing for him to do is to request help from the experiment station or the National Iris Society.

CITY FORESTRY IN MILWAUKEE

MR. OTTO W. SPIDEL

(From Reporter's Transcript.)

Mr. Chairman, Ladies and Gentlemen: If we should look back a comparatively short space of time, it will surprise us to discover what little interest had been taken in the past by municipal authorities as far as the care of the welfare of the shade trees in the highways of their respective communities was concerned. It was the usual custom in the past to leave the planting and the care of our highway trees entirely in the hands of the individual property owners. It was left entirely to him to choose the variety or type of tree that he wished to plant, irrespective of what his neighbor was planting, irrespective of any agreement among the various property owners of the block that he happened to live in. It was a personal matter of his. We can all well realize the final results of such undertakings.

We have today in the city of Milwaukee certain blocks that contain at least seven different kinds of trees planted all the way from five, seven, eight, ten to twenty feet apart, according to the whim of the individual who planted them at the time. These conditions naturally could not go on any great length of time. The authorities began to realize that it was necessary for municipalities to take a hand in the matter, in other words, to put the planting and the care of trees under municipal control. The final upshot was that our larger cities today have the care of their trees under the supervision of what we call the City Foresters' Department, that has charge of the entire planting of trees.

The city of Milwaukee came to that conclusion at the end of 1917. Our legislature enacted a law empowering the Board of Park Commissioners of the city of Milwaukee to plant and care for all the trees in the highways of the city that were situated between the lot line and the curb. The year after this law went into effect I was appointed as the city forester, and looking over the city, of course, I found the condition that I have previously referred to, and to get into working order I divided the city of Milwaukee into districts, establishing a station in each district. There was ample provision made for the housing of two trucks, high-powered sprayer and tool room and a small office for the fore-

man. You will realize that to care for 82,400 trees in a city will require naturally some man power. Each station was equipped with these tools that I have mentioned and was in charge of a foreman with eight men. One station that we referred to as Station No. 1 was also equipped with a garage, with a workshop to care for the repair work that may be needed at times on the eight trucks that we are using and the four sprayers, and it also keeps one man constantly at work filing saws, grinding axes and putting handles on tools. Forty saws at work all day, you will realize, requires some saw filing, each one at least every second day.

We have for the last four years planted annually 3,000 trees in the spring of the year throughout various parts of the city. We use what we call the standard size for highway planting, two inches in diameter, and the varieties are the Elm, Norway Maple, Ash, Linden and Chestnut that we have been using so far, using one variety in each street. We space them in the following manner: twenty feet from intersecting streets, from curb to curb, so as to leave sufficient space for traffic and street signs. We are condemning all trees and shrubbery planted on the corners. We do not permit any shrubbery higher than three feet planted in the tree borders. In the winter time, such as the present, we are moving large trees in the parks where they were planted long years ago and are now getting too dense. We start quite early because we have large trees with clay balls and they move very nicely.

We have a very small experimental station in one of our parks in which they have been trying several types of trees, acclimatizing them if possible. For instance, I am trying to see what we can do with sycamores. We hope in due time to have avenues of sycamores in some parts of Milwaukee. In undertaking this work I found that, of course, most trees in the city had not been touched within the last twenty years and after every storm there was no end of wreckage, dead wood lying in the boulevards and streets. So as to cut out this in an effective manner I first of all had all avenues and all highways pruned where there is most traffic, such as Prospect avenue, Grand avenue and most of the other boulevards in the city.

The close planting of our street trees brought about a trouble which will take some time to overcome. We are badly troubled in the city of Milwaukee with the tussock moth and in pruning during the summer months, we make it a practice of brushing the egg masses from the trees as we go along, which will prevent

spreading and help us in keeping it from spreading in districts that have been unsprayed. We have now cleaned out a considerable part of the city from the tussock moth and the scurvy scale, which has bothered to some extent, and we have eliminated as much as possible the soft maple on account of the cottony maple scale. We are very much bothered with that pest in Milwaukee. Of course, we try to eliminate all scale pests as much as possible by dormant spraying. I tried all sorts of summer spraying, 40-1 mixture lime-sulphur has been very little help, but our 8 to 1 in winter is very effective. We have today sections in the city which are entirely clear of the tussock moth, as well as the scurvy scale.

Fifteen years ago considerable planting was undertaken in the parks, young trees, and I must say these trees are coming in very handy; we are leaving six, eight or ten-inch specimens for the cross-overs from the parks and taking others over where there are not many trees, such as along the lake shore and South Shore Park.

I wanted to speak of the men that are doing the work in the city. Each station, as I stated before, has a foreman and eight men. The foreman today is paid \$165. He has charge of this crew, and all the foremen are Davey graduates. It is necessary for me to have such men that have been used to tree surgery work. On account of the very close planting in the past we have a very heavy leaf drop and it is caused by the interference with the root system, and you all know how very much trees in the city are handicapped with water-tight pavements on one hand and sidewalks on the other and much of the materials that contractors have used in filling back to the curb. We are today installing sub-irrigating systems wherever the property owners are willing to go to the expense. At the present time the installing of sub-irrigating systems amounts to 80 cents a foot. We are using 3-inch tile with a crushed stone cover.

We have a law that requires a permit before planting. There are many property owners that have never heard of that sort of planting and they start planting as quick as the house goes up, so the first thing we do as soon as we get a list of newly paved streets is to go there and start our planting scheme, generally trying to vary our varieties. One may be elm, one Norway maple, one basswood, and so on, so that in driving through sections of the city each street that you are driving through may have a different type of tree. At the present time I believe we have about 12,000 trees that have been planted by the department.

We have a very, very delicate feature to contend with and that is, condemning trees where they are too closely planted. You would be surprised at times to know how much sentiment is connected with trees that were planted in front of homes in the city. Grandfather, who has long since passed into the Beyond, planted this tree, brought it in from the farm, and so with tears in their eyes they will sometimes say, "Cannot you leave it another year?" Well, of course, if we make exceptions to one party the others feel that they have the same right, so that our answer always is: "If Grandfather were alive today he probably would want to see the tree taken out." At any rate, it is a matter of a present-day proposition that we must contend with and leave out all sentiment. We have thousands of trees that really are in good condition in the city, but on account of the narrow space that they are planted in they must be removed. It is very hard to take them with a sufficiently large ball to move them safely and the only thing to do is to cut out every other tree and to save those that remain, and we have thousands of trees in the city of Milwaukee that should be chopped out, but we are going at it gradually. You people may not realize what misunderstandings occur in the very beginning when a crew of men go through the city pruning trees. People will come out and say, "Why, I paid for this tree. We ought to be consulted about it. We should have been told about it." But we cannot pay attention to such a proposition, because these things cannot be left to the individual, so we lay out our districts that are to be pruned and sprayed and simply go at it without any question and carry out our work in that way.

DISCUSSION

QUESTION: May I ask, is there any charge assessed against the property for the work on the trees?

MR. SPIDEL: Of course, it is all assessable work to begin with, although we have a very small sum appropriated, about \$18,000, for the overhead, for which we buy our trucks, sprayers and tools, and the bookkeeping and maintenance and upkeep of our entire outfit, so all work that is done is assessed to the property owner directly interested.

QUESTION: Have you any control over a diseased tree inside of the lot?

MR. SPIDEL: Unfortunately not. Of course we can tell the property owner we will take the egg masses off his trees. I am driving about talking in various parts of the city and explaining the seriousness of the condition. I have induced many property owners to keep their places clean.

RELATION OF WISCONSIN FRUIT GROWERS TO THE DEPARTMENT OF HORTICULTURE

PROF. J. G. MOORE

I suppose that in starting out I ought to say that anything that I say this morning is not said in a spirit of criticism. In fact, I am going to consider myself as making a report to the society in regard to what the Horticulture Department is trying to do, and then put up some pertinent questions to you for your solution.

As you know, a department in a university or college, charged with a certain line of work at the present time is organized along three lines, teaching, research and extension. The teaching work in a way is not so directly related to the horticultural interests of the state in which the work is being done. It touches, of course, here and there an individual who becomes a fruit grower and thus influences the horticulture of the state ultimately, or it trains him to take leadership in some phase of horticulture which may not be necessarily within the confines of the state in which he receives his training and in that way one state serves more or less in the capacity of a benefactor to its sister states. However, when we come to the question of research and extension, we are in a field which does immediately affect, or should immediately affect the horticultural interests of the state directly.

If we take the first, the research aspect, we must not overlook the fact that, as in the case of teaching, research is not necessarily confined and probably should not be confined alone to the interests of the state in which the work is being done. You have heard more or less discussion in recent years regarding the question of educating people from outside of the state in the University of Wisconsin and arguments pro and con as to whether Wisconsin should spend money to educate people, or rather, to pay part of the expense of educating individuals from outside the state.

Now, the same question might well be raised as regards research work. I think you will concede that after all the view which we should have in our research work along horti-

culture lines or any other line, should not be so restricted and narrow that we must choose problems upon which to do that work, which necessarily apply only within the state. We have taken from the work of other people; we have felt at liberty to go out and take the results that have been accomplished, the results of work that has been done in Minnesota, Iowa, New York and elsewhere, and turn them to our profit and we in turn ought to be in a position, and I think we are in a position, to give something to these other states in pay for what they have done for us. Not that they ask any pay, but because we ought, as organizations promoting the advancement of horticulture, to have a viewpoint which takes in more than that territory which is confined within the boundaries of our state.

We do select problems for our research work which have a direct bearing upon Wisconsin horticulture and I think I need not advance any argument here or bring any specific instances to prove to you people, who have followed the work of the Horticultural Department since it was first organized under Professor Goff, that in the research work of the horticultural department there have been brought out from time to time certain findings which have been of great importance in the development of the fruit industry in this state, and so I am not going to debate the question as to whether research in horticulture is worth while or has been worth while. I think that is a case that is proved without argument.

We come next to the extension phase and here is the phase which I think is giving horticulturists in most states—I know it has in Wisconsin—more concern than any other phase. Extension work in horticulture, as you all know, is in a relative sense, of very recent origin and development. Of course, we have had more or less extension work ever since agricultural colleges were organized, but it is only within the last few years that there has been concentrated effort put in extension work and there has been no phase of agricultural activities which has developed so rapidly within the last few years as the extension phase. Adding extension to the work already assigned to the various departments puts on them a very considerable load and from an administration point of view, it has raised a very serious question because, recognizing the desirability of extension work, of carrying the work of the

colleges out to the people, we also recognize the fact that we are limited in the facilities which we have to do this work, and so, as Dean Russell told me the other day at a conference, "Our big problem has been to know just how far to go along certain lines of extension at the expense of teaching or research." That has been the problem of the Horticultural Department.

A few years ago in talking to this Society, I outlined the orchard extension work which we were doing, and suggested that I thought that ultimately there would be increased interest among the people of the state in better management of their orchards. We worked for some ten or twelve years in this extension work before we could begin to put our finger very definitely on anything that we might say was the direct result of the seed which we had been sowing. But undoubtedly the seed which was sown by the Horticultural Department and in which we were assisted by this society, was evidently good seed, only it had to lie awhile in the soil in which it was sown before it began to germinate and grow. When I tell you that during the last year we were asked to go into twenty counties of this state and put on intensive work along fruit lines, you can begin to see that Wisconsin is wide awake to a proposition of what ought to be done in horticulture in this state.

Orchard work is just one-line of extension effort; landscape gardening is another phase of our extension work. There are eight or nine counties asking for an intensive program in landscape gardening, such as we have been putting on the last few years, in Winnebago, Waupaca and other counties in the state. This situation points to the fact that there never was a time in the history of horticulture in Wisconsin, when the harvest was ripe for the gathering to the extent that it is at the present time.

Having tried to show you briefly what the call is, I want to tell you next how we are able to meet that call. This is the sad part of the story. After studying the question of the best method of presenting any phase of extension work in the state, after trying out more or less fully various methods, we came ultimately to the conclusion that the effective way to do extension work was to do it intensively, to go into a county and do that county thoroughly and then move on

to the next, rather than go here and there and all over doing a little work and have nothing come of it due to the fact that there was no one to follow it up long enough to bring the interest up to the point where the work was continued. One of the things that has taken place in the state, which made it possible to change to this intensive plan, was the advent of the county agent. The great trouble with extension work in the past, at least so far as horticulture has been concerned, and I think it is true of other lines of extension work carried on back in 1905 and 1906, and after that for a number of years, was that there was no organization at the point where the work was done to follow up and intensify the work and see that the work reached a larger number of people than those who were intimately associated with the work at the beginning.

Now, the county agent changed that situation entirely. We are able to go into a county at the present time, take up the work with the county agent and through education of the county agent and a relatively small number of people interested in the subject, to absolutely cover that county with the gospel of better fruit and better orchard management. Owing to the nature of the work which we have to do, this is the only possible way of accomplishing large results. Those of you who are familiar with orchard spraying can readily see that it is not possible to cover very much territory with a single individual giving directions to growers as to how to spray, because of the physical limitations of getting around and the fact that the time of application of the spray is limited. That is what makes it impossible for us to meet the requests of these various county agents, about 18 or 20 in the case of orchard work last year, who are asking for intensive work in their counties. I have a couple of letters which I want to read to you, which show the situation as regards the extension work. (Reading letters.)

The reason for reading these letters is to show you how impossible it is with our present equipment of one man to cover the state of Wisconsin and give assistance in 20 counties in intensive orchard work. The same situation exists to a lesser extent in extension work in landscape gardening.

Why should I mention these things to you? Why not do as Governor Blaine said this morning, let the trouble rest

lightly on my shoulders and forget about it? Well, after getting letters from county agents such as those referred to, one begins to feel that there is some responsibility. You may ask the question, why don't you do it, why don't you help these fellows? With all this harvest ready to harvest, why don't you get busy? Well, we have been busy, but you cannot harvest a very big crop with a small force. I am condemning no one. I am criticising no one. The situation is this. We all know that it takes money to do work. We all know that the university is given a certain appropriation, that there are a lot of departments, all as intensely interested in their line of work as we are interested in horticultural work, and therefore, just about this season of the year, the budget season of the year, everybody is putting forth his best efforts to get just as much of that money for his particular department as he possibly can. I have no criticism to make of the proportion which horticulture has received, I do not want it understood that I am complaining that we have not got a just proportion, but I do want to say this, that if we are going to take care in an adequate manner of the calls that are being made similar to these which I have read, and put this proposition of better fruit in Wisconsin over when the thing is ripe for it, we will have to increase our funds and increase our force. People who get the most funds are the people who have the biggest call or the biggest backing outside that is helping them to get the funds. I am going to be very frank, you do not need to expect the Horticultural Department under the present conditions, to be able to help these men who need help, any more extensively than we have in the past, unless we have greater facilities for doing it. We are willing to pull all we can, but the fact of the whole matter is this, that it is very largely up to you as a horticultural society and as fruit growers of the state to help determine how much can be done in this line of work.

There is just one other thing which I want to mention. Owing to the fact that a horticultural department is a part of a definitely organized institution in which the fruit growers of the state directly have little or no part, there often seems to be the feeling that you are just a little bit outside; you do not feel quite free to butt into the organization with suggestions. You leave that to the secretary of the horticultural

society. The point I want to emphasize here is that the Horticultural Department is ready and willing and anxious to have you bring your problems to it, so that we may help you in any capacity we can. Not only that, but we are even ready to go a step further and to say that if there are things going on in the Horticultural Department which do not meet your approval, or about which you have some questions, we are very glad to have you come to us with those criticisms, with your suggestions, because we feel, and we want you to feel, that the Horticulture Department is merely a servant of the horticulturists of the state, that we are there to serve you in whatever capacity we can serve you best and so far as possible, follow out your suggestions.

In a neighboring state they have put into operation an idea which I think in a way is a very commendable idea. It is that the Horticultural Society has seen fit to organize within itself a committee whose function it is to get in touch with the men of the college and experiment station to take up and discuss and try to work out methods of meeting their particular problems. I think that undoubtedly that method could probably well be followed out in Wisconsin.

I do not know that I have fairly put up to you the relation of the Horticultural Department to the fruit grower, or the relation of the fruit grower to the Horticultural Department, but I have tried to make you see that you have a responsibility in helping to do the work which the fruit growers of the state are asking us to do. I thank you.

VARIATIONS IN NATIVE TREES, SHRUBS AND HERBACEOUS PLANTS

WILLIAM TOOLE, SR.

The plant breeder is interested in any tendency of vegetation to vary, because that is the foundation of his dependence, in efforts to originate, or, as some express it, to create new varieties. The lover of nature delights in observing and comparing the various forms and coloring which nature offers for our admiration in the vegetable kingdom. Propagators and dealers are interested in whatever is new or novel, that they may attract buyers, and the

buyers or growers are eager to test whatever promises to be an improvement over existing kinds. Only careless observers have failed to notice the various styles of growth of our native white elm. Some trees hold to the fastigiate, or broom-like form, until forty or fifty years old. Others are graceful and pendulous even when quite young. I have never seen an old healthy white elm tree which was not worthy of admiration, but some are attractive at any stage of growth if not crowded too closely in planting, as is often the case in cities and villages. Mr. Forrer, of Milwaukee, tells of one nursery firm that propagates by grafting from a special selection of the white elm. This careful selection and propagation, of course, adds to the first cost, but when we consider that a tree may live to delight several generations, this first cost is but a small part of the future value of the tree. It is difficult to say how great is the value of a tree when growing in a desirable situation. There are variations in individuals among the various species of our native oaks, but I have never noticed any form which seemed more desirable than the average of its kind. The Red Maple—*Acer rubrum*—sometimes called swamp maple, although not particularly partial to swamp, is attractive when in bloom in the spring and again in the fall with its brilliant autumn coloring of leaves. There is a marked contrast in the brightness of the coloring of the leaves on different trees. I have often admired the varied marking and brightness of color of a particular tree in the city of Baraboo. Some trees are also much more showy than others when flowering. There is difference in denseness of foliage and time of leafage of our native Basswood. I know of one tree having a distinctly pendulous habit of growth which is very attractive. The ice storm of last winter temporarily spoiled the beauty of the tree.

The value of variation of our native plums has been given full recognition. Improving the fruit of our native Crabapples has been discouragingly slow. There is much variation in the flowers as well as the fruit. They are so easily propagated by grafting on common apple roots it would be well worth while to make selections of the most desirable flowering kinds for ornamental planting.

There are differences in length of needles, and density of foliage, in both the White Pine and *Pinus resinosa*. Perhaps these differences could not be well determined in propagation, but there could be opportunity for selection in the nursery. Among our

native White Spruces there are noticeable differences in denseness of foliage and shades of green. While the differences are not so varied as with the Colorado Blue Spruce, selections could be made that would be worthy of propagation. The Gray Pine—*Pinus Banksiana*—is generally not attractive, but selections may be made that are really worth while, as there is a wide difference in fullness of foliage and brightness of appearance. They are frequently used for Christmas trees, and as they thrive in very sandy soil, it might pay to propagate them from seeds of the best. The nurserymen seem to have the variations of Junipers and Arbor Vitae well in hand and offer a number of varieties.

An inviting field of research is offered in native nuts, Butternuts, Black Walnuts, Hickory Nuts, Beechnuts and Hazelnuts. Beechnuts do not grow in our part of the state, so I do not know if they offer any special variations.

Butternuts offer a wide range for discriminating choice in size of nuts, thickness of shell, and fullness of meat. The largest nuts are not always the best kernel producers. The nuts from some trees when cracked yield their meats more readily than others. For cake, candy and salad filling butternuts are very desirable.

There is a wide difference in the fruit of Black Walnuts in size, thickness of shell, accessibility of meat and flavor. I prefer mildness of flavor, but some people prefer what they consider richness. Altogether the Black Walnut is very desirable, and it is well worth while to secure the best.

Hickory nuts are general favorites, and I wish that ours of Wisconsin were as large as some which grow farther south. There is, however, a wide variation in size and quality of our Wisconsin hickory nuts, including thickness of shell, fullness and texture of meat and flavor. Of course, we look to the Shellbark Hickory—(*Carya ovata*)—for best kinds, but I think there are possibly good kinds to be found among the Bitternuts—(*Carya cordiformis*). A few years ago a neighbor gave me some nuts which had the smooth rounded form and general appearance of the Bitternuts. The shells were as thin as those of the Pecan and the full meats were of the best quality without any trace of bitterness. It might have been a natural hybrid, but I never saw the tree or the outer covering of the nuts. The tree has since then disappeared. I have known of people having a liking for some of the White Oak acorns. Perhaps there are some which are not astringent and are good enough to be generally desirable.

Passing from trees we may well bring forward the Hazel to introduce shrubs. We have two species of Hazel, the beaked form (*Corylus rostrata*) and the more common variety with ruffled cups (*Corylus americana*). There is a wide difference in size and general good qualities of our common Hazelnuts. There was a good yield of hazelnuts in our own and neighboring pastures the past season, and I regret that I did not make selection of the best varieties for future growing. If given space by themselves the Hazels when once established would hold their place against intruding vegetation.

I notice that in other states considerable encouragement is given to bringing forward the best of the native nuts, and they are included in the premium lists of some of our Wisconsin county fairs. Our Wisconsin State Horticultural Society would do well to encourage the development and culture of the best of our native nuts. Nuts are popular because they are palatable, nutritious and healthful.

Viburnums among our native shrubs are very desirable for ornamental planting, and the Nanny-berry—(*Viburnum Lentago*)—also called Sheepberry and Wild raisin, deserves a leading place because of the attractiveness of the foliage, flowers and fruit. In our own pasture we find there is a considerable difference in the size of the flat clusters on cymes of flowers, and on some bushes the fruit is so nearly good that it seems as if it might be worth while to try to improve them. With smaller seeds and a little more pulp we would have a decided acquisition to our fruits.

I think there are differences worthy of consideration in our wild Highbush Cranberry—(*Viburnum Opulus*), but with us the wild bushes are so scarce that there is not much opportunity for comparison. I have tried to raise them from seeds, but the seeds would not germinate.

The paniced *Cornus* varies greatly in size of clusters of flowers and showiness of fruit. The white berries on some bushes make a fine display in the summer. The shrub called Nine Bark (*Physocarpus opulifolius*) is well deserving of cultivation, giving an abundance of flowers shortly after the Van Houtei *Spireas* have ceased blooming. They are easily grown from seeds and the differences of flowers and seed vessels offer good opportunities for making improvement by selection.

Some people have shown good taste or judgment in planting the common Elderberry for ornamental purposes. There are de-

cided differences in the size of the broad, flat clusters of flowers, also in time of flowering and ripening of fruit. Some people like the fruit for cooking. If I ever learn to like them I shall certainly seek for some of the best to plant. I am pleased to learn that someone in the East offers a choice selection of the Elder for sale.

The shrub, *Ilex verticillate*, which is variously known as Winterberry, Northern Holly, and Black Alder, is always showy when in fruit, and there is a considerable difference in the showiness of display and size of fruit on different shrubs. It bears transplanting well and is easily grown. They are polygamo-dioecious, therefore the fruit-bearing shrubs must have those which bear stamens near them just as it is with varieties of strawberries which are said to have imperfect blossoms. They can be readily propagated from root cuttings and suckers.

Another showy fruiting shrub is *Euonymus atropurpurea*, with the common names of Burning Bush and Wahoo. While there is not much difference in the appearance of the fruits, there is a decided difference in the fruitfulness of different groups of bushes. Propagation is easily made from root cuttings and suckers.

There is a wide difference in the height, quality of fruit and fruitfulness of the Shadbush, Juneberry, or Service berry—(*Amelanchia canadensis*). There is also some difference in the flowering. Nurserymen have made some selections for the trade.

There is some variation in the Chokecherry, and I have been told that some are really good for eating.

Cranberries, which vary considerably in the wild state, have probably received all the attention necessary to secure improved varieties for cultivation.

My greatest interest in seeking for improvement among the natives has been with herbaceous plants. The kind to which I first gave special attention was the New England Aster. Here and there in the wild we find those having a blue-purple shade of flowers, and occasionally those which are nearly red. After many years' sowing and selecting we now have them scattered about the place in varied shades of blue and purple, red and pink, rosy lilac and nearly white shaded at the edges with pink and purple. These asters flower the first season from seeds if planted early, so annual progress can be made in selection. I have neglected these asters for a couple of years because of other plant development

work, but shall give them renewed attention lest there be some loss of what has been accomplished.

Nothing in the line of striving to produce increased variations has interested me so much as my work with our native Phloxes, especially the Prairie Phlox—(*Phlox pilosa*). While with much searching considerable variation may be found in the wild, yet experience has shown that from seeds we can secure increased variation. Much pleasure has been derived from experimenting with the Woods Phlox—(*Phlox divaricata*). Between the extremes from near blue to white we have delicate shades of lavender, rosy lilac and pink in varied degree. A few plants flower from seed the first year and it may be possible to fix the habit in some strains of selection. White grubs have very much interfered with my work in phlox, as well as other things. I have been much interested in the varied forms of the Black Eyed Susan—(*Rudbeckia hirta*). There is some variation in shades of yellow and wide differences in length, breadth and arrangement of petals. They vary in habit that they are not distinctly biennial or perennial. So many of them bloom the first season from seeds that they probably could be used as annuals.

Having raised the Orange Milkweed or Pleurisy root (*Aselepias tuberosa*) from seeds I have been surprised with the resulting varied shades of color in the flowers, from light yellow to bright orange and reddish orange. They are very showy when in flower and I shall keep up my interest in growing them from seed and making selections.

When dew sparkles on leaves in the morning the flowers of Spiderwirt (*Tradescantia virginica*) are very attractive. As we find the plants wild they do not seem partial to particular soils, although with us they colonize most often where the soil is light. I have them with flowers of pale blue, varying in others to rich blue-purple. They are so easily grown and the flowers look so cheerful they deserve more general cultivation.

I wonder why the iris fanciers have not made more of our wild Blue Flag (*Iris versicolor*), flower de luce we used to call it. There is a considerable variation in shadings and veinings of blue to purple.

I have been told of white ones being found. The plants will succeed in ordinary garden soil and if necessary thrive in wet situations.

The Sun Dial or Wild Leupine (*Leupinus perennis*) seems to be partial to light soils, although not always found in such situations. The long recemes of pea-like flowers often make a fine show for Decoration day. There is a wide variation of blues and purples shown in the flowers, and occasionally we find white ones. The plants root so deeply that they do not bear transplanting very well from the wild. The seeds are so fugitive it is difficult to secure them before they scatter. If I could secure the native seeds I would give them a more extended trial.

I like to grow the Rue Anemone—(*Anemonella thalictroides*). There is a wide variation of color shades in the flowers from white to nearly red. I think it worthy of the increased attention which I shall give it. About fifty years ago a friend gave me some plants of a double variety which she found growing wild. The flowers were as double as miniature pompom Chrysanthemums. One winter mice ate the tubers, so I lost them.

I have raised the Wild Bluebell or Harebell (*Campanula rotundifolia*) from seed and find there is a considerable variation in form and depth of color of flowers, also in habit of plant growth. They are readily raised from seed and are not partial to any particular kind of soil. They offer much possibility for improvement.

I wish I had time to take in hand the Shooting Star—(*Dodecatheon meadia*). I have them in nice variety and they deserve more attention.

I have cultivated our native Turk's Cap Lily (*Lilium superbum*) for many years, and have found them in the wild in various shades of ground color from light yellow to red orange. They are easily grown from seed and readily respond to good cultivation.

The Greek Valerian—(*Polemonium reptans*)—also often called Bluebells, is a general favorite and easily grown. There is enough variation in flowers and general habit of the plants to make it seem worth while to seek for the most attractive forms and shades of color.

Water Leaf (*Hydrophyllum virginianum*) has variegated leaves and flowers which are pretty, but not showy. There is variation enough in both leaves and flowers to encourage desire for a selection of the best.

Lungwort or Virginia Cowslip (*Mertensia virginica*) is another of the Bluebells, with a wide variation of shades in the flowers. This favorite plant could be readily bred to separate varieties.

The Hepatica or Liverleaf takes kindly to cultivation and gives a wide range of colors from white through lavender, rosy, lilac, pink and blue to nearly purple.

Of climbing vines some people who have planted the Climbing Bittersweet—(*Celastrus scandens*)—have been disappointed because they received no yield of the showy fruit. One cause of disappointment is because many are dioecious, that is, having staminate and pistillate flowers on separate vines.

This sexual difference is also a feature of the native Virgin's Bower (*Clematis virginiana*). If staminate and pistillate forms are not near by one may have flowers without the feathery seed clusters.

Someone may ask what reward there may be for the labor and care involved in trying to bring about desired changes in the habits of plants. Of material rewards to be measured in money value there is generally not much of promise in the outlook, but to one who loves to feel a companionship in nature's production, there is the pleasure of anticipation and the joy of accomplishment. Hopes are often realized beyond expectation and the pleasure of sharing with others the favorable result of our efforts is often a reward beyond measure.

Friday Afternoon Session

TREATMENT OF ROADSIDE TREES FROM STANDPOINT OF HIGHWAY ENGINEER

Address by A. R. HIRST, *State Highway Commissioner*

The business of highway building in Wisconsin has grown to be one of tremendous magnitude. I came to Wisconsin fifteen years ago as State Highway Engineer. At that time the control of rural highways throughout the state was entirely in the hands of the township. There was being expended at that time for the construction and maintenance for rural highways and hedges approximately three and a half million dollars a year. Last year there was made available for expenditure by the federal government, the state, the counties, and the towns on roads outside of the limits of incorporated cities and villages, a total of \$37,000,000, and we built for that—part of the program was untouched—

we built over three hundred and fifty miles of concrete and over two thousand five hundred miles of other roads. This included the construction of about seven hundred bridges on those three thousand miles of road. We built in the neighborhood of 10,000 culverts. The total cost of that operation, including maintenance, was \$37,000,000.

In the maintenance of the roads, Wisconsin probably stands foremost among American states, at least in the magnitude of the operation. We maintain a system of 7,500 miles of state trunk highways and those are the ones with the triangle markers on them and a number in addition. The counties of Wisconsin at their own expense maintain nearly 10,000 miles, counting the trunk highways. Those are the ones which are marked, or should be marked, some counties have neglected to do it, with a rectangle and a letter. This 17,000 miles of highway is approximately 22 per cent of all highways in Wisconsin and it is a much larger maintenance service than is given in any other American state. We maintain more miles of road, probably have a better marking system than has any other state. Now, all these things have cost tremendous amounts of money.

It may be of interest to know that of the total taxation in Wisconsin, direct and indirect, which now equals \$122,000,000 a year, \$52,000,000 goes for the construction of roads and streets and bridges, and other maintenance, in all units of the government in Wisconsin. In other words, over and above the rural highway expenditures, there is expended \$15,000,000 by the cities and villages in Wisconsin in the construction of highways. These figures are astounding and appalling, and, off hand, when you think of the expenditures for highways in Wisconsin, that they have increased ten times in fifteen years, it seems almost too much. But, on the other hand, the thing which has created the necessity for the expenditures on the highways has increased ten times as much.

We licensed in Wisconsin in 1907, 3,700 motor vehicles; in 1922 we licensed over 380,000. In other words, motor vehicles increased one hundred times and over and each of them traveled more miles and was heavier, if you include the motor truck, than the vehicles of fifteen years ago, so that while our expenditures for highways have become, as you might say, appalling to some people, they have not increased one-tenth as fast as has the use of highways in the last fifteen years. Wisconsin is spending one-

tenth as much per mile of rural traffic as it did fifteen years ago. I want you to remember that for a minute—Wisconsin is spending one-tenth as much to take care of rural traffic as it did fifteen years ago. The motor vehicle has created the demand for the roads, it has caused the expense for the roads and for their maintenance, and the motor vehicle this last summer traveled over our highways 1,400,000,000 miles. There has been nothing in the whole history of civilization which at all approaches the growth of the motor vehicle in the last decade in America.

I was asked to talk about roadside trees from the standpoint of the highway engineer. In operating the highway business of a state, there are all kinds of highways to be considered. On the main roads of Wisconsin such highways as Number 15, in the neighborhood of Milwaukee, Number 19 in the neighborhood of Milwaukee, we have a daily traffic of approximately 3,500 vehicles a day. On the state trunk highways of northern Wisconsin, even the most traveled of them, we get highway traffic of about 200, 250 or 300 light automobiles per day. These are on the main roads of the state, and as I said in the beginning, these main roads, including county highways, constitute 22 per cent of the mileage, and it is quite probable that on this 22 per cent of the mileage at least 90 per cent of the miles traveled goes, in other words, this one-fifth of the mileage would take care of approximately nine-tenths of the traffic.

Highway engineers, including myself, have often been accused of being unsympathetic about the beauties of the roadside, but many of those who accuse us of being unsympathetic are totally unaware of the manifold phases of the work. This year, commencing with May, when we started to keep as accurate a record as we could, there were nearly 1,000 more or less serious automobile accidents on the rural highways of Wisconsin. As I remember the figures, there have been about 150 persons killed and at least 300 injured seriously. We may complain about the regulations of speed for the motors, but most of us when we are out with a free road ahead also step on the gas, and we are building highways not for the careful driver who keeps within the legal speed limits, and obeys every precaution of common sense, but we are building highways for every user of the road, and some of them are not 100 per cent mentally competent and some of them have been drinking moonshine. In other words, we have to take care of the reckless, the thoughtless, the mentally incompetent and

those who are drunk, and it is a severe responsibility placed upon the highway department of state and counties to try to take care of traffic with the minimum of disasters.

As far as roadside trees are concerned, they enter very little into the factor of the safety of traffic except at special points. Low growing bushes have complicated the problem on almost every road, because if within the limits of the right-of-way, especially on an east and west bound road, these bushes may hold snow so that the road may be closed unless tremendous sums are expended in an endeavor, which may at times be futile, to keep it open. We believe in tree planting, because nothing more enhances the beauty of a road than vegetation and trees along it. We have destroyed, I am very frank to confess, many trees which should have been saved and could have been saved if every man in the organization and every man in the contractors' organization had had it in mind in time. You understand that in grading a modern highway, especially on a main line of travel, we are making roads that would have at one time been considered of tremendous width. The distance between the ditches of every standard grade road is approximately 30 feet and that does not include the slope of the banks when they are cut in, or filling, that is just the road width. In the old days, roadbeds as originally built in Wisconsin, approximated sixteen and eighteen feet between the ditches, and it is quite obvious in these widenings that practically every shred of vegetation between the fences, has to go. There is no way of avoiding it, if we are to build roads of a width safe for traffic on the main highways.

In letting out the contracts and specifications for road work, it is customary in every state and has been the custom in this state, to provide that the roadway should be clear, so many rods wide, and should be graded and left free of stumps and stones so many rods wide. It is in that respect that we have had the most accidents within the three rods, the usual clearing limits; for instance, very often grow trees which could just as well be saved if steps were taken to limit the contracts in advance, but it is quite difficult work to tell just where the excavation limits are going to come prior to the grading. Of course, we have our slope stakes between our cross-sections, but often there is doubt about certain trees and often they unfortunately go when they should not go. We have, however, done better this last year. We are going to continue to improve and expect to complete a tree list,

one which would provide for the saving of trees if public safety makes it possible to save them. But after all, in all the years to come, the beautiful drives of Wisconsin are largely going to be those roads which are not intensely traveled. In other words, to a considerable degree the side roads, because on the main roads we will have to build them so wide, the traffic will be so severe and so dangerous that every precaution will have to be taken about crossings and vegetation and shrubbery if we are not going to murder, not 150 people, but possibly 1,500 people per annum.

Those who live for the artistic and say that this curve around the hollow with a beautiful grape vine or something else is all right, that drivers can slow up there, but the fact is that they do not slow up there and in saving some of these features about which we have had some severe disputes, I would feel myself a potential murderer if I allowed conditions to exist which some of the extremists said should continue to exist. Every time we build a road over a grade crossing—every time we do it we know that we have signed the death warrant sooner or later of a person or persons. We cannot allow sentimentality to run away with us. The beautiful is all right, I admire it just as much as any person in this room, but in building the main highways of Wisconsin, we are building traffic arteries, just as important as any line of railroad which was ever projected through the state of Wisconsin and over which road the railroads build such straight lines to eliminate distance, to eliminate curves, to cut out everything that interferes with the vision of their engineers. There is not a place in Wisconsin on any highway where we have deferred to the local desires for curves, or where we have done something which we felt as an engineering matter should not be done, that we have not been sorry for it within two years after construction, and while we are advancing to some extent in our engineering practice, there is not a state in which a highway built ten years ago is adequate or safe for traffic today. You cannot have your highway traffic multiplied by one hundred within a fifteen year period, and expect to continue the conditions which surrounded highway traffic fifteen years ago. Many of us think each year that the limit in automotive ownership must be here, but nevertheless, Wisconsin scored the largest increase in automobiles in the last three years, and it does not appear that the end is here yet.

There are certain difficulties as to tree planting along highways. I have not said anything about the fact that on certain types of road excessive shade along highways makes it impossible to maintain the road during the wet seasons. That is not true of concrete roads or other high class surface roads, you can maintain them despite a large amount of shade, but it is a factor which cannot be disregarded. The factor of the drifting of snow on the middle of the highways cannot be disregarded.

It is my impression, as I look on the situation, that on the whole much more can be done for the beautification of our highways by saving adjacent groves and wood lots than there can be done by continuous planting along the highway. I was brought up on a farm, I lived on a farm until they threw me off, and I know that despite what some people say, it is not possible to maintain a row of trees in the middle of a field or on the edge of a field without ruining the crops thereunder, and the planting of trees along highways in extenso means that the abutting property owners must either be willing to relinquish a part of the value of the land under them, or they must be paid for it. Quite a few farmers are quite complacent about groups of individuals coming out and planting trees along their property, because they know as well as I do, that the enthusiasm of planting having dissolved, the trees will be allowed peacefully to die before they become a menace to the land. If we are to have any effective tree planting in Wisconsin along highways, or the maintenance of wood lots adjacent to highways, we must have a central organization whose business it is to see that these things are not only done, but to sustain an organization for maintenance thereof. I know that no spasmodic, non-paying enterprise ever gets results over a series of years. If it is the desire of the people of Wisconsin to beautify their roadsides, to encourage roadside planting, to develop real trees instead of dead sticks, if it is the desire of the people of Wisconsin to provide hundreds of camping sites and woodlots, as should be provided, then there must be created an organization with a paid personnel to look after these things. An organization which holds a meeting once a year and decided that these things would be nice and then forgets it until the succeeding year, does not accomplish much. No human enterprise worth while, be it public or private, was ever successful unless it had an organization back of it which functioned actively 365 days in the year, including 366 in leap years.

As far as my power in the highway commission is concerned, I am absolutely and thoroughly in harmony with any policy which will help to save any beauty spots which now exist along our highways, and to secure others. We would be glad to cooperate with the conservation commission or any department or commission in saving everything worth while that we can save and yet protect the lives and happiness of our clients, the people of Wisconsin, for whom we are building and maintaining roads.

I have been in the state fifteen years, I have heard roadside planting talked about on both sides for fifteen years, and I have read the resolutions passed by various societies for fifteen years and yet the death of roadside trees as compared to those planted in the last decade in Wisconsin, has been as one hundred to one. Now, if we really care about these trees that we want to save, to save what we have and get more, the highway commission can do a little. We have promised many people that we would do a little, we have improved this year, we will improve next year, but it is a matter of constant thought of practically every member of our organization that we will take care of saving those trees which may be saved. There is possibly nothing in the law to prohibit us from planting trees, but until we have the appropriation and an organization to take care of those trees after they are planted, it is useless to plant them. What fraction of the trees planted on Arbor Day in Wisconsin do you imagine live? Why, when I was a school kid we planted the trees in the same holes each year so as to save the trouble of digging new holes. The thing which I will emphasize, ladies and gentlemen, is first, that the highway commission is trying and is going to continue to try to keep our roadsides as beautiful as they can be kept, and yet provide for the public safety, and the second thing I want to emphasize is, if we are going to make any real progress in this matter, it must be through an organization which functions all the time. That is, the one proposition, and not only has it got to be able to function, but it has got to have some money to function with. We have county planning, it is more or less co-ordinated, I believe, under the Department of Agriculture of the state, it is quite easy to get those laws passed if they do not carry an appropriation, but those laws are almost totally useless unless they do carry an appropriation. Most of us are very willing to spend a part of the day, or an hour or two in the emphatic discussion of any public question in which

we ought to be interested. Business men and farmers, and other clubs, and younger people devote a considerable amount of time during the year to the consideration of problems a little beyond the bare problem of making one's own living. It is quite proper to have speakers address gatherings and then to pass a resolution endorsing what that speaker may think should be done, and then forget about it for a year. The next week we attend another meeting and endorse the speaker on his specific proposition, and then we forget about that. Nothing is possible under those conditions. The Women's Clubs of Wisconsin, and the State Horticultural Society of Wisconsin, the Friends of our Native Landscape and the other bodies which are interested, and properly so, in the preservation of the beauties of Wisconsin, not only for ourselves but for those who are coming after us, can effect nothing by meetings or resolution, they must actively get behind the proposition of creating not only a state organization, or a part of the state organization which will have that work as its duty, but county organizations which will also have that work as their duty. I have been in every county in practically every village and city in this state. I have traveled—of the 77,000 miles of road we have in Wisconsin—I have undoubtedly traveled over at least 55,000 of the miles we have, an aggregation of the most wonderful territory that I know of in America. We have the climate, we have the beautiful green grass almost everywhere, every year, all during the year. We have lakes and rivers, fish and game, we have everything in this state which would make it the greatest resort area in the middle west. We are slowly acquiring a system of roads at least as good as any other state in the middle west. We have developed the idea of public camp sites in Wisconsin way beyond such in any other state. We had 230 I believe, last year, cities and villages which furnished free camp sites to tourists. But as far as the acquisition and the maintenance of public breathing places is concerned, we have no method, no far-reaching concerted movement to create state parks. The ones we have are almost inaccessible, not only the roads *to* most of them, but the roads *in* most of them are such as one can hardly travel on. We have only gone half way in the matter of state parks. Altogether as a people we have been moderately free to provide these state parks, really wonderful places, but we have not provided the money in effect to maintain them. If our state parks are not worth while, say they

are not worth while; if it is worth while for Wisconsin to have them, it should be worth while to make them a source of state pride instead of state shame. That is not criticism of the conservation commission, they have spent all the money they had to give, to good advantage, but when, as a matter-of-fact we have parks to which you cannot get and most of the parks you cannot get into with a motor vehicle, it is not a condition which should persist, and not only should we have these large parks scattered here and there, throughout the state, but we should have literally thousands of smaller ones.

We have 1,200 towns in Wisconsin, that is, townships with town systems of government; every one of them should have two or three little parks for the people and for the children to play in. As I traveled through Wisconsin and through the country districts, where the land is not worth \$25.00 an acre, I find little children playing in the middle of the road, because the school grounds are not large enough for them to play in. We should develop our school grounds so that at least the youngest child can have a chance to play without the chance of being run over by an automobile, and if many of the towns would have taken a couple of hundred dollars out of the school house that they built and put it in lots around the school house, the children would have been much better off as far as the value of their education is concerned. We must provide a chance to play. The automobile has changed the whole face of civilization. While some may be inclined to criticize it, because it is a tremendous expense, I estimate that the people of Wisconsin spend at least \$20,000,000 a year on the ownership of automobiles—while it is a great expense and can possibly be carried too far, it is one of the things which is going to enable us and our children and our children's children really to live. If there is one thing that will keep the children on the farm, it is the motor vehicle, plus a road that he or she can use it on. If there is ever going to be a great back to the farm movement in America, it will come from the fact that on the farm one can live just as well and just as happily as one can live in the city, and the two great factors which will bring this about, three I will say, are first, make education in the country just as good as it is in the city, and secondly, pick up the farm and move it to town. The one can be done by extending the system of rural education until the farmer boy and girl has just as good a chance as my boy or

my girl in Madison, and the second can be done by building an adequate system of roads which will serve the people and the whole state.

Now, I have drifted around this afternoon, I have felt free to do so because Mr. Cannon is not here, and others who were also on the program. I have rambled about, but if I have left in your minds at all the thought that the big thing about roads is not the roads themselves, that is more or less a mechanical and engineering proposition, but the road is after all, the thing which binds us as neighbors together. Nothing else will do it or can do it. No state can be a model state without an adequate system of roads. We are spending millions of dollars in this state for roads, but we must spend even more or we must scrap our motor vehicles. An inadequately built or maintained system of roads does not go with \$200,000,000 worth of motor vehicles to run over roads. If the citizens of Wisconsin insist upon owning and operating motor vehicles to the number of 400,000, they cannot for a moment avoid the responsibility of making it possible to operate those motor vehicles economically, profitably and pleasurably, and I have been in this road business twenty years now, long past the time when the mere building of a mile or two of road or ten miles of road, or one hundred miles of road means anything to me. I have helped to build so many thousand miles of road that a few thousand more or less would not change my reputation or my experience an iota, but the thing which keeps me in this business is the fact that I am not only building roads, I am doing my humble part in building a state fit to live in, and after all, those are the things which count. An Indian was asked to address a dinner party and the old chief got up and said, "The Indian he no understand white man, the white man he no understand the Indian. The white man he spends all his life getting ready to live, the Indian he lives all the time." Did you ever think of that? The white man spends all his time getting ready to live, the Indian lives all the time, and the thing which interests me in this road proposition, in selecting, in setting and building and maintenance, the fights, scraps and squabbles, is that after all, those of us who, like Mr. Hazlewood, who has just recently passed from among us and those others of us who will likewise pass, have in our humble way started a movement in Wisconsin which will enable our two and a half million people to live all the time.

FUTURE TROUBLES—CAN WE AVOID THEM?

S. B. FRACKER, *State Entomologist.*

In his comment on the title of this talk the secretary of the Horticultural Society says that present troubles are quite sufficient for most of us but that entomologists are always looking out for more.

One of the primary purposes for which a specialist on pests, whether they are insects or plant diseases, is employed is that of anticipating what is likely to be injurious in the future. This is a simple problem when the pest or disease is permanently established and appears annually. We are all ready to go on record as stating that there will be trouble this coming year with apple worms, potato beetles, plum curculio, cherry shot-hole fungus, and the other troubles which cause us additional worry and work each season. In these cases we are following the old rule of judging the future by the past and all general spraying schedules are based on the assumption that the insects and plant diseases which will give us the most trouble in the immediate future are the same ones we have had to fight in the past.

Then there are those pests and diseases which come only in waves but which may be of tremendous importance while they last. A year ago this society was stirred up by the outbreak of the corn ear worm which had ruined a large part of all the sweet corn in the state. The climate of Wisconsin is ordinarily such that this insect cannot survive from year to year but for two seasons it had had a chance to develop. Again judging the future by the past we felt perfectly safe in making the statement last winter that the corn ear worm outbreak was a temporary and spasmodic occurrence and that while it might be continued perhaps another year there was no danger of its becoming a permanent problem. This forecast has proven to be justified, for losses from the corn ear worm in 1922 in most sections of the state were almost negligible.

The future troubles which I planned on discussing this morning are of a still different type. Many plant diseases are present in different parts of the world doing little damage, which take on the most alarming powers of destruction when imported

into new areas. The reason for this is the fact that the plants upon which they work in their native home have developed qualities of resistance while those in the new area are unable to throw off the effects of the disease. The chestnuts of Asia, for example, have not been wiped out by the chestnut blight because of the resistance they have developed to this fungus, but although it is only fifteen or twenty years since that disease was introduced into the United States, the fine chestnut groves and woods of all the northeastern states are almost a thing of the past; the dead trunks and branches stand out among the other varieties of trees like the gaunt spectres we are accustomed to see in the fire-swept forest areas of northern Wisconsin.

Half a dozen insect pests and plant diseases of major importance arriving in the United States from foreign lands have recently become established in this country and are gradually pressing toward us. Most of those for which we need to keep the sharpest lookout are now present in the east, but one is southern and another is advancing from the Rocky Mountain region. Some of them are bound to reach us eventually, perhaps in two years, perhaps in one hundred; while others may be kept away from the industries of Wisconsin permanently.

The only justification for taking the stand of an alarmist at this time is that one or two of these pests may be in certain sections of Wisconsin at the present time and if the attention of fruit growers and farmers of the state is called to them, limited outbreaks may be discovered in time so that they can be completely eradicated. In the amount of money involved, the European corn borer constitutes the most serious of these dangers. The commissioner of agriculture of Massachusetts, basing his statements on the work of this pest in eastern Massachusetts says recently that to compare the threatened results of the loss from the corn borer to the loss resulting from the world war is not a vain stretch of the imagination. The depredations of this insect have been called to the attention of the Horticultural Society at one or two previous sessions but in the meantime the invading army has approached much closer. The areas now covered include large sections of Massachusetts and New York and a complete wide belt around Lake Erie covering areas from six to fifty miles wide in Pennsylvania, Ohio, Ontario and Michigan.

For some unexplained reason the European corn borer uniformly has two and occasionally a partial third brood in Massachusetts, but in the Lake Erie region has only one, with now and then a possible second. Where it has two, the damage is much more severe. Whether these are two strains of the same insect or whether the difference is entirely climatic is not known. It is the belief of the commissioner of agriculture of Massachusetts that an introduction of the Massachusetts strain of the insects directly into the lake states would result in the development of two broods in this region also.

Growers are often inclined, and perhaps with justice, to discount to a certain extent the estimates of damage by specialists because the familiarity of the entomologist and plant pathologist with insects and plant diseases causes them to see the results of injurious attacks with special clearness. In the case of the European corn borer the entomologists seem to have underestimated rather than overestimated the possibility of damage. I have in my hand a clipping from the *Boston Herald* of October 15th containing interviews with some of the truck gardeners of that area showing that these men, some of whom have gross revenues from agricultural activities running into five figures yearly, reported losses of one thousand, five thousand and seven thousand dollars on account of this infestation. A market gardener of Melrose declared emphatically that due to this season's losses from the corn borer alone he would never plant another kernel of corn; although he found the early sale of his crop profitable, five acres were so infested that he was unable to find an ear of corn on them or to cut an armful of green fodder for his cow, and the prospect that his entire acreage would be as badly infested another year led him to the declaration that he is "off sweet corn for life."

Perhaps the situation would be more encouraging if corn were the only crop attacked. At Arlington the celery growers were in October struggling to salvage a worth-while remnant of their crops. It was difficult to find any fields of celery, beets, beans, rhubarb or spinach within fifteen miles of Boston that were not infested. When it is realized that five years ago scarcely a borer could be found in any of these crops the rapidity of development may be understood. Some of the celery fields now show as high as 32 per cent infestation. In the Anderson greenhouses at Arlington where every house was filled with growing chrysan-

themums the stalks were so riddled that the proprietor said he is writing off a loss of seven thousand dollars on his season's business. In this case the borer came from infested weeds which grew rankly outside the greenhouses. They crawled up over the glass roofs and spun themselves down through the ventilators.

One truck gardener of Winchester, a Mr. Russell, not only lost heavily on his sweet corn but found his asparagus, cabbage, cauliflower, peppers and tomatoes attacked and to the surprise of everyone even suffered a serious setback on his grape harvest. The borer penetrates the growing fruit and thrives on its juice, leaving the infested fruit shrivelled and worthless. It was necessary to pick over each bunch, greatly increasing the cost of growing and getting his fruit to market.

If the federal government is able to maintain adequate quarantines, first around the New England infestation and second south and west of the Lake Erie district, the introduction of this pest into Wisconsin may be held off until natural enemies can be imported in sufficient numbers to help reduce damage from the borers. At the same time every truck gardener, florist, fruit grower, and farmer should be on the lookout continually. The original means of introduction was in broom corn from Australia and Russia and while surveys have been made around the broom factories of Wisconsin, such importations may have given the borer a start at some place where it has not yet been found. It is more likely to be detected in corn than in other plants and one of the conspicuous results of its work is the breaking over of the tassel. If such broken tassels are seen in the field the borer can be found by splitting the stalk. It is a little gray worm resembling a cut worm in some particulars but smaller and it does not show the bright colors of the corn ear worm or the common stalk borer. Whenever it is found that a "worm" boring in a plant might possibly be the European corn borer a specimen should immediately be sent to a state or federal entomologist for identification.

Coming from Asia instead of from Europe is a small insect known as the Japanese beetle which established its American residence near Camden, New Jersey. In 1916 a few specimens were found on half a square mile and diligent search revealed about a dozen. As these showed signs of being injurious they were identified, but the ones that were not discovered showed remarkable ability to propagate and the following year two and one-half

square miles were infested. Two years later this had spread to forty-eight square miles and by the fall of 1921 the insect was doing damage over an area of 213 square miles in New Jersey and fifty-seven square miles in Pennsylvania. Instead of its being difficult to find a dozen beetles as it was four years before, by 1920 it was comparatively easy to collect a thousand quarts of adults and even that seemed to have no appreciable effect on the number present.

Like the European corn borer, this is also an omnivorous feeder, attacking field and garden crops, flowers and shrubs, fruit, shade and timber trees. Like our permanent pest the striped cucumber beetle, it is not content with riddling the foliage of trees, shrubs or vegetable crops in the adult stage, but as a larvae is a white grub of no mean abilities for damage. Several of the growers were asking the writer yesterday about the latest developments in the control of our regular white grubs which are always of serious importance. These insects, as you know, have a three-year life cycle so that each brood shows up only once in three years. The Japanese beetle is able to do as much damage beneath the soil but has only a one-year life cycle and appears every season.

In spite of this rapid spread and of the fact that when the writer had the privilege of visiting this infestation a year ago the leaves of cherry and other fruit trees were completely riddled with the work of the insect, the local growers were not convinced of its serious consequences until the season of 1922. Like the European corn borer it has finally shown itself in its true colors and is now considered to be one of the most dangerous insects ever introduced into this country.

Fortunately, it is not carried on the wind to long distances like the corn borer but has a natural spread of only about five miles a year. If the active inspection and quarantine measures which have been applied to the region surrounding Philadelphia continue and the insects are not accidentally shipped on the roots of nursery stock or vegetable shipments it may be a generation or two before this pest reaches the Mississippi Valley. However, it is one which must be taken into consideration and for which we hope our Wisconsin growers are watching. It differs from our native beetles in having dull red wing covers and a bright green head and thorax. Its size is about that of the Colorado potato beetle.

Another insect of somewhat less powers for injury is the Mexican bean beetle, a native not of Europe but of the Rocky Mountain region. As long as it remained in the mountains it did little damage and has been reported from the regions about Colorado as a general but only slightly injurious pest for many years. Two or three years ago, however, it was accidentally introduced into Alabama and was shipped from there in several directions, now occurring widely distributed throughout northern Alabama and Georgia and most of the eastern half of Tennessee. This is a general pest of all kinds of beans, including soy beans and while it might not be as injurious with us as it is in the more southern region, is something for which we should keep a sharp lookout. The entomologists of the United States department of agriculture tell us that they expect its rapid spread throughout all of the eastern United States now that it has become established.

While these stories perhaps sound rather hopeless for the prosperity of agricultural conditions in the coming years or perhaps in future generations on account of the difficulties and the expense of control operations and extensive loss of crops, there are some serious pests which have been discovered in this country to such a limited extent that hope can well be held out for their complete eradication. The most important of these is a plant disease known as the potato wart. This was introduced into several of the mining villages of Pennsylvania and West Virginia in ship loads of European potatoes during the war. The fungus does not kill the affected parts but stimulates growth producing masses of warty tissue the appearance of which suggests a cauliflower. These warts are rough and irregular, soft and spongy in texture, may vary in size from masses as big as one's fist to minute specks or pimples scarcely visible to the eye. In some cases the potato itself practically does not develop at all, every potato in the crop being replaced by a worthless warty mass.

A source of hope in the control of this disease is its limitation to certain varieties. Unfortunately, our best market varieties, Rural New Yorker and all of the rural group, are particularly susceptible, while the Triumph is also completely destroyed. Green Mountain and Irish Cobbler are the most important and popular of the immune varieties.

Once the organism gets into the soil it persists for a number of years and potatoes grown on the same land become infected.

This suggests the most important control measure which consists of quarantines of the infested areas. With careful administration the hauling of dirt, manure, potatoes and all sorts of products which may have been in contact with the soil is being entirely prevented.

Through the unheralded moving of families from the infested regions into the mining regions of other states the potato wart disease may even now have a wider distribution than is known and a sharp lookout should be kept for it. There are hopes, however, that it will never reach such commercial potato growing regions as northern Wisconsin and Michigan.

The talk this morning has consisted of a few chapters out of America's imposing history of the importations of diseases and pests from abroad. Several others could have been added describing such major pests as the alfalfa weevil and the Argentine ant. In the words of McCubbin, "they follow in style and substance the earlier chapters on San Jose scale, Gypsy moth, Chestnut blight and White Pine Blister-Rust so that the monotonous repetition is becoming exceedingly tiresome. Each chapter in the long record up to the last three or four years contains the same elements, a period of carelessness and neglect during which the pest was introduced, then a period of loud-voiced alarm, then a scurrying around to arouse public interest and to secure funds to fight the intruder. There follow a series of futile attempts to eradicate it, and finally the country settles decently down to live with the pest, either letting it have full course or trying by various means to render it as innocuous as possible—in any case promptly settling an appalling load on our national economy because of decreased production or costly annual control measures."

Europe, Asia and Africa still contain dozens of plant pests and parasites whose possibilities, should they be introduced into a new climate without their natural enemies cannot be foretold. Some of us are inconvenienced at times by the close restrictions on the importations of plant material but such troubles are insignificant in comparison with the terrific damage done by some pests after introduction. These increasing restrictions raise "the hope that the long series of disasters brought about by these foreign plant parasites will finally come to an end, that we may finally write 'finis' to the deplorable record and close a volume whose story reflects but little credit on the foresight of a powerful and highly civilized nation."

DISCUSSION

THE PRESIDENT: I should like to ask Dr. Fracker whether he has any report on the bean weevil? We have had a bad infestation in Winnebago county.

DR. FRACKER: Yes, for the past two years we have probably had more complaint than ever before. Usually the request is for help in controlling the weevil in the beans after they are brought into the house or placed in storage. In reply we say the usual control measure is either heating the beans or fumigating them, preferably heating them, if that is convenient.

MR. HAUSER: Is there any way of keeping the European corn borer from being distributed?

DR. FRACKER: There would be if the restrictions of the department of agriculture are followed out with the utmost care. We have a state quarantine against all of the infested regions, and against all the materials which are likely to carry the corn borer. Of course, we are not in a position to administer this ourselves, because we are not in the infected region, but our quarantine is identical with that of the federal department, and the federal inspectors attach an inspection certificate to everything that comes out of the infested regions. I am sure some of you would be interested in the methods by which this is carried on. The only place where I have seen the work was around Boston. It happened to be the celery season and the inspectors were opening up every bunch of celery that was being sent out. There was an inspector in every celery producing garden. It was essential to do that to keep the borer which might be distributed in these bunches of celery from being carried to the entire region that secures its produce from this district, in other words, from Northern New England, Vermont, New Hampshire, Maine and to some extent western New England and western Massachusetts.

To what extent these measures are being applied in Ohio I do not know but there is a great deal of pressure being brought to bear on congress from two directions. The Mississippi Valley states are very anxious to have these quarantine measures applied with the utmost care in the Ohio and Michigan region, and the Eastern agricultural interests are bringing great pressure to bear on the department of agriculture to have the greater part of the work done in the vicinity of Boston where the damage is severe.

QUESTION: How do you control the cucumber beetle?

DR. FRACKER: This question comes up at every meeting of the Horticultural Society. The methods of controlling this insect are not entirely successful. I believe that Mr. Dudley of the Federal Bureau of Entomology, who has been working on this matter at Madison five or six years states that there is no better way than to keep the cucumbers and melons completely

covered with a dust of some kind. He has secured the best success with a mixture of black leaf forty and hydrated lime dust in the proportion of one to ten by weight. The use of wood ashes is quite effective if applied in the early morning when the dew is still on. The beetles do not like to feed on a surface that is covered with dust.

MR. M. S. KELLOGG: Dr. Fracker spoke of the browntail and gypsy moths. To what extent has the spread of those moths been controlled in the eastern section?

DR. FRACKER: The browntail moth has been practically eliminated as a serious matter in the woods by the introduction of parasites. You can go through extensive areas of the old center of infestation without seeing a browntail moth. The gypsy moth, on the other hand is still a serious matter. They succeeded in restricting the spread until 1915, so that the additional area each year was limited, and, in fact, some years the infestation was driven back. Since that time it has spread rather rapidly. Congress has been particularly economical, and the reduced appropriations have had to cover larger areas than ever before. The result is that the gypsy moth has gotten away from them and now covers all of New England, except the northern part of Maine. It is within five or six miles of the New York line, throughout the entire eastern border of New York, with the exception of a small area near Lake Champlain. The state of New York has under consideration the establishment of a dead line perhaps ten miles wide which they hope they can keep the gypsy moth from crossing. It will cost them as a state alone perhaps a quarter of a million dollars, and yet they feel their forests are such that they cannot afford the loss, particularly since the Adirondack forests have a heavy infection of white pine blister rust, and they are going to try to save their hardwood from the gypsy moth.

The spread the last few years has been particularly alarming to all the New York forestry industries.

The secondary infestation in New Jersey, which was reported sometime ago apparently they will be able to eliminate.

EUROPEAN TRAVELS OF A CEREAL PATHOLOGIST*

E. C. STAKMAN, *Pathologist, U. S. D. A.*

My job is to try to tell you how to undo some of the damage which you have unintentionally done. I am going to talk about common barberry. You probably have heard so much about it

*The trip was made for the office of cereal investigations of the U. S. Department of Agriculture.

that you are sick of it. I am sure all grain growers are sick about it.

The common barberry is not native in the United States, neither is it native in most parts of Europe. It is native in the mountains of southeastern Europe and in Asia. During the Middle Ages the monks brought the barberry into northern and central Europe, planted it around gardens and monasteries, commenced to plant it in gardens, and then farmers noticed that the black stem rust began to be prevalent in nearby wheat fields. They did not know why, but they knew it did become prevalent. As a matter-of-fact, they became so thoroughly convinced of it that before they ever knew why or how barberry increased the black stem rust laws were passed requiring its destruction. The earliest of these laws were passed in Europe and the American colonies about 1700. That was almost two hundred years before any scientist had determined any relation between the barberry and black stem rust. Furthermore, up to about 1700 the black stem rust was practically unknown in Scandinavia but it began to appear as soon as barberry bushes became prevalent.

The early horticulturists were very fond of the barberry—they even offered prizes for the best bushes and thus distributed it rapidly. The history of the bush in the United States is similar. It was brought over by the early colonists, was distributed and soon became a menace.

Now, the common barberry is a very pernicious thing. It does not remain in domesticity; it escapes from cultivation, produces many berries containing seeds which sprout and produce new bushes. That is what happened in Europe; the barberry escaped from the monasteries, escaped from the gardens where the village citizens planted them, and escaped from the hedges in which the farmers had planted them near their fields, and what was the result? The result was that in 1800 the black stem rust situation on wheat, oats, barley and rye, became so serious throughout central Europe and England that the farmers soon saw that they were at cross purposes with the horticulturists. They very soon saw that if any more barberries were planted by the horticulturists, that if the barberries kept on increasing and escaped from cultivation by perfectly natural means, they would have to stop growing grains in many localities.

About 1800, therefore, various countries of Europe began passing laws providing for the destruction of the common bar-

berry. Those laws were not very successful, because many people, including a number of horticulturists, would not believe that the common barberry had anything to do with the black stem rust of wheat. But farmer after farmer insisted that the black stem rust was most destructive to grains near the common barberry. The same thing was true in the American colonies. One man said he had discovered why the common barberry caused the black stem rust to appear on grains. He said the acid sap of the berries evaporated and got into the grain, corroding it and thus causing rust.

In 1865 the relationship between the barberry and the black stem rust of the wheat was shown scientifically. It has been proved hundreds of times since then. The rust lives during the winter mainly in the black stage. This stage of the rust cannot pass directly to grains or grasses but it develops on the common barberry on which the spring or cluster cup stage is produced early in the spring. These cluster cup spores are blown by the wind to grains and grasses on which they cause the red or summer stage of the rust. The red spores are in turn blown by the wind to other grains and grasses and cause more of the red rust. Late in the season the rust again forms the black spores on grains and grasses and is ready to live during the winter on straw and stubble and again get a start on barberry bushes the following spring.

Dr. Keitt has just shown you some spores on the screen. The spores of the black stem rust are of the same general nature. As many as eight million spring, or cluster cup spores of the black stem rust may be produced on a single barberry leaf. Each one of those spores is capable of producing a pustule of the red stage of the rust on grains and grasses inside of about a week. Supposing there is a barberry bush on the edge of Madison on which there is an average of five million spores on each leaf. There will be a billion spores on this single bush, and every one of those spores can start rust on grains or grasses. Each one of the billion spores can produce on the grains or grasses one of these rust patches on which there are about 100,000 spores, and each one of these 100,000 can produce about 100,000 more within a week. No wonder one bush can cause so much damage!

In the northern part of this country the black stem rust cannot exist from one year to another without the aid of the common

barberry, because the stage of the rust which goes through the winter cannot infect grains and grasses—it can infect only the common barberry and then it spreads again to the grains and grasses.

In Europe immediately after 1865 a great many barberry eradication laws were passed in different countries. In Germany there are twenty-five laws or local regulations. In some of the various departments and local divisions of France there also are laws providing for the destruction of the common barberry. The same thing was true of the old Austro-Hungarian monarchy. More recently laws also have been passed in Bavaria and new laws have been passed in Hungary. A law has been passed in Norway. There is a legal provision for the eradication of the bushes also in Denmark and Norway. In England farmers and horticulturists themselves simply saw so clearly the damaging effects of the common barberry that without the aid of a law they got together and eradicated the bushes from the grain-growing districts.

What has been the result of the eradication laws? It has been demonstrated conclusively that by means of the passage of existing barberry eradication laws it has been possible to eradicate the common barberry from the agricultural districts. One can ride for miles and miles through the agricultural districts in England without being able to find a single common barberry bush. One can drive for miles and miles through France and not see a single common barberry bush. The same is true of Denmark, Holland, Belgium, parts of Germany, Austria and Hungary.

What has been the result of the eradication of those common barberry bushes? The result is that black stem rust has been practically controlled.

I made a trip throughout the best wheat and grain-growing regions of France about June 1st, and I could not find a single spot of black stem rust on the grains. Neither could anyone else. But then I went up into the Alps, where there are tremendous numbers of barberry bushes. I counted thirteen of them in a single rye field and every single one of those bushes was yellow with rust. What was the result on the grain? Rye, which would not be harvested until in August, already was black with rust. I saw an old peasant woman out there pulling grass and I asked her if she knew what the black rust was. She said she

certainly did, she had seen it every year for a great many years. I asked her if she knew where it came from, and she said it came from the epine vignette, which is the French name for the barberry. I asked her if it did any particular damage. She said it injured the wheat so severely that they could not grow it successfully. I said, why don't you pull out the common barberry instead of pulling out the grass? She said she did not do it because the berries made a good preserve and they could eat the preserve but they could not eat the grass. It seemed to me it would have been very much better if those people had pulled out the common barberry bushes. Their grain could not possibly yield well.

Down in Spain you would rather expect the summer stage of the stem rust to live throughout the winter and become independent of the common barberry. But Spanish pathologists who had studied the situation year after year say that the rust always appears earliest and does the greatest damage near barberries. I found very little stem rust on wheat in Spain except in those regions near which there were common barberry bushes.

The same thing is true in Italy. In Italy you would expect the summer stage of the rust to live through the winter and become independent of the common barberry, but that is not the case. In southern Italy there are few common barberry bushes and there black stem rust does but little damage. In 1913 stem rust did considerable damage on wheat in a locality about sixty miles southeast of Rome. They found that this rust had spread from a number of common barberry bushes. They eradicated some of the bushes, and the next year the black stem rust did not appear in those fields from which the bushes had been eradicated, but it did appear in the others. So in 1914 they took out the remaining bushes and ever since that time the region has been free from black stem rust.

Even in Greece where one would expect still more that the rust would be independent of the barberry, it is to a certain extent at least dependent upon it. In the mountains there are thousands of barberry bushes which are native in that region and I saw plenty of rust on them. Grasses and grains were heavily rusted there, while down on the plains, away from the bushes, there was little or none. The story is practically the same in the other Balkan states and in Hungary, Austria and Germany.

In some parts of Sweden there are tremendous numbers of barberry bushes. Near Stockholm I looked for rust and could not find any. Finally I found a patch of rust on grasses, and noticed the rust increased in severity in one direction. I kept on walking until I found the barberry bushes. I went up to Upsala and some places along the way there were so many barberry bushes that the woods actually looked red. I went down there and I found that the oats, which in this country are not so severely attacked, I found the oats there were absolutely black with rust. The situation has become so bad in Sweden they have been forced to discontinue the growing of wheat and even oats in certain regions where the barberry bushes are most numerous. That is a matter of record; that is a statement made by Swedish plant pathologists and agriculturists. In some regions along the east coast the rust does terrific damage but towards the mountains in the west, where there are fewer barberry bushes, the rust does not occur. Up in northern Sweden barberry bushes are very scarce or practically absent, and there is practically no rust whatever.

In Norway a good demonstration has been made of the effectiveness of destroying barberry bushes. In about 1885 the farmers of one district eradicated all of the barberry bushes they could find. The next year the rust appeared only near some bushes which had been missed in the previous year's search. At the present time there is a law requiring the destruction of bushes in Norway. However, it has been impossible to destroy them all since the law went into effect. It is perfectly clear that where there are barberries there is likely to be heavy stem rust, and where there are no bushes there is no rust. It is quite evident that the rust cannot live without the bushes in Norway.

There is no barberry eradication law in England, but after the farmers noticed the destructive effects of the bushes they simply got together and dug them. At the present time there are very few bushes in the rural districts. All of the England botanists with whom I talked told me that the bushes were extremely rare. I personally traveled for many miles by automobile in England and found no bushes whatever except some which were pointed out to me by a professor of plant pathology of Cambridge. Neither could we find any stem rust on grains except near these bushes. I looked also for stem rust in Scotland but could find none except near some barberry bushes which

were growing in a hawthorn hedge. In Wales there still are many barberry bushes, especially in the hilly districts. The relation between these bushes and outbreaks of black stem rust was so perfectly clear that there could be no question whatever about it. Where there were barberries there was stem rust; where there were no bushes there was none. Nothing could be more striking than the contrast between stem rust conditions in England and those in Wales. In England there are so few barberry bushes that black stem rust is not feared at all, and is usually difficult to find. In Wales, on the other hand, where the bushes still remain, outbreaks of the rust are frequent and severe. It goes without saying that steps now are being taken to eradicate the bushes from Wales.

For many years Denmark tried to eradicate the common barberry. But there always were some theorists who argued that barberry could not have any relation to black stem rust. They thought they knew more about it than grain growers who had seen the effects of the rust time after time. That often is likely to be the case. They had frequent and very destructive epidemics. Finally they decided they had had about enough and passed a law in 1903 requiring the destruction of the common barberry. They got busy and destroyed it promptly. The result was that the rust disappeared just in proportion to the number of barberries which were destroyed. It is a matter of record that there has not been a single severe general rust epidemic in Denmark since the bushes have been removed, and that is nineteen years. Before that, they had serious outbreaks in 1889, 1894, 1895, 1896, 1897 and 1901, and moderate outbreaks in 1893 and 1900. These facts have been published by an eminent Danish pathologist. The records were kept accurately, and there is no question about their correctness. In the fourteen years before the barberries were eradicated there were eight severe outbreaks of rust, an average of more than one every other year. But in the nineteen years since the bushes have been eradicated, there has not been a single epidemic. Together with a Danish botanist, I traveled for many miles in Denmark and we could find no stem rust whatever except near the Copenhagen Municipal Forest, where there still were a few common barberry bushes.

Now, ladies and gentlemen, whether you may be interested in propagating and selling common barberry or not, we certainly should be more interested in assisting in the production of good

grain crops. Any one who insists on maintaining or propagating common barberries is simply insisting on maintaining and propagating a menace to our most important grain crops. It is just as conclusive as any fact possibly can be. As practical horticulturists and fruit growers, you all know how apple rust spreads from the red cedar, and you know that the best protection of an orchard against rust is to eradicate the red cedar. The situation with respect to the common barberry is equally clear. The common barberry is the principal factor in spreading black stem rust in the northern grain growing states. Furthermore, every year the common barberry bushes are permitted to remain, the danger becomes greater because the number of bushes is continually increasing. If the barberries ever become as numerous in the principal grain growing states as they are in certain sections of Wisconsin at the present time, it will be practically impossible to grow certain varieties of small grains because there will be barberry bushes near every grain field and the rust will be destructive practically every year.

I just want to tell you how much damage a single barberry bush can do. Down in Indiana this last year there was one common barberry bush which caused stem rust for about five miles from that bush to about eighteen farms. The farmers themselves estimated that the financial loss from the rust from that single bush was \$12,000. Now, if one bush will cause \$12,000 damage down in Indiana, it is going to do it in Wisconsin, Minnesota and elsewhere. It seems to me that as horticulturists who are intelligent plant growers, you should accept scientific evidence. I hope I have convinced you that the destruction of the common barberry is imperative. There is no valid reason in the world why it should remain. The Europeans have solved this problem because they have taken hold of it energetically. Certainly we can do what they have done. I hope, therefore, you will all use your influence to bring about the eradication of the common barberry. I thank you.

DISCUSSION

MR. TOOLE: Just how far will rust spread from the barberry to grain?

PROFESSOR STAKMAN: We know that the spores can be carried many miles. We have caught them several thousand feet in the air on vaselined glass slides exposed on airplanes. The

rust has been traced directly from barberry bushes for at least ten miles. In Indiana, the damage done to the wheat on the eighteen farms which I mentioned previously came from one bush, from which the rust spread at least five miles in one direction and seven miles in another. I should like to make one thing perfectly clear: The most important fact is not the distance to which the rust can spread directly from a single barberry bush. It must be remembered that grains and grasses may become heavily rusted near the bushes and the spores developed on them are then blown considerable distances by the wind, where they start more rust. The wind then picks up these spores, blows them away, and a new area of infection results. This process can be continued indefinitely as long as grains and grasses are green. Actually, therefore, rust can spread almost indefinitely from a single barberry planting.

PROFESSOR MOORE: I should like to ask this question: What is the reason that in the countries referred to there are sections in which the barberry is now found?

PROFESSOR STAKMAN: It is simply because common barberry is native in some of the mountains of Europe, for instance, in the Alps, in the Pyrenees and in the Balkans. They are so numerous in those mountains that they cannot be eradicated. Furthermore, not a great deal of grain is grown in the mountains themselves, and the bushes, therefore, have been allowed to remain.

PROFESSOR MOORE: Is it not true that in sections of Wisconsin we have practically that same situation?

PROFESSOR STAKMAN: You people know more about that than I do. There are some regions, I understand, in Wisconsin in which there are a great many bushes and from which it may be difficult to eradicate them. Therefore I believe that by means of chemicals the bushes can be killed. It is not necessary to dig them; put salt or sodium arsenite around the bushes and they can be killed without all the labor and expense of digging.

DR. FRACKER: Answering Prof. Moore's question, those areas apparently cover a very small percentage of the area of Wisconsin, perhaps thirty square miles.

PROF. STAKMAN: It may be difficult to eradicate the common barberry from certain areas. There are many difficult jobs in connection with growing good crops. In order to continue to grow small grains profitably it is necessary, however, to eradicate the bush. Furthermore, if Wisconsin is going to do her part in protecting the grains in those states in which they are grown more extensively, the bushes must be eradicated.

PROFESSOR MOORE: As I understand Dr. Fracker, in his opinion in certain sections it is practically impossible to eradicate the barberry.

DR. FRACKER: I may have given that impression, which is not the impression I intended to give. There are limited locations down in Grant county, one in Trempealeau county and the largest one in area extending from Madison west in partially interrupted areas in which the barberries have been exceedingly numerous. I think about two years ago they eradicated the bushes from there. To eliminate them from these 300 areas seemed to be almost hopeless. The federal department was called upon and put in an experiment centered in these areas with the hope of killing the entire plants so that the fragments of roots left would not result in more bushes than we had in the beginning. The results of those experiments have been most encouraging, in that four different chemicals have been found which, when applied upon the plants not only killed the plants at the top, the poison reaching all parts of the bushes but also penetrating to all ramifications of roots, so that spreading would not result. As these chemicals are relatively inexpensive, the trouble can be quickly solved and with great rapidity.

PROFESSOR STAKMAN: As I have seen it in the United States, it is not any more difficult, or as difficult as it was in Denmark or in England, because in those countries they have grown the barberry a great many more years than we have and they have just as difficult country. They have gotten rid of the barberry by keeping everlastingly after it. You have got to keep after it a good many years. They do not worry about killing the bushes. They say they kill the bushes by putting three or four pounds of finely crushed rock salt on them. They do not worry about it, it can be done.

MR. MOYLE: I have noticed from the discussion here this morning that these countries that are so terribly afflicted with the barberry rust are the wheat producing countries. Here is China and Japan; how do you explain that they have a barberry in China and Japan that has no rust, the Japanese barberry. I am a nurseryman, I have been shaking in my boots. They say it is impossible for those spores to prey on the Japanese barberry, how do you account for it? Is it not possible if we have a barberry that is immune, on which no rust will breed, is it not possible to have wheat and rye that is immune? Then we can have both the barberry and the wheat.

PROFESSOR STAKMAN: Nobody can explain just why one bush is resistant and why another is not. We know that the Japanese barberry is resistant to rust. We know, however, that there are plenty of barberries in China and Japan which are not resistant. We know also that they have plenty of rust there. Now, as far as the breeding of rust resistant varieties of wheat, oats and barley are concerned, do not think for a minute that there are no people working on that. We are working on it with the plant breeders at Minnesota as hard as we can. The U. S. Department of Agriculture has been at it for fifteen years

or more. But there are over thirty parasitic strains of stem rust that attack wheat. There is not a single variety of wheat in this country that is immune from all of them. The only variety of the general group of wheats that is resistant to all of them is Khapli, an Emmer variety which is practically worthless. So you see there are some problems in that regard. It is perfectly true that you can get varieties of wheat which are resistant in certain sections for a certain time, but agriculturists have always said that the resistance breaks down. It does not break down, but, as I say, there are over thirty parasitic strains of wheat stem rust and there is not a variety of wheat that we have been able to get hold of which is resistant to all. Furthermore it is difficult to combine the yielding and milling qualities of a variety of wheat with the rust resistant qualities. If the barberries are eradicated, it will be possible to grow the most desirable wheats whether they are rust resistant or not.

MR. TOOLE: Is it possible to control rust on the barberry with spraying in any way?

PROFESSOR STAKMAN: It is possible to reduce the amount, but I do not see that the common barberry is so desirable as to warrant that. It could be kept down, and if the common barberry were grown only in parks it probably would not do a great deal of damage, but you all know that just as soon as you leave some of the common barberries there, birds come along and pick up some of the berries, fly away with them and drop the seeds and then you will have barberries coming up again. I do not think we can afford it.

MR. MOYLE: How do you account for the fact that during the War we had that wonderful season when there was such a large crop of wheat, we had as many barberries as we have had since. How do you account for it?

PROFESSOR STAKMAN: Just exactly like this: Remember rust is a disease caused by a parasite. In order to get rust, you have got to get the parasite on the plant. Then the weather conditions must be favorable for the germination of the spores, and then for the development of rust in the plants. In 1918, you know as well as I do, that it was a fairly dry, warm summer early in the season, and for that reason rust never got well started. It is like putting corn in the soil. You plant corn and if the soil is dry the corn seed is not going to germinate. Even after it germinates, if the weather is cold you are not going to get good corn. The same thing with rust. The same with apple scab. In a wet spring you are going to have apple scab, in dry weather you have none. This parasitic plant that causes rust is dependent upon temperature conditions and moisture conditions, just exactly like corn, wheat or any other kind of plant.

MR. MOYLE: We have been told that was a wise dispensation of providence that we got that wheat.

MR. RUSTE: Are we safe in planting the Japanese barberry?

PROFESSOR STAKMAN: Yes we have inoculated hundreds of Japanese barberries and they never rusted. But the common barberry hybridizes with the Japanese barberry and some of the hybrids may resemble the Japanese variety but rust like the common one. I think Dr. Dickson had some very nice evidence on that. We found a number of such hybrids, so that if you see any Japanese barberry rusting, which I do not think is likely, you can be pretty sure it is a hybrid. But the Japanese barberry itself is immune from rust.

DISEASE RESISTANCE AS A FACTOR IN THE CONTROL OF PLANT DISEASES*

JAMES G. DICKSON, *Pathologist, University of Wisconsin.*

INTRODUCTION

Your honorable Secretary has challenged the pathologists of this country to produce a wheat immune to stem rust and thus avoid the necessity of removing the common barberry, a very important factor in the spread of black stem rust of grains. Your Secretary has emphasized a general plant disease control method of tremendous importance for plants in general and for the wheat plant in particular. It is not alone a problem for the plant pathologists, however, for the agronomists and plant geneticists as well as the pathologists must combine their efforts to solve a problem of such magnitude and complex nature. The pathologists, plant breeders, and agronomists of Europe as well as America have accepted the challenge, indeed the challenge was accepted almost before the cause of black stem rust was fully understood and since then such men as Eriksson (1896), Carlton (1900), Bolley (1900, 1905), Ward (1902), Biffin (1905), and many others have spent much of their time attempting to secure such a wheat. Why have not such eminent men succeeded? Stop for just a few minutes to view the undertaking this problem involves and possibly the reason will be more apparent.

Many in this audience can remember the popular acceptance of the germ theory of disease. Previous to that the general conception, especially among our culturalists, was that weather, soil condition, etc., caused the rusts, smuts and blights that appeared

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upon the crops. And after all were these students of plant conditions entirely astray in their conceptions?

The plant, unlike the animal, is dependent upon its environment. The plant is entirely dependent upon climate, soil, etc., for its temperature, moisture, light, food materials, etc. Is it any wonder then that weather influences the rusts, smuts, and blights that occur to cause further disturbances in their growth? Most certainly the germ must be present to produce the diseases mentioned, but in the final analysis, is the causal germ the only important factor associated with the disease?

For example, which is the important factor in the production of wheat and corn seedling blight caused by the wheat scab parasite (*Gibberella saubinetii*)? In this case two entirely different plants are attacked by the same parasite. Wheat seedlings blight at high soil temperatures and are resistant when grown in cool soils. Corn seedlings blight at low soil temperatures and are resistant when grown in warm soils. The germ is present in most of our soils, yet the disease does not appear unless the plants are growing under certain unfavorable conditions, in this instance soil temperature. The investigations have shown that, in this case at least, the temperature at which the seedlings are growing determines resistance or susceptibility to the blight. The studies have shown further some of the fundamental causes of disease resistance in plants, a phase of the disease resistance studies about which the pathologist and plant breeder at present know but little.

Further, if the influence of climate, soil, etc., upon the germ, the fungus, is considered along with their influence on the host plant, the complexities involved in the phenomena of parasitism will be more fully realized. And most certainly, before the nature of disease resistance can be fully understood, the pathologist must study the influence of environment on this close relationship between the parasite and its host. For in breeding diseases resistant strains the pathologists and breeder are attempting to further restrict the range of the parasite.

METHODS EMPLOYED IN DISEASE CONTROL

The pathologist resorts to different methods in the control of plant diseases depending upon the nature of the disease and the conditions under which it develops. Usually four important methods have been used, (1) Spraying, which kills the germs be-

fore they enter the host, for example: as employed for late blight of potato, apple scab, etc.; (2) Sanitation, which tends to decrease the supply of germs producing the disease, for example: the removal of diseased plants or plant parts as in the case of raspberry yellows, crown gall and anthracnose of the cane fruits and in control of citrus canker as used in the recent citrus canker campaign; the removal of susceptible varieties of plants, as in the case of asparagus rust and fire blight where the removal of the Transcendant Crab and Yellow Transparent varieties reduce the germ present; the removal of the alternate hosts of highly specialized parasites, as in the case of the white pine blister rust, the apple leaf rust, and the black stem rust of grains; the exclusion of diseased plants by quarantine, as in the case of potato wart, flag smut of wheat; and the rotation of crops as employed in the control of wheat scab, corn root-rot; (3) Seed selection and disinfection, which avoids the germ or kills it before entering the seed plant, as in the case of potato scab and oat smut, and (4) Disease resistant plants or species.

BASIS OF DISEASE RESISTANCE

An outstanding factor in disease resistance considered in a broad sense is found in adaptation to environment. In order to properly maintain the health and vigor of plants and thus maintain their resistant qualities against parasitic attack, they must be grown in a suitable soil, at a suitable temperature, in a suitable light, and supplied with adequate quantities of water and food materials.

The grower can modify to some extent the environment of a variety and thereby increase production, quality, and disease resistance, but his success depends largely on his ability to do this through the knowledge of the needs of his crops and the effect on them of the local soil and climate. The control over soil and climate is limited chiefly to date of planting, location, lay of the ground and fertilization and, therefore, it is necessary often to breed or introduce new varieties to meet the local needs. Since the climate and soil conditions vary greatly within short distances, it will be necessary in many cases to breed locally adapted strains of the crops.

The disease resistance problem is still further complicated because, apparently, the nature of the resistance in plants differs

The structure of the plant may be the cause of the resistance. Brefeld (1903), and Hecke (1905), (1906), found that barley and wheat plants resistant to loose smut had closed flowers which means fertilization takes place within the glumes and the smut, therefore, cannot enter at the proper time to infect the flower. The habit of growth may influence the resistance as in late blight of potatoes. The arrangement and size of the leaf openings, stomata, and water pores may be a factor as Pietsch (1915) found in resistant carnations and Allen (1921) described in Kan-red wheat. The condition and thickness of the surface of leaf and stem also may be a factor as shown by Sorauer (1913), Appel (1915), and others.

Again the differences within the cell, that is, the acids, toxins, ferments as well as foods that it contains may determine the disease resistance. The resistance of certain fruits to decay is probably due in part to acid content and in other cases tannin content has been shown to be important in resisting disease. The foods available within the cell certainly influence the disease resistance and susceptibility of wheat and corn seedlings to seedling blight. And again the differences in what appears to be disease resistance may be disease endurance, i. e., the plant grows and produces even with the parasite present; this is certainly a factor in the rusts and smuts of the cereals.

Further, the apparent resistance to disease may be merely a disease avoidance. The susceptible period in the plant growth comes at a time when the germs of the particular disease are not abundant. Early maturing varieties of grains illustrate this as they mature before sufficient rust spores are present to cause a heavy rust infection.

Most certainly all of these factors play a role in plant resistance and avoidance of disease, and yet they greatly complicate the study of disease resistance and the selection of disease resistant strains. In many cases the plant seemingly is resistant due to a complexity of these factors. To the plant breeder, therefore, the problem is a complex one for resistance generally is not a simple Mendelian unit character.

METHODS OF DEVELOPING DISEASE RESISTANCE

With this brief survey of the complex nature of disease resistance, turn now to the methods of developing disease resistant

plants. This may be accomplished generally by (1) substitution of resistant species, (2) selection of resistant individuals, and (3) crossing resistant and susceptible species or varieties. Illustrating these three methods of developing disease resistant plants with specific examples will help demonstrate their application to different types of diseases.

First, in some instances, the disease has been controlled by substituting resistant species for the highly susceptible one previously grown. It is a well known fact that in nature two related species suffer in different degrees from attacks of the same parasite. This varying susceptibility makes it possible to thus substitute for highly susceptible species others of nearly equal cultural value which are less susceptible or resistant. This is illustrated in the control of coffee rust. The Arabian species (*Coffea arabica*) in the Asiatic tropics was destroyed by the rust. The African species (*C. liberica*) was substituted but did not prove resistant in this locality, and finally the wild African species (*C. robusta*) which produces an inferior coffee was introduced and saved the coffee industry in certain regions.

The substitution of the Japanese barberry, which is immune to black stem rust, for the common barberry, which is susceptible and thus spreads rust to the grains, is another example of the substitution of species.

The introduction of an inferior resistant species and grafting a nonresistant variety on this was practiced in Europe to control the diseases of the grape. Appel (1915) says, however, the grafted vine is only an imperfect substitute as its life is of short duration and the labor involved makes its culture expensive.

Second, greater advances in disease control have been made in certain types of disease by selecting resistant individuals from badly diseased fields and further selecting from these strains. The occurrence of healthy plants among diseased ones is not absolute proof of the resistance of such plants, and, therefore, to make sure of the immunity of any special strain, careful experiments are necessary over a wide range of environmental conditions. This method has proven successful in the control of disease in local areas, yet disease resistance in all of these cases is not absolute, that is, a combination of environmental factors occurs occasionally which induces disease among these strains. Bolley (1901, 1903) produced by selection wilt resistant flax, Tisdale

(1915) demonstrated, however, that even this flax strain when grown in warm soils wilted. Professor L. R. Jones (1915) has selected yellows resistant cabbage, yet this Wisconsin Hollander variety under extreme conditions, especially high soil temperatures, develops a high percentage of slightly diseased plants. Such plants, however, continue their growth and with the return of somewhat cooler weather all symptoms of the disease disappear and the plants produce good heads. In contrast the plants of the common susceptible Hollander will succumb to the yellows during the extreme weather conditions. Tisdale (1921) has shown that very young seedlings of this resistant strain are as susceptible to attack as the common Hollander, in other words, the resistance is acquired during the growth of the plant. Orton (1908) has in a similar manner selected wilt resistant cotton from two different species and improved these varieties by selection. Thus, these plant strains are relatively resistant and will give profitable crops, under conditions which produce an epidemic with the susceptible varieties. It is significant, however, that these selections have been made with one particular group of soil infesting parasites and, as stated by Professor Jones (1915) the most encouraging results in disease resistance have been secured with the vascular *Fusarium* diseases where disease resistance seems to be the hopeful method of attack. Generally, however, little has been accomplished by this method with the rusts or smuts. And further, these selections may be quite susceptible to other diseases attacking the plants.

Third, the control of disease by producing, through hybridization, strains with disease resistant characters and with good quality and high yields. Orton (1908), by crossing produced a wilt resistant watermelon for South Carolina, but this strain was not resistant when grown in Oregon. Hansen (1905), has produced hybrids between cultivated varieties of roses and the hardy prairie rose which were partially resistant to powdery mildew.

Reed (1912), and Vavilov (1919) have crossed wheat varieties resistant and susceptible to the powdery mildew. Certain varieties and strains which were resistant in the field, however, became infected when brought into the greenhouse in the fall. Gaines (1920), in crossing wheat varieties for smut resistance has shown the complexities of the problem for he finds resistance to bunt in

wheat is not a simple Mendelian unit character and, further, different varieties of wheat possess different types of resistance.

In briefly summarizing the results of these three methods of breeding resistant plants, three things are outstanding in the complexities of the problem. (1) The influence of environment upon the plant may modify its powers of resistance to disease; (2) The seemingly extreme variation in the nature of disease resistance makes it impossible to always expect similar results in different plants and diseases; (3) Inadequate knowledge of the fundamental cause of resistance in plants prohibits the breeding of disease resistant varieties on a scientific basis.

DISEASE RESISTANCE AND THE CONTROL OF BLACK STEM RUST

After this very general survey of disease resistance in plants, turn now to the specific question at hand, namely, that of controlling black stem rust of the grains by rust resistant varieties. The experimental evidence available on black stem rust resistance in the cereals indicates that here especially the fundamentals underlying disease resistance in plants must be determined before much beyond the local control of black stem rust of grains can be expected.

The common bread wheat varieties (*Triticum aestivum*), in general are very susceptible to rust. On the other hand, many of the durum wheats, (*Triticum durum*), are relatively resistant. These latter are profitably grown in certain regions and are helping to reduce rust losses. Reed (1908) cites cases in 1904 where the losses in bread wheats averaged 50 per cent in contrast with 10 per cent in durum wheats. Einkorn (*Triticum monoccum*), is also usually very rust resistant. And some varieties of emmer, (*Triticum diococcum*), are resistant, while others are susceptible. The spelts, (*Triticum spelta*), are usually quite susceptible to rust attacks. Here then, are five species of wheats varying from very resistant, although none are immune, to very susceptible strains. The substitution of species, generally, cannot be resorted to due chiefly to the problems of adaptation and yields and to the fact that the durum wheats and Einkorn do not have the bread making qualities.

In certain cases, these most resistant species of *Triticum* have rusted. Howard (1909), has described a rust attack on Einkorn

during extremely hot, humid weather at Pusa in India. Brooks (1921) states: "Rust resistance in cereals * * * does not seem to be absolute in character, but to be influenced in part at any rate by the conditions of environment, including the physiological condition of the host." Stakman and Levine (1922) have found types or strains of black stem rust capable of attacking all wheat species mentioned above.

Locally selected, rust resistant strains or varieties of the bread wheats have been selected and crossed with susceptible varieties having desirable qualities. Biffin (1905) in crossing wheat varieties found that the strains relatively resistant to the yellow rust (*Puccinia glumarum*) of wheat bred true. These strains retained their relative resistance to yellow rust, varying considerably from year to year, over a period of eight years. These wheat varieties resistant to yellow rust were not necessarily resistant to the black stem rust of wheat. It seems apparent from Biffin's experiments that in certain wheat varieties there is an hereditary factor as regards resistance to yellow rust of wheat and that environmental conditions influence the expression of this genetic factor. Freeman and Johnson (1911) state that a number of varieties of wheat are resistant to black stem rust. They add, however, that some of these varieties at least are not universally rust resistant, as their behavior in different countries to different biologic forms of the rust parasite is variable. Waldron and Clark (1919) described a variety of the bread wheats named Kota which was rust resistant at least in three localities in the Upper Mississippi Valley. This wheat variety according to Stakman and Levine is susceptible to several different strains or forms of the stem rust parasite.

The occurrence of biologic forms or strains of the black stem rust parasite in different sections of the country as described by Stakman and Levine (1922) necessarily complicates the problem of breeding rust resistant varieties. For they have shown, as mentioned previously, that a variety of wheat resistant in one locality is readily attacked in another because it is exposed to infection by another strain of the parasite. The occurrence of these special strains or forms of the parasite has been shown to occur in the case of other plant parasites, notably the parasite causing the leaf rust of wheat and that causing the bean anthracnose.

Finally, to cite a concrete example of the influence of environmental factors and different strains of the rust parasite, on the problem of breeding a strain of wheat resistant to the black stem rust, turn to the performance of Kanred wheat. This variety, which was originated and tested at the Kansas Agricultural Experiment Station, was found rust resistant after numerous nursery and greenhouse rust infection experiments. The seed was distributed for trial in other sections of the country. While this wheat variety remained resistant in many sections, yet it was badly rusted in Minnesota and South Dakota and at Madison has rusted during two of the past three seasons. At Madison, at least, this strain has not been superior in any respect, including rust resistance, to the established strain of Turkey wheat (Wis. Ped. No. 2).

Notwithstanding the complexities and difficulties involved in the problem of breeding disease resistant plants, the undertaking is of stupendous importance. These difficulties only emphasize the challenge to pathologist, geneticist, agronomist, and horticulturist, to accomplish this by going back to the fundamentals underlying disease resistance. This, most certainly, is not to be accomplished by one man or group of men, but all must combine their best efforts to the solution of the problem. The particular problem resting preeminently with the plant pathologist and necessary in placing the work on a sound scientific basis is that of determining the peculiar variations and characteristics of the parasite on the one hand, the fundamentals of disease resistance in plants on the other.

Considering the complexities of the problem, the progress which has been made is most highly commendable. It justifies the hope that the problem will finally yield to the production of disease immune strains of plants to aid in the control of plant diseases.

OUR SONG BIRDS AND BIRD SONGS

MRS. E. L. ROLOFF

What is a bird without its song? To anyone who is a lover of birds, and upon making the acquaintance of a new bird, the first thought that comes to one is to hear its voice, its song.

Firstly, for the pleasure the song itself gives and, secondly, to make the better acquaintance of the bird and to thus be able to identify him, either in the bird chorus in the morning, or in a solo of his own sung from the tree tops, when otherwise, without song, we might not know of the bird's existence in our vicinity. Many of our most beautiful and beneficial birds might even escape our notice if it were not for their song.

According to the classification of our birds, the family of "Land and Song Birds" is the largest and most interesting of our bird families, and nearly all of them have a voice of some kind, from the faintest little squeak of the humming bird and the almost inaudible wheeze of the wax-wings up to the most wonderful creations of bird songs of the thrushes.

Although we hear bird voices, calls and songs, at all times of the year, it is during the two months of May and June that song birds are at their best, for at this time most birds are nesting and in full song and to a bird lover to be awakened at daybreak by the tuning up of the first few voices of the earliest birds, and in a few moments the chorus is swelled to twenty-five or fifty different birds—all singing at the top of their voices, and one is able to identify each one of them, is indeed a great pleasure.

The robin is usually the choir leader. He starts with a few little chirps, and then bursts out in full song, soon followed by songsparrow, meadow lark, Phoebe, mourning dove, flicker, vireos, bob white, pewee, wood thrush, wren, oriole, brown thrasher, catbird, purple martin and many, many others; thus the orchestra which performs the "glad spring symphony" is made up of the individual voices of an endless variety of soloists, each bird singing his own song, no two alike. Of these the wood thrush has been called "the great tone artist"; the red eyed vireo, the "obligato accompanist"; the songsparrow, "the melodist"; and the partridge "controls the drums."

To best study our song birds will be to take them up in families. Of these, the family of finches, sparrows and grosbeaks is the largest and most important one and, to a certain extent, our best common songsters, surpassed only by the thrushes. The list includes the purple finch, goldfinch, rose breasted grosbeak, chow-wink, indigo bunting and the song, vesper, field, fox and white throated sparrows. These are all fine songsters, the song sparrow alone is unexcelled in variety of song motive and in accuracy of pitch. The stout, conical bills of the finches and sparrows

are instrumental in giving a certain character to the voice. The song of the goldfinch, which is commonly called the "wild canary," is very similar to that of the canary, especially his call notes, "cheep, cheep," given in a rising inflection of nearly an octave, and then "per-chic-o-ree" while he is on the wing in an undulating flight, always breaking out with the song on the crest of the wave-like curve. The purple finch is considered the most perfect and lovely warbler we have. Of the sparrows, that of the white throated or Peabody bird's song is remarkable for its rhythm and its pure, clear-whistled tones. Anyone who can whistle can imitate it—"Old-Sam Pea-bo-dy, Pea-bo-dy, Pea-bo-dy." The field and vesper sparrow's songs are unusually clear plaintive-like whistles ending in a diminuendo trill. The vesper sparrow singing at eventide after sundown, two or three long silver notes of peace and rest, ending in some subdued trills and quavers, which has given to him his name, vesper sparrow. He sings from a high perch, without interruption for a half hour or more. The fox sparrow whistles a beautiful, loud, clear whistle as he scratches, with both feet at once among the leaves on the ground for food; his real song, however, is heard only in his more northern home. The little chipping sparrow's incessant high pitched trill can not perhaps be called musical, but he is such a splendid neighbor which helps greatly to make his song a welcome one. The song sparrow is the "flower of the family," a musician of exceptional ability. He sings under all conditions of weather and at all times of the day. Can there be anything more fresh and pleasing than to hear his first song on a bright March morning? The chewink has a sweet call note, "che-wink," and a sweet little song of "see-to-who-e-e-e?" The rose breasted grosbeak is another splendid songster similar to the robin.

The thrush family, which is a large one, is represented here by the wood thrush, olive backed thrush, veery robin and bluebird. Of these the song of the bluebird is the first one to greet us in the spring of our migratory birds returning from the southland. Bluebirds never take a position as if to sing. Their so-called song is rather a plaintive, sentimental call consisting of three notes, "pu-ri-ty, pu-ri-ty," which seem always to be directed at his mate and yet nothing is more pleasing and welcome to us than these first call notes of the bluebird. The song and call notes of the robin are perfectly familiar to all of us and, sometimes, later on in the season, when he brings his whole family and relations

to our strawberry patch, are we not sometimes tempted to label them as "very noisy nuisances?" But after all, what a host of good cheer we find in his music when we hear his first song in the spring. When—

"In the sunshine and the rain;
I hear the robin in the lane,
Singing 'Cheer-i-ly, Cheer-i-ly,
Cheer up, dearie! Cheer up, dearie!
Cheer-i-ly, Cheer up, cheer!'"

The thrushes are the birds of real melody and will afford one more delight, perhaps, than any other class. The wood thrush stands at the head of songsters, clear as the finest golden toned flute, his "u-o-lee, u-o-lee" sung at eventide from a nearby fence post or branch of a tree once heard is never forgotten.

The brown thrasher, catbird and wren comprise another family of very fine songsters; that of the brown thrasher is the most varied contribution to the bird chorus. While singing he is usually perched on the topmost bough of a tree. His voice is loud and clear and produces a wide variety of notes. He sometimes sings for half an hour from the same perch, usually in the morning and occasionally at other times of the day. The catbird, who is called the northern mockingbird, is another beautiful songster if he wishes to be. He is a mimic and improvises as he sings, imitating all birds and sounds that take his fancy. Even catcalls are put in anywhere, and are used as scoldings when he is so inclined. And the little house wren who sings to us nearly all day long, the most enthusiastic, rippling, laughing song—how could we get along without him?

The vireo family, consisting of the red-eyed, yellow-throated and warbling vireo, produce constant and cheerful bird songs. The redevye's "you see it! You know it! Do you see me?" can be heard at all times of the day, singing and feeding as they go. The vireos are birds of the tree tops, gathering their food, insects, from the foliage and smaller branches of trees.

Of the family of orioles, bobolinks, blackbirds and meadow larks, the Baltimore oriole sings notes of joy from the tree tops. His voice is that of the bugler that heralds actual spring; and the meadow lark, who does not know and love the song of the meadow lark? His "Spring o' the y-e-a-r, I see yo-u, You ca-a-n't see me-e-e!" has a breezy sound, as fresh and wild as

if the wind were blowing through a flute, and in answer to this, all the red winged blackbirds, large flocks of them, join in chorus as if in a foreign language, "O-ka-lee! Conk-a-ree, Conk-a-ree," from the nearby tree tops. A little later we hear the notes of a rollicking medley, from the nearby hayfield. It is the bobolink, the soloist of comic opera. It is said of him that "he is a great singer, but the latter part of his song is a species of musical fireworks."

The woodpeckers are not singers, but their bills are really the equivalent of drum sticks with which they rap out a rolling tattoo, a summons to their lady loves. They are the members of the drum corps. Both the downy and the hairy woodpeckers have a metallic call note, "Peenk, Peenk." The flicker is the noisiest of the woodpeckers. He announces his arrival by a long, loud call, "Kee-er! Kee-er," a thoroughly melodious April sound. His song is a long, monotonous clamor, "yif-yif-yif-yif-yif" incessantly.

Purple martins have pleasing voices, which sound more like rippling bird laughter and happy, cheerful social twittering, than an attempt at singing. The warbler family, consisting of about twenty-five or more species, warble all day as they flit and feed along in their migrations, most of them being with us only about ten days in the early part of May. Their feeble little voices are pitched very high, and no musician will consider them good songsters. The yellow warbler in his "Swee-see-see-see," and the Maryland yellow throat in "Witchety, witchety, witch," are perhaps an exception in that their voices are loud and penetrating.

We have several more soloists in nature's orchestra belonging to smaller families, but must not be omitted. Foremost of these is the quail or bob white. How we all love to hear the happy whistle of "Bob, Bob White." But the sad part of it is that we hear him less and less as the years go by. Is he being exterminated? If so, should we not all join our forces before it is too late and appeal for his better protection?

Our flycatchers are not songsters and yet the monotonous little call notes of the Phoebe calling "Phoe-be, Phoe-be" at any time of the day and the sweet, pensive little song of our wood pewee, "Peah-wee, Pe-e-r," are always in evidence in our bird choruses.

Another happy little songster is our black-capped chickadee. All winter long we hear his lively little call, "Chick-a-dee-dee-dee," when he comes to the suet tree for his meals. Occasionally we

hear his clear whistled song of two notes, "pe-wee, pe-wee." And the blue jay, what shall we say of him? He has been called a joker, and the "clown of the circus." He can produce some clear musical notes if he wishes, then in the same moment his squalling catlike "J-a-a-y, J-a-a-y" will drive all of the smaller birds out of the neighborhood for the time being. Then again he will mimic any tone or sound he hears which strikes his fancy, but he never attempts anything that could be called a song. Why should he? If he is the joker and the clown perhaps it becomes his duty to furnish variety as the spice to the music. Who knows?

THE PEONY

W. A. LAWTON

As you drive through the country or visit any home, you will be almost sure to find one peony at least, and, quite often, several. In almost every instance you will find them growing in sod or utter neglect. Most of them blossom, but they are pitiful in the extreme to the intelligent eye, they look like neglected children. Dig them up, divide the roots and reset in well cultivated ground, and they will grow and expand under loving care the same as a child, into something beautiful.

It is only in very recent years that the peony has become to be known commercially. A few growers and dealers have been in the field for a quarter of a century or so. In the last three years, new growers have entered the business on a larger scale and are pushing the sales of the newer varieties into every state of the Union and Canada.

There may be among my hearers those that have become interested in our flower and have private gardens of their own. To such I may not be able to advance anything of interest, as we shall deal with the subject as simply as possible.

Peonies are like persons to me, as they all have names, and, if one is familiar with the names of the different varieties, he at once feels at home in any well regulated peony garden. Every plant should be staked with a name plate on it—therefore when you approach a plant and read its name, you probably find yourself beside a friend whose history is an open book to you and so you can have a silent visit and so continue from plant to plant for hours and perhaps days, according to the size of the garden.

There are people that know peonies as simply "pinies" and have no idea that they have names. No owner of any well regulated peony garden will allow any strangers therein. Those plants of which you do not know their names, are thrown out. There are several thousand named varieties of peonies but most of the growers consider that about four hundred will cover most of those that are worth while.

How peonies are named and introduced we will now consider.

To raise and introduce new varieties, you first select seeds from the very choicest blooms you can produce from the best sorts you have under cultivation. Plant the seeds and watch over the plants you grow from these seeds for a period of five years or so. In about this length of time, they will blossom. Out of thousands of plants you may find a half dozen that seem worth while. Whatever you select, you watch over for another period of five years to learn their habits and to make sure that they bloom true from year to year. If you are now satisfied that you have something worth naming, you give it a name and register same with the Secretary of the American Peony Society and then put a price on it and offer it for sale to the general public as fast as you can increase the variety. Your peony introductions will probably be named for some member of your family, some historical name, or for some name that seems to describe the flower, and they will be called your Seedlings.

Until recent years France and England have been the chief introducers. At present there are a greater number in the United States and our Seedlings rival if not surpass, any others under cultivation. Among our own people I could name three or four men who probably have and still are introducing as fine Seedlings as the world has ever known, on a large scale. There are a great many persons who are doing this on a small scale.

The price of a peony is governed, in the main, by its scarcity. There is only one registered variety that is priced as high as one hundred dollars, others at fifty, twenty-five and so on down to a dollar and below. A peony root will at least double every year and will do even better under competent hands. When any given variety has been sold extensively about the country and many growers have it for sale, the price will lower as the stock increases. In other words—the supply and demand will make the price.

So much has been written about soil, planting and care that it becomes confusing to a beginner. Different sources advocate this, that, and the other. It is well to read everything available on planting, then use your common sense and go ahead. You probably won't go far wrong if you give your peony plants the same attention that you do your tomato plants, you will have a good showing. Of course, you all take good care of your tomato plants. Some time ago there was a good article published in *WISCONSIN HORTICULTURE* on the care and culture of the tomato and I hope you all read it and if not I hope you will look it up. I cannot recall what issue contained it but the Editor will help you find it. I thought it particularly good. It seems to suggest mildly that anyone with a garden probably knows something about the subject in hand and that it becomes just a little tiresome to have a lot of writers telling us most minutely how to grow everything under the sun. What one person may state about growing peonies, another will rise up to dispute. Therefore we will point out a few first steps and anyone can build up their knowledge from day to day and year to year, from actual experience, which is a very good teacher.

For a permanent peony garden, or for even a few plants, select ground free from shade and well away from trees. It must be well drained as peonies will not do well on wet ground. Good garden soil will grow good peonies—keep this fact always in mind. To tell you how to enrich the soil would open up too large a subject and this you must determine yourself, in case you go into the business. For the amateur gardener, I would suggest a mulch pile. Secure all the leaves you can in the Fall, mix with manure, sod and refuse. This will rot and be ready to use in one year. Spread it all over the field and over tops of plants. Do not turn it into the soil, let it work in by degrees. Do not put any fresh manure on the field. Well rotted manure may be placed between the rows, well away from the plants. Peony roots resent manure and if it comes in contact with them it will injure or kill them. Put plenty of wood ashes between the rows.

The time to plant is in the Fall, beginning the last of August and continue until "freeze up." There is absolutely no other time to plant. A few are still planting in the Spring, but in doing so they gain nothing in time, as the roots are set back one year from being disturbed—and further, they are positively damaged by loss

of eyes which at this time are brittle and easily broken off. In the Fall the roots are dormant and the eyes solid and easily handled.

Before planting, see that the soil is deeply plowed or deeply spaded and well worked up. Stake out the rows four feet apart to allow for cultivation. If for permanent planting, plant three feet apart in the rows. If for propagation, six to twelve inches. Make a diagram of the field or map of your planting in detail. If stakes are broken or misplaced, you can then replace accurately by referring to your plat. This is most important as if you once get your stakes mixed, there is no positive way of identifying your plants even when they are in flower. You think you know, but you can never be positive and there is no man living that can.

Having worked the soil up fine so it is soft to the touch, dig a hole deep and wide enough to receive the root. See that the eyes or sprouts are not more than about two inches below the level of the ground. Then fill in the dirt and pack tight about the roots. If the ground is dry, soak with water. If possible, try to select a time for planting when the ground is moist, soon after a rain. Constant cultivation and hoeing is necessary to produce healthy robust plants.

The first year cover the plants with straw, hay or lawn rakings. This is to prevent constant freezing and thawing, which may lift the roots which have no firm hold on the soil. It does not harm the roots a particle to freeze and the more rigorous the climate, the better and more robust the plants. The second winter the plants need no covering, they will take care of themselves as the roots have gotten a firm hold by this time. Let the old flower stalks stand over winter and in the spring cut off and remove from the field.

Do not dig or disturb your roots for a period of three years. After three or four years, if you wish to increase your stock, lift the roots and with a sharp knife cut up into as many small divisions as possible. Each division must have one eye and it is better to have two eyes, with a root sufficient to grow it. Cut off the ends of the root. Wherever you cut, numerous small rootlets will branch out. Do not be afraid to cut well back. Re-set in the usual way. Dividing the roots at first seems a great problem but you soon become expert at it as it is very interesting.

I consider it wise to plant only a small division to start with. With a small root you can easily press the dirt around each little rootlet and with proper care it will grow quickly and produce a large healthy plant and will give superior results over a large root. The larger the root the harder to plant properly. The peony does not like to be disturbed and so whether the root planted be large or small, the first season will show but little bloom and these will not be true. The second season it will make a good showing and the third year it will in most cases have become established and if you have done your part, the plants will produce blooms that will simply amaze you and attract friends and strangers alike to your gate. Plants will usually blossom well for ten or more years. As long as they are doing well, do not disturb. When they cease to blossom well or do not look healthy, dig them up, divide and re-set. On old roots you may have to use an ax, they will be so immense. Be sure to cut them well back before planting.

In our location the time of blossoming begins about Decoration Day. The first to blossom are the varieties sometimes called Grandmother's Garden "pinies." We think them beautiful because they are the first to greet us. They have no perfume and are dwarf in size. The very first is *Tenuifolia Flore Plena*, or more commonly called the Fern peony, a pretty red. This is followed by the *Officinalis* family, *Rubra*, *Rosea* and *Alba*, or red, pink and white. The *rubra*, or red, has been in cultivation quite generally for generations past. Then comes the mid-season and late peonies, covering about six weeks in all. We soon forget the early "pinies" over the wonder of what follows in the tall, stately varieties with their gorgeous colorings and sweet perfumes.

Wherever there is a field of peonies, you will find people coming for miles around to view the sight and having seen what no pen can describe, they will wish to possess some of these wonder plants and start a garden of their own, or if they have one started they will want to add to it by making new selections and so the gardens are growing from coast to coast. The field is large and the demand, which has only just begun, grows greater every year and it surely will increase as beautiful varieties can be bought for a nominal sum and the first cost is the last and your original purchase can be increased from year to year in a surprising manner.

When the first warm weather arrives in the spring, it causes the eyes which you planted two inches below the level of the ground, in the fall, to come up and these quickly grow into stalks and throw a flower stalk on which you will find several buds. Pinch off the side buds as soon as your fingers can get hold of them, and leave the center bud to blossom. This will give each stalk a large flower instead of several small ones and will save your plants from looking mussy. If you pick all the flowers, do not pick the stem too closely to the roots, leave enough leaves to develop the root. If you wish to see a blossom attain its loveliest form, cut the stalk when the bud throws its first petal, place it in water in the cellar and let it unfold there in the cool darkness. The flowers cannot stand intense heat from the sun and whenever our summer heat comes too soon, it plays havoc with them. Over choice varieties we sometimes erect some kind of protection to ward off the rays of the sun.

The peony is perhaps the most healthy plant we know of. If grounds are constantly cultivated and kept free from weeds and refuse, disease of any kind will hardly ever appear. Probably the most frequent question asked of a peony grower is this: "What about the ants on my peonies?" The answer is, there won't be any ants if you keep the dirt jumping. Ants rarely work in cultivated soil and if there are a few they won't hurt your peonies, they are after the honey from the buds and when the flower opens they disappear. Another question quite as frequently asked is, "Why don't my peonies blossom?" If you have planted in the open on good soil with good cultivation and the variety fails to bloom, better throw it over the fence, it's not worthy of your care. I have never found this to be the case with people who ask this question of me. When I go to see their plants, I find them up against the side of a building, under a tree, or in solid sod ground and very often manure piled about the plant which either kills instantly or by slow degrees.

To advance the cause of the peony we have a society called the American Peony Society. We invite anyone interested to join us through the Secretary, Mr. W. E. Saunders, London, Ontario. The fee and dues for the first year is five dollars, thereafter three dollars per year. Our main trial grounds are at Ithaca, New York, where Cornell University is located and a department of floriculture is fostered by this institution.

Peony exhibition shows are held annually where members are allowed to exhibit their blooms for prizes. New seedlings are exhibited, at this time. The 1923 show will be staged in Minneapolis next June. The general public is invited.

ANNUAL SUMMER MEETING
OF THE
WISCONSIN STATE HORTICULTURAL SOCIETY

Sturgeon Bay, Wisconsin
August 16-17, 1922

PRESIDENT H. C. CHRISTENSEN, *Presiding*

ADDRESS OF WELCOME

H. M. FERGUSON

Gentlemen of the State Horticultural Society, and your ladies: It is needless to say that we are glad to have you with us. I believe that back in 1911 or 1912 we had you here before. We thought then that Sturgeon Bay had something to offer you. Now we are sure that we have something to offer you. We have been trying for several years to get you here again, because we felt that we had the resources and facilities to take care of your physical comfort; also, the beauty spots to tickle your aesthetic sense; and the orchards and the fruit industry perfected to such an extent that they can be studied with pleasure and profit.

But our idea in getting you here was not altogether altruistic. We felt that an organization such as this had something to offer us also; that a body of men of this kind had a wealth of experience to draw from that would give us something which we could use to advantage in our own community and in our own work.

I am told that this is to be a two-day convention, today being devoted to the business of your organization, and tomorrow being devoted to seeing something of our county, its industries, its resources, and its beauty spots. I want to say at this time that a two-day convention is not enough. You cannot see what we have to offer in just one day. Why not make it a three or four- or five-day convention, and forget that you came up here for simply two days? Why not stay with us for a week and give us a chance to get better acquainted?

We have stone quarries down here which are probably the most efficiently operated in the state, and have the finest quality of crushed stone in the Great Lakes region. We have orchards, which perhaps you are familiar with, which we believe are above the standard in most communities. We have a dairy industry here which is making rapid strides, and which we believe can be studied with profit by those who are interested in it.

Now, you have entered the door of Door county. We give you the key to the door, and we want you to lock it on the inside, and throw the key away and stay here as long as you will, and let us help entertain you, and get what you have to offer.

LATE PLANTING OF HERBACEOUS PERENNIALS AND SHRUBS

WILLIAM TOOLE, SR.

The question has been asked me by one of our members if I did not think that the fall was a good time to set out shrubs and perennials. The time was when my mind was very much on spring as the only time to plant. I thought, when the weather was getting warm, and nature was starting her vegetation growing, that was just the time to join in with nature. Since then, though, I have found you can get pretty fair success if you are careful, planting almost any time, but you have got to be careful, and you should have some knowledge of plant physiology. Sometimes we set out a plant at the wrong time, because nature is inducing the top to push along, and we take for granted that the rooting is all provided for. If you set things out at a time when there is no root action, whether it be because the warmth of the season at the time is pushing the top along too much, or whether you have let the roots get dried out—whatever the cause may be, if you have not provided for root action, there is a very poor chance for top action to be successful afterwards.

We have all had experience in times past seeing how the warmth of the season would start growth, even though the ground is frozen, and that has shown us that upper vegetation may be pushed along, regardless of what the root conditions may be. Plant men, greenhouse men, know how to take advantage by retarding the upper growth, and thus promoting a growth of the root.

Now, on the matter of comparison between spring and fall planting. In the springtime, if you plant early enough, it is the ideal time, I still think, for planting. On the other hand, however, if you are a little late in taking the plants up later in the season you will find that you are somewhat at a disadvantage. In the fall there are many things that have made their growth, like peonies, poppies and other things, which have reached such a condition that they are ready to form their roots, and go on and be planted. For these early fall is really better than spring for planting. I would emphasize that especially as to peonies and poppies. I find the same thing is true in regard to a number of other perennials. Fall is a very good time. You have this advantage, that whatever you have planted, besides having gotten established, with a good rooting, will have a good advance on the next spring's growth, and we have learned the advantage of that in this northern country, with its short springs. When spring comes it is worth a good deal to have some things already attended to, so that you can give better attention to others.

In regard to shrubs, there have been many times when I had to move things in the fall, and I have been surprised to find that they did very well, especially if they were not put off too late. I will not say that they did better than they would in the spring, but I would not wonder much if most of you had had that same experience, that things in the shrub line do very well when planted in the fall. So if you have a good deal of planting to do in the spring, anyway, you can to advantage put in your shrubs in the fall. Secure them, heel them in, and give them protection with some kind of mulch, and you have made a good step forward towards providing for the best of conditions in the spring.

DISCUSSION

QUESTION: How early should the planting be done in the fall. Should it be done after the leaves fall, in the case of shrubs?

MR. TOOLE: I think with many things it would be just as well if you did not wait until the leaves had all fallen. You notice in the case of shrubs, it is generally the older leaves that fall first. While you might feel as though you had been defrauded, if you got things from the nursery without every sprig and spur, you know by experience that some of those tops ought to come off, and it is well if you get them before all leaves have fallen, and whatever trimming is needed, you should do, to provide a reduction of the branches to offset the loss of the roots.

THE KICKAPOO REGION

M. J. HOVEY

Perhaps some of you want to know, first, where the Kickapoo is. It is in Crawford county, near the Mississippi River, one hundred miles directly west of Madison. If you are going there by train, take the St. Paul from Madison to Wauzeka, and then take the branch line up the Kickapoo Valley to Gays Mills. The Kickapoo Valley does not look like very much, and you may think you are going into a wilderness when you start up the Kickapoo. It looks very much like southwest Missouri, if any of you know what that means. The little Kickapoo River runs south through Crawford county, and joins the Wisconsin River at Wauzeka. The railroad station is Gays Mills. Our orchards are located about two miles east of Gays Mills on the hills.

The bluffs there are about four hundred feet higher than the valley, and the orchards are located on top of the hills. The land is rolling; in fact, quite hilly, and few of our orchards are located on level ground. Our north slopes have the better soil. On the south slopes, the rock crops out and the soil is not very deep. The orchards there were started, I believe, back in 1908, at which time the Horticultural Society started their trial orchard there. That orchard was taken over by an orchard company, known as the Gays Mills Fruit Farm, having at that time, I believe, about 120 acres planted.

That orchard is owned by a group of men located in Milwaukee. We have altogether about eight hundred acres in this neighborhood. Seven hundred acres of that orchard now are being cared for by the Kickapoo Development Company. The orchard ownership is in tracts, varying from 10 to 100 and 120 acres.

About 100 or 120 acres additional are being taken care of by private parties, and not handled by the development company. We have headquarters for our superintendent, a large boarding house, and a number of smaller houses where the men live. We have been handicapped somewhat by not getting the class of help that we needed, but that situation is gradually improving particularly as we get better living quarters and are able to give better places for our men to live.

We have about sixty acres of cherries, using the same varieties that you do here—the early Richmond and the Montmorency, and about twelve acres of grapes, and the balance in apples. Our apples are largely Wealthy, Dudley, Snow, Wolf River, Northwestern Greening and a few other varieties. The orchards are doing very well, and just now are coming into bearing, this year being the first year that we have had any considerable amount of fruit to ship. Of course, we have had some fruit for the past five or six years, but this is the first year, as I say, that we have really begun to ship in carload lots, so that we can say that we are really in the fruit business.

Of course, like everyone else, we have had a good many things to learn. We expected the orchards to come into bearing much earlier than they did, but the tracts now—the younger of them being set out in 1914, 1915 and 1916—are coming along, and, together with the few older trees that were set out in 1909 and 1910, are beginning to produce quite a volume of fruit.

Our development company being under the charge of one superintendent, we try to lay out the work for each orchard tract in the spring, agreeing in a general way as to the work which will be done on each tract, and then we have the superintendent go ahead and do the work as the season advances. Accounts are rendered to each company each month. We find that handling the work in this way is quite economical, and cuts down the amount of equipment required. During the earlier years, practically all of our cultivating was done with teams. Three years ago we began purchasing tractors of the small wheel type, and found them quite satisfactory. Last year we purchased one of the caterpillar type, and found that quite satisfactory, although considering the cost of the tractor, we do not feel that we are justified in spending more money that way, and that we can do better with the small wheel type of tractor, considering the amount of work done and the amount invested. Our orchards are located on the side hills, which makes it necessary for us to watch the drainage and keep down erosion. For that reason we are gradually drifting toward a plan of planting clover between the rows, this year, putting eight foot clover strips between each two rows of trees. The trees are planted 24 feet apart, and from our experience it seems that perhaps this is a thing that we will be obliged to do even more than we are doing now.

SECRETARY CRANEFIELD: I am sure we have all listened with a great deal of interest to what Mr. Hovey has had to say. Now, when you read the newspapers, you may learn a lot, and especially from the agricultural papers, although you may also learn some things that are not so. All of the past week an article has been going the rounds, not only in the agricultural press, but in the news press of the state, to this effect; that "the wonderful soil in the Kickapoo region, along the ridges, is well adapted to growing apples; several years ago the *experts of the agricultural college discovered this region*, and proceeded to develop it."

Now, only those who have been in close touch with the work of the Horticultural Society in the Kickapoo region can see the joke in that. Be it known to all of you that the experts at the agricultural college, with due deference to their ability, etc., never discovered the Kickapoo, but after it was discovered and developed by the State Horticultural Society—about seven years after most of the orchards were planted—we succeeded in taking some of the Agricultural College men out there by sheer force, to show them what was there. The State Horticultural Society discovered and developed the Kickapoo, with the aid of such men as Mr. Hovey and others, and not the College of Agriculture.

THE FRUIT INDUSTRY OF DOOR COUNTY AS A BUSINESS—ITS PRESENT AND FUTURE

E. S. REYNOLDS

Mr. President, Ladies and Gentlemen: I am sorry that I do not feel capable of leaving the impression with you that our president, Mr. Martin, could have left with you had he been here to deliver this talk this afternoon. I will try to give you some figures of our growth since 1919, and tell you what we expect to be able to do in 1925.

We started in 1919—I take that year because that is the first year that the Fruit Growers' Canning Company functioned as a factor in the industry. In other words, that is the first year it canned cherries. In 1919 the total crop in the county was 5,136,000 pounds of cherries. The following year, 1920, we had a shorter crop, with 4,702,000 pounds of cherries. Last year, in 1921, at which time we thought that frost had been a serious

factor in curtailing the crop, we had 8,617,000 pounds of cherries. This year just past, we have harvested a crop of 10,637,000 pounds of cherries. That is an increase in four years of 100 per cent.

In 1919, of that total crop, 61.5 per cent was handled by the canning factory. The next year there was an increase of 73.8 per cent. In 1921, it was 71.5 per cent. This last year 82.5 per cent were canned, with an additional 4.7 per cent barrelled and frozen.

We found, as we first started, that there were two channels in marketing and distribution. First was the old system of distributing as fresh fruit, in 16-quart crates. In 1919 the second method was used. In other words, the fruit was distributed in the tin, as well as fresh. We are growing so rapidly that it makes us look forward to 1925, when we will have probably a million 16-quart crates of fruit to market.

In the matter of distribution, we are building up a foundation, figuring on a million crates in 1925. First of all, the radius of our fresh fruit shipments can be increased. In other words, we can ship more fresh fruit. We will eventually increase our radius by about 500 miles. I believe that we have merely scratched the surface in the marketing, the type of marketing that we are doing, in the canned commodity. In other words, we have been gradually expanding, and changing the ratio between the small sized tins, the number 2 tins, and the large sized cans, or the number 10 size. First of all, the number 2 size tin satisfies home consumption. It is the housewife that buys the small sized cans. If we can teach her that she can buy cherries that are put up as well as, if not better than she can put them up in her own home kitchen, and can buy them at her corner grocery store, we have done a great service to her, as well as increasing the consumption of our product. Our records will show that we have taken important strides in this direction.

For instance, in the year 1919 we canned and marketed 33,202 cases of No. 2 cans. That is the small size. In that same year we marketed 24,110 dozen No. 10's. The No. 10 can, by the way, holds three full quarts. This year just passed we have built up our distribution and our sales, so that we have packed, and have a market already established, for 108,235 cases of No. 2's, and 59,107 dozen of No. 10's. That is an increase of over three times in the small sized can, and it is an increase of but twice in the large size can.

So you can see, we are stepping in the right direction, trying to get our goods where they will get into consumption by the housewife, so that the housewife will know what to make a cherry pie out of. Not sweet cherries; we do not want them to make cherry pies out of sweet cherries.

In the matter of distribution of the canned commodity, we are distributing through 148 separate jobbing sections in the United States. Of course, in some of those sections we distribute through a great number of jobbers, but we have 148 at least through which we distribute.

Furthermore, we are distributing today in cities of Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Montana, Missouri, Nebraska, Ohio, Oklahoma, Pennsylvania, North Dakota, South Dakota, Texas, West Virginia and Wisconsin. The heaviest portion of our distribution is in the southwest, in the three states of Kansas, Missouri and Oklahoma. We are just beginning to open up a territory in the west, on the Pacific Coast. You may say that is a queer place to look for a market for canned cherries; they have all sorts of fruit of their own on the Pacific Coast. But the Pacific Coast, as you know, has a good many eastern people on it, and eastern people on the Pacific Coast cannot find the right sort of cherries. They can find all other kinds of cherries, but they cannot find the old kind that they used to make pies out of. So what we are trying to do is to put the right sort of cherries into the Pacific Coast markets, and our efforts so far have met with success.

A half million pounds of fruit this year have been pitted into 50-gallon white oak casks and frozen. This method of distribution supplies a long felt want among the wholesale pie bakers. The wholesale pie baker would much rather open a 50-gallon keg of cherries and make his pies for the day, than he would to open up the same quantity of the fruit in tins. It is much cheaper for him and much more satisfactory. Also, the wholesale preservers feel that this type of fruit meets all of their requirements. We are just starting on this type of marketing, and we find that it is going to turn out just as we expect it. With the start we have made, it looks as if in 1925 we are going to have a ready market, and more than a ready market, for anything that we can produce.

There have been two great drawbacks. People have usually said, when speaking of Door county, "Oh, well, you will never

get them picked." I have never seen the time yet when we did not have twice as many pickers as could have picked the crop. Secondly, people have said, "Well, when you get them picked, what are you going to do with them?" By building up a foundation with the trade, and gradually stepping out into new localities, we believe we will have no trouble whatsoever in taking care of one million cases of fruit in 1925.

Now, that will do for cherries. We have had many sad experiences, trying to find a way to take care of our apples, and we have found what we need to do with apples, in marketing the apple crop through the cider mill, or as canned apples. We have found one thing, and that is that it does not pay to try to market an apple product as a soft drink—that is, in the old apple cider form. There is a small demand for apple cider, but Uncle Sam has taken the kick out of it and it has fallen into the soft drink class. As a soft drink, it caters to a very fickle public. In other words, it caters to the same class of people who will drink Green River today, and turn around and drink Coca Cola tomorrow. So you cannot tell where your market is. There is but one stable apple commodity at the present time. I am not talking about the fresh fruit. I refer to vinegar. I believe that the next step in the direction of marketing our apple crop, will have to be along the line of fancy vinegars, put up in glass. As soon as we have worked this out, so that we can keep pace with the increasing apple crop, which we have before us, I believe we will have made some progress.

We have a good many distorted reports. We are growing, but we have not grown quite as rapidly as one of the newspapers implied when it printed the statement: "This year the Fruit Growers' Canning Company packed 90,000,000 pounds of cherries." Of course, a little cipher now and then makes no difference, but 90,000 pounds of cherries is quite a sizable pack.

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