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## South Dakota Fruit Garden

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# SOUTH DAKOTA FRUIT GARDEN



The outstanding success of the famous John Robertson orchard near Hot Springs, several scenes of which are shown on the cover of this publication, show what may be expected in South Dakota orchard growing if these practices are followed:

1. Location on protected slope surrounded by trees.
2. Supplementing natural moisture by collecting run-off water in terraces.
3. Clean cultivation and constant care.



Terraces hold snow water which melts while ground is frozen, thus conserving run-off.



# The South Dakota Fruit Garden

by FRANK I. ROCKWELL\*

## Fruit Essential in Diet

Fruit is recognized as essential in the diet. Most South Dakota farm families either spend too much of their income in buying this part of their food, or do without. Nearly all South Dakota farms can produce an ample supply of fruit, provided a good location with wind protection is chosen, and the varieties are right and given good culture.

Many native wild fruits can be grown as a part of the farmstead or garden windbreak. The right selection of domesticated berries, bush and tree fruits in accordance with locality will enable one to produce a goodly variety sufficient for family needs on as little as one-half acre of ground. Some of the dwarf so-called tree fruits such as the Sapa, Opata, and Oka cherry-plums and the Anoka apple usually come into bearing the year after transplanting—practically as early as berries.

Hence, the desire for quick results should not bar tree fruits from the garden. While many of the better apples may take several years to come into bearing, these may be planted between the earlier producing plums and cherries without detriment or waste of space, thus assuring returns for land and labor while the longer-lived kinds are developing.

## Moisture Supply

In 1940, the U. S. Census Bureau reported only 4,219 South Dakota farms growing fruit, or 24 percent of the number that raised fruit in 1930. One factor which killed out so many fruit trees undoubtedly was shortage of moisture.

Another was neglect of the orchard. The importance of careful and thorough con-

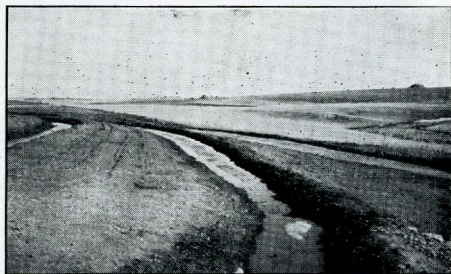
servation of moisture as well as of soil heretofore had not been fully understood nor appreciated. Consequently, many of the precautions essential in planning and caring for the fruit garden were neglected.

Moisture conservation provisions described for windbreaks in South Dakota Extension Circular 397, "Planting Windbreaks," are equally needed in the fruit garden. Those of greatest value in fruit production are:

1. Location of fruit garden where protected from south, west, and north by windbreak.
2. Location where protected from sun and hot winds by slope or aspect of ground as on north or east side of hill.
3. Collection of snow by hedges on sides from which snow blows.
4. Retention and intake of water on slope by contour terraces, well constructed and of sufficient grade to prevent overflow.
5. Natural irrigation by diversion to terraces of flood or runoff waters.
6. Increase in moisture-holding capacity of soil by restoring humus by turning under a heavy sweet clover or grass sod or working into the soil a good covering of green or barnyard manures.

## Location

The choicest site for a fruit garden, as well as for trees and shrubs generally in



Terraces follow the contour and prevent gully erosion while conserving moisture.

\* Extension Forester and Horticulturist

South Dakota is the northeast slope. Several factors combine to make this true.

The northeast slope retains moisture longer than flats or other slopes because it is more sheltered from direct rays of the hot afternoon sun and from the burning south winds. Since the northeast slope does not warm up so readily during midwinter or early spring thaws, there is less damage to fruit trees from "sunscauld," which is the killing of the bark on the southwest side of the tree, an injury from which apple and other fruit trees commonly suffer in South Dakota.

Slopes but slightly less favorable are those facing north and east. There is less danger of late spring frost injury because the ground remains cooler, the snow lies longer, and fruit buds are slower in opening. Slopes in general are warmer than flats or low ground because cold air is heavy and settles below.

Hence, the danger of summer and early fall frost damage also is less. Slopes provide drainage of both air and water, each essential to fruit production. The higher on the slope, the less danger of frost. The downward drainage of cold air with no obstructions to cause frost pockets is essential.

Slopes afford an opportunity for the collection of runoff flood waters in terraces where it can be held until it sinks into the soil. Flood water from other areas can be diverted into the terraces to increase the moisture supply. With the possibility which exists for a supplementary water supply furnishing automatic irrigation and moisture conservation on terraced northeast, north and east slopes, there would seem to be little need for loss of fruit orchards in future drouths, if such a site is selected, properly developed and cared for.



Here are four hardy evergreens suitable for protecting apple orchards. From left to right, they are: Ponderosa pine, Colorado spruce, Black Hills spruce and Douglas fir.

Farmsteads protected by a terraced windbreak on the northwest or north may have opportunity to provide some fruit trees at the eastern end of the terraces. This would have the benefit of the north or northeast slope as well as of the windbreak to the west.

Windbreak protection to the fruit garden is necessary for greatest satisfaction, whether on a slope or on a flat. Loss of moisture through evaporation is directly proportional to wind velocity over the ground surface. Wind velocity is retarded 50 percent or

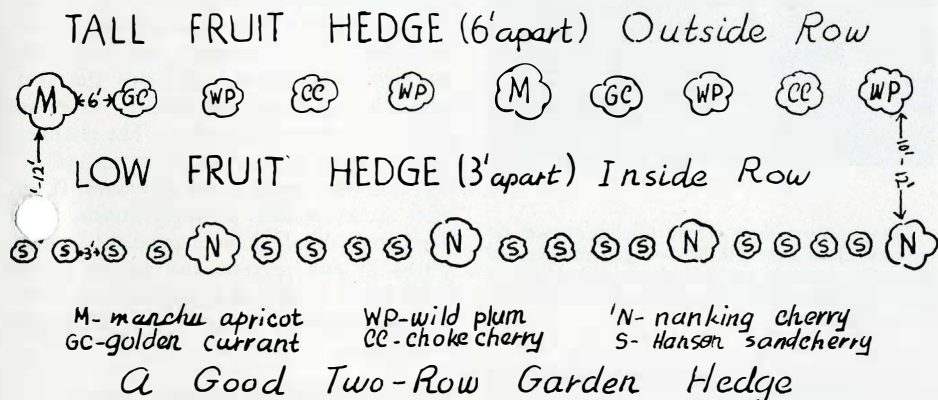
more for a distance equal or greater than 10 times the height of the windbreak. Protection from the south is necessary; from the west and north, very desirable. The windbreak may consist of buildings, of the slope of a hill, or of trees and shrubs.\*

Tall growing trees should not be closer than 50 feet to orchard trees. Low growing shrubs may be 15 or 20 feet away. An inside hedge of low shrubs with a hedge of tall shrubs outside suitable for protecting

\* See Extension Circular 397, "Planting a Windbreak to Survive Drouth."

### Hedges to Protect Your Vegetable and Fruit Garden

Hedges to protect the garden, to beautify the yard, to improve the windbreak, to collect and control snow, might be composed of wild fruit bushes of several kinds which would provide an assortment of delectable jams and jellies. An effective double row might consist of (1) a low hedge of Hansen bush cherries (or sandcherries), gooseberries, currants, dwarf juneberries or Nanking cherries three or four feet apart, and (2) a tall hedge of chokecherry, native plum, golden currant, buffaloberry or Manchurian apricot, five or six feet apart. The taller varieties will fruit better if separated by some of the shorter kinds.



**WILD OR SEEDLING FRUITS** which may be used for windbreak rows and hedges or landscape shrubs in border or lawn and at the same time produce fruit for preserves, jellies, and jams for the family table:

#### LOW TO MEDIUM HEIGHT 3-7 feet

Sandcherry  
 Black Currant  
 Golden Currant  
 Dwarf Juneberry  
 American or Highbush Cranberry  
 Nanking Cherry (Introduced)  
 Elberberry (Red, Black)

#### VERY TALL 12-20 ft. Introduced

Manchurian Apricot  
 Siberian Crabs  
 Manchu Crabs

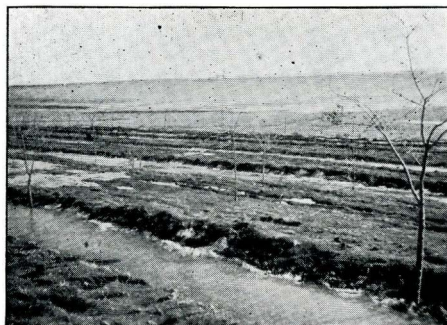
#### TALL BUSHES 6-15 feet

Juneberries or Serviceberries  
 Chokecherries  
 Wild Plums  
 Nannyberry (or Black Haw)  
 Buffaloberry

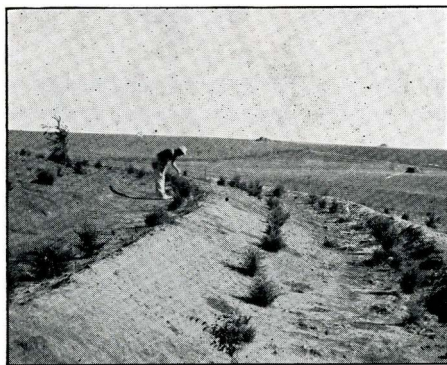


vegetables as well as fruit is shown on page 5.

Unfavorable locations for fruits are southwest, south and west slopes. These are exposed in summer to drying south and west winds and the burning heat of the afternoon sun; in winter, damage from sunscald may be severe. Low areas between slopes also are undesirable on account of poor drainage and greater susceptibility to frost damage.



These pictures show wrong placing of trees on terraces. These trees will be damaged or destroyed when the channels are plowed out and ridges rebuilt. Trees should have been placed on or just below the ridges.



## Soil and Preparation

A deep loam containing both sand and clay and plenty of organic matter is desirable, but the soil is usually less important than the site. The condition of both sandy and clay soils may be much improved by liberal dressings of barnyard manure, or by sod or green manure plowed under. For currants and gooseberries, heavy soils are preferable.

Whenever there is any slope to the ground, it should be terraced on the contour to permit collection and retention of as much snow and rain water as possible. This added moisture will often make the difference between success and failure. Terrace ridges are built not less than 15 feet apart on the steepest slopes, diverging as the slope becomes more gentle. The process of throwing up ridges excavates channels which should be capable of holding 12 to 18 inches of water. Snow water from early thaws held on the terraces until frost is out saturates the subsoil and helps the fruit bushes and trees survive drouth. Trees are planted on the terrace ridges. The channels must be kept open so as to permit cultivation and deepening when necessary. If terraces are more than a couple hundred feet long, they should have a gradient of two-tenths of one percent and permit excess flood water to spill at either end on a well sodded waterway so as to prevent serious soil erosion.

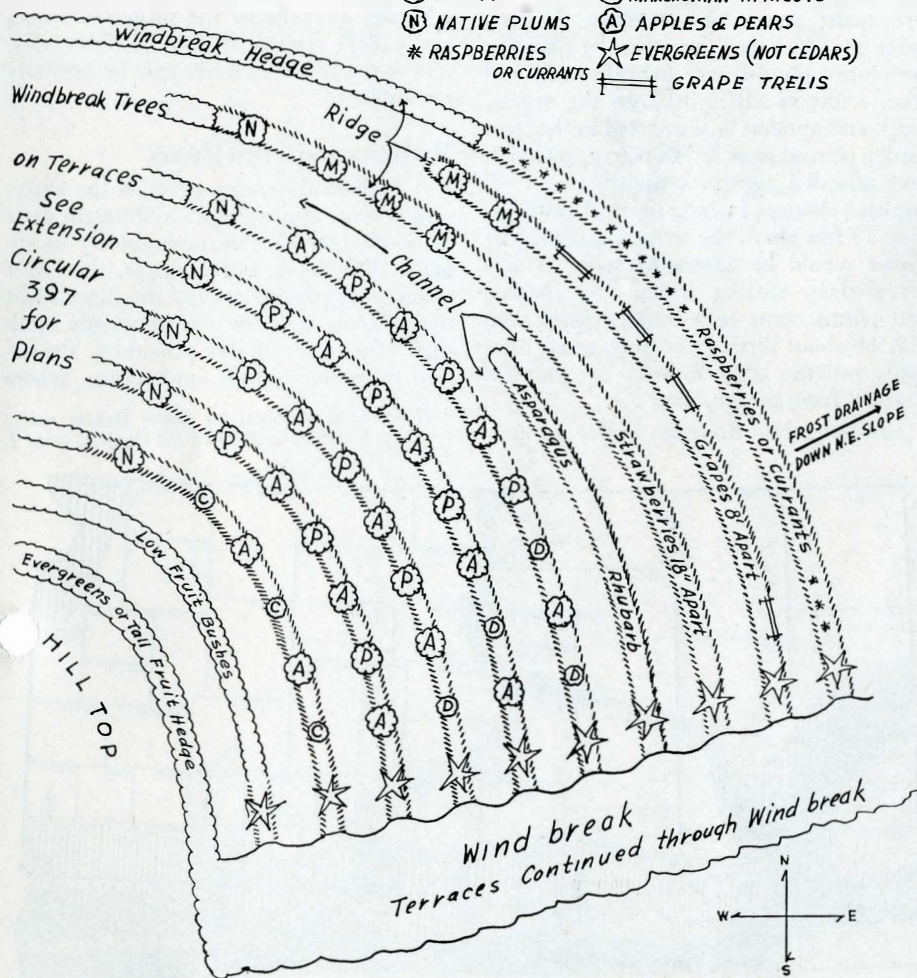
## Size and Planting Arrangement

Where small fruits of various kinds are to be planted, about 10 trees of apples, plums, and plum-cherry hybrids with a few apricots and crabapples should provide ample tree fruits for the average family. In the milder climatic zones, pears, cherries and grapes may yield several crops of fruit before being stricken by an unusually hard winter. Only those should be planted which can be given proper attention. The fruit garden plan for any home will depend on many factors such as available site, etc.

# PLAN FOR IDEALLY LOCATED HOME FRUIT GARDEN

## LEGEND

- |                              |                           |
|------------------------------|---------------------------|
| ⊙ CHERRIES                   | ⊙ DWARF CHERRY-PLUMS      |
| ⊙ PLUMS                      | ⊙ MANCHURIAN APRICOTS     |
| ⊙ NATIVE PLUMS               | ⊙ APPLES & PEARS          |
| * RASPBERRIES<br>OR CURRANTS | ★ EVERGREENS (NOT CEDARS) |
|                              | GRAPE TRELLIS             |



All plantings on terrace ridges built at least 12' to 15' apart to prevent runoff and hold soil and moisture in terrace channels.

Fruit trees 15 ft. apart. Apples and pears 30 ft. apart with shorter-lived plums and cherries between, for mutual protection.



Plans suggested here may be modified in many cases to fit the sites to be planted.

Trees should not be crowded since all sides of the tree must be exposed to sunlight for good production. On favorable sites, apples, pears, and apricots may be 30 feet apart; plums and cherries, 15 feet. Space may be saved, however, by planting the plums, plum-cherry hybrids, bush and other fruits as fillers between the apples, pears, and apricots as illustrated in the fruit garden plan on page 7. The better protection thus afforded conserves moisture and diminishes chance of winter injury.\* With terraces 15 feet apart, the terraces occupied by apples would be alternated with terraces occupied by smaller fruits. The cherries and plums come into bearing early, and may be about through bearing when most apple varieties begin to bear. See plan for terraced fruit garden, page 7.

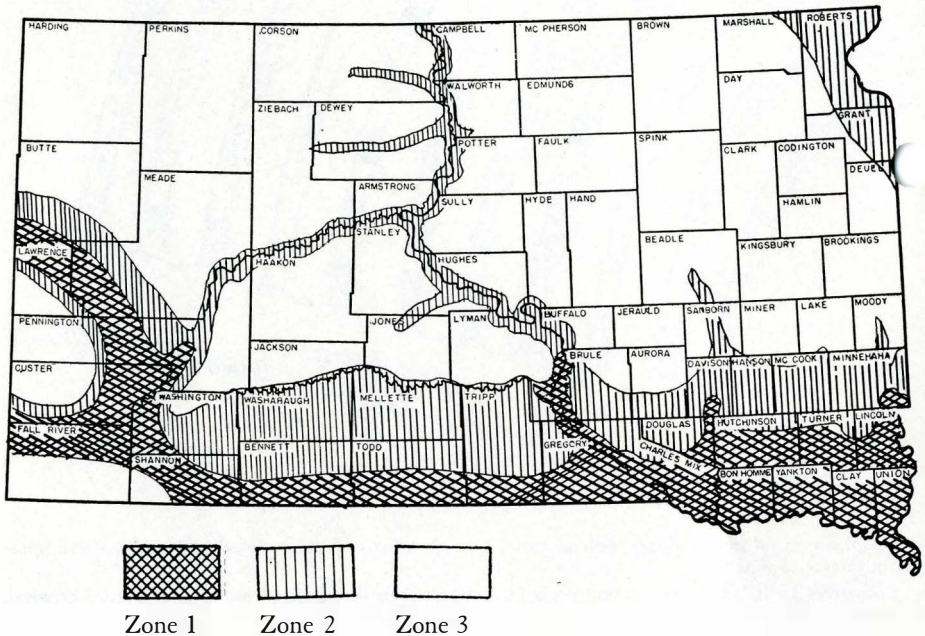
Similarly, the Minnesota Valley immedi-

ately around Big Stone Lake in Roberts and Grant counties is the lowest elevation in the state and is probably modified still further by the proximity to such a substantial body of water, resulting in more favorable conditions for fruit production than generally prevails in the protected slopes and valleys classed in Zone II. Sites adjacent to the Missouri River may be similarly favorable.

### Varieties and Fruit Zones

A marked difference exists in the hardness of some fruit varieties in different parts of South Dakota, due undoubtedly to climatic differences. For example, the lower valleys immediately around the Black Hills undoubtedly have the climate greatly modified as a result of this proximity. Protection from slopes, hills, and forests, where

\* Note the fruit zones for South Dakota under "Good Varieties for Home Fruit Garden," page 9.



South Dakota Fruit Zones

## Good Varieties for the Home Fruit Garden

(Figures indicate the number suggested for home garden)

| Kind                                  | Principal Value           | ZONE<br>I  | ZONE<br>II  | ZONE<br>III   |
|---------------------------------------|---------------------------|--|---|---|
|                                       |                           | Southern Border,<br>Lincoln Co., West &<br>lower Valleys around<br>Black Hills | Counties from Minne-<br>haha West; Protected<br>Slopes & Valleys<br>Generally | Plains and Level Prairies<br>of Northern two-thirds<br>of State |
| <b>SUMMER APPLES</b>                  | For Quick Returns         | Anoka  | Anoka (1)   | Anoka (1)   |
|                                       | Cooking & Eating          | Red Duchess (1)  | Red Duchess (1)   | Red Duchess (1)   |
|                                       | Top Grafting              | Virginia Crab  | Virginia Crab   | Virginia Crab   |
|                                       | Jelly Crabs               | Dolgo (1)  | Dolgo (1)   | Dolgo (1)   |
|                                       |                           | Florence   | Florence  | Florence (1)  |
|                                       | Sweet Crab                | Whitney  | Whitney   | Whitney   |
|                                       | Varieties for Trial       | Beacon   | Beacon  | Beacon  |
|                                       |                           | Melba  | Melba   | Melba   |
|                                       |                           | Red River Crab   | Red River Crab  | Red River Crab  |
| <b>FALL APPLES</b>                    | Main Crop                 | Wealthy (2)  | Wealthy (2)   | Wealthy (1)   |
|                                       |                           | Anisim (1)   | Anisim (1)  | Anisim (2)  |
|                                       |                           | Joan (1)   | Joan (1)  | Joan (1)  |
|                                       | For Trial                 | Goldo (1)  | Goldo (1)   | Goldo (1)   |
|                                       |                           | Minjon   | Minjon  | Waukon  |
|                                       | Top Grafting<br>(Cooking) | Hibernal   | Hibernal  | Hibernal  |
| <b>WINTER APPLES</b>                  | Long Keepers              | Haralson (3)   | Haralson (3)  | Haralson (2)  |
|                                       |                           | Wakpala  | Wakpala   | Wakpala (1)   |
|                                       |                           | Sugar Crab   | Sugar Crab  | Sugar Crab  |
|                                       |                           | Northwestern (1)   | Northwestern (1)  | Malinda   |
|                                       | Varieties for Trial       | Victory M369   | Victory M369  | Victory M369  |
|                                       |                           | Prairie Spy  | Prairie Spy   | Prairie Spy   |
|                                       |                           | Fireside M993  | Fireside M993   | Fireside M993   |
|                                       |                           | Hawkeye  |   |   |
|                                       |                           | Sharon   |   |   |
|                                       |                           | Turley Winesap   |   |   |
|                                       |                           | Delicious  |   |   |
| <b>HANSEN RED<br/>FLESH APPLE</b>     | For Trial                 | Almata   | Almata  | Almata  |
| <b>PEARS</b><br>(See Pears Below)     | For Trial                 | Peter Piper (Golgol)   | Peter Piper (Gogol)   | Peter Piper (Gogol)   |
|                                       |                           | Parker   | Bantam  | Bantam  |
|                                       |                           | Mendel   | Mendel  |   |
|                                       |                           | Patten   |   |   |
| <b>PLUMS,<br/>Minn. Hybrids</b>       | For Trial                 | Ember  | Elliot  | Underwood   |
|                                       |                           | Superior   | Superior  | LaCrescent (yellow)   |
|                                       |                           | Elliot   | Underwood   | Radisson  |
|                                       |                           | Underwood  | Monitor   | Fiebing   |
|                                       |                           | Monitor  | Fiebing   | Monitor   |
|                                       |                           | Tonka  | Pipestone   | Splendid  |
| <b>HANSEN PLUMS<br/>FOR ALL ZONES</b> | Large Hybrids             | Oziya, Cree, Tecumseh, Kahinta, Waneta   |   |   |
|                                       | Fragrant Hybrids          | Kaga, Hanska, Toka, Kota   |   |   |
|                                       | Cherry-Plums              | Sapa, Opata, Oka   |   |   |
| <b>NATIVE PLUMS</b>                   | For Cross Pollination     | Surprise, Terry, DeSota, Wyant, Westesa, Assiniboine,<br>Bounty                |   |   |

available improves conditions still further. The result is that Black Hills weather is generally more favorable than that of Union and other counties along the southern border, classed in Zone I.

**APPLES:** "Varieties for Trial" in the suggested list of fruit includes several varieties of improved quality recently released by neighboring state experiment stations. Name and description of M369 and M993 by the Minnesota Fruit Breeding Farm have just been released.

**PEARS:** Market pears generally lack hardiness and are very susceptible to the damaging fire-blight. N. E. Hansen's Manchurian Hybrid (Peter Piper or Gogol) and some other new northern hybrids are preferable for South Dakota.

**CHERRIES:** Hansen bush cherries are the native sandcherries improved by Dr. N. E. Hansen of which he has named several varieties, entirely hardy throughout the state. Other cherries worthy of trial are: For the entire state, the Korean cherry and the red Nanking Cherry (*Prunus tomentosa*), bird cherry of China; For Zones I and II, the winter tender red pie cherries, Early Richmond, Wragg and Montmorency.

**APRICOTS:** Hardy for South Dakota include the Manchu and 11 other selections of drouth and wind resistant Manchurian seedlings introduced by Dr. N. E. Hansen; and the Scout and Morden apricots of Manitoba suggested for trial.

**Grapes:** The Beta, vigorous, productive and hardy throughout South Dakota without winter protection, is very desirable for jelly and grape juice. South Dakota and Minnesota hybrid grapes are worthy of trial. Provide frames for climbing.

**CURRANTS:** All standard white and red currants hardy. Red Lake is productive. Viking is said to be immune to white pine blister rust. Native golden currants with black or yellow fruit are hardy and valuable for windbreak hedges and landscaping.

**GOOSEBERRIES:** Hybrids of native Dakota species with English currants have produced numerous good varieties such as the Pixwell.

**RASPBERRIES:** Will produce only on moist protected sites which can be sure of receiving water during the fruiting season. Good red varieties are Latham, Chief, Ruddy and Ohta. Of the raspberries, the red varieties are the more productive in South Dakota. The system of planting most desirable to follow is the narrow hedge system, with suckers allowed to spread only between the hills originally planted. Rows then are about 12 inches wide, held in place by wire trellises. Ten canes per four linear feet give greatest yields.

**STRAWBERRIES:** Require well protected sites. Good June-bearing types are Dunlap, Howard or Premier, Minnesota 1192. Ever-bearing varieties include Gem, Mastodon, Progressive, Wayzata, (or Lockhill) and Dry Weather. Strawberries are like raspberries in demanding an ample moisture supply while the fruits are developing. With water available when needed and plants mulched with straw at freeze-up time during winter, these berries can be grown in most localities. It is often practicable to water a small strawberry bed but not a more extensive but less productive fruit garden.

An effort is made in the accompanying chart, "Good Varieties for the Home Fruit Garden," to distinguish between the major climatic zones and suggest the varieties most satisfactory for each.

## What to Plant

Planting stock to give satisfactory results must fulfill four specific requirements.

1. Only varieties known to be hardy under South Dakota conditions should be planted!\*
2. Most bush and tree varieties must have been budded or grafted on hardy root stocks, such as Siberian crab in the case of apple trees, northern wild plums in the case of plum varieties, Manchurian apricot seedlings in the case of apricots.
3. A sufficient number of varieties to permit cross-pollination must be planted in mixture. While some varieties of apples, plums, cherries, and grapes may be able to fertilize themselves enough to produce fruit, many will not; and in most instances, fertilization is much more satisfactory and a better crop assured if enough varieties are interplanted to ensure cross-pollination. In the case of the improved varieties of plums in particular, it is important to have some of the native plums, wild or selected, near enough for the bees to transfer the pollen.
4. The quality of stock should be of the best—medium sized, thrifty and free from disease. One-year old trees are to be preferred, affording a better chance to trim and develop the low-headed, bush-type trees needed.

Northern nurserymen, particularly those of the Dakotas, are most apt to have the varieties that are hardy and have stock propagated by the methods suited to the northern climate. Stock from more southern latitudes and bargains from any unknown source, will seldom prove satisfactory. Ask



your dealer if his trees fulfill these two requirements before purchasing.

One point of special importance in commercial apple production is concerned with "top working"; that is, either grafting or budding other varieties on to the top. Some of the better varieties such as Delicious and Jonathan which are not hardy enough to endure South Dakota winters when propagated as budded or root-grafted stock, are said to survive and produce well when top-grafted on the permanent side branches of well-formed trees that have been growing in the orchard two years or more. Two varieties have given the best satisfaction when used for stock in top working—the Hibernial apple and the Virginia crab, due to exceptional winter hardiness and wide-angled branches which do not split.

### **Points About Planting**

Plant as early in spring as it is possible to prepare the soil. All plants should be entirely dormant, with no buds starting at the time. Stock should be carefully handled and well protected to prevent loss. Roots should never be permitted to dry out, the stock being heeled in promptly on arrival. It cannot be planted at once. Berries and roots are set the same depth that they grew previously; fruit trees slightly deeper. Soil from the holes is separated into topsoil and subsoil as the holes are dug. In planting, the roots are spread out naturally in the hole, topsoil placed about the roots and thoroughly packed, and subsoil used to fill up the last of the hole. Fruit trees when planted should be leaning to the southwest.

### **Prune When Planting**

A bush (low, open head) shape of trees is needed to grow apples, plums and other fruits in South Dakota. The shorter the trunk and the lower the branches, the greater the shading of the trunk and the less danger from sunscald, which is so serious in the northern Great Plains Region.

If unbranched year-old trees are planted, they should be cut off to about 12 inches above the ground. Branches will develop from dormant buds of the stub. If there are several good sized branches, three or four may be left. The lowest branch should be but a few inches above the ground on the southwest side of the tree. For the framework of the tree, three to five other branches are selected arranged spirally around the trunk, from four to six inches apart. The leader and remaining branches are removed without leaving stubs.

Additional pruning is necessary as the tree grows that it may develop a strong satisfactory framework, and subsequently improve in production. For correct information, see South Dakota Extension Circular 388, "Fruit Tree Pruning in South Dakota," or Farmers Bulletin 1522, "Home Fruit Garden on Northern Great Plains."

### **Pruning Berries and Grapes**

Before strawberries are planted, all fully developed leaves are picked off, leaving only the growing center leaves. Removal of flower stems as they develop until the middle of July increases the plant vigor, the production of runners and fruit later on. The canes of raspberries should be cut back to six inches at time of planting. Grape vines are usually cut back leaving but one or two buds.

### **Cultivation and Fertilization**

Clean cultivation throughout the growing season is essential, to control weeds and conserve moisture. Plums need continuous cultivation throughout their bearing life. A man with a hoe should always follow the cultivator, to remove weeds that cannot be reached with cultivator. In cultivating terraces, a single disk can be arranged to throw the dirt up on each side and maintain the terrace channel so it will continue to retain water.



The quantity of water in terraces must be regulated to conserve it as much as possible while not washing over terrace ridges and destroying terraces.



On gentle slopes where the trees may be planted on the contour without previous terracing, the disk cultivation may be used to gradually throw up ridges above the trees, thus developing terraces for better moisture conservation.

Continued clean cultivation tends to deplete the humus supply of the soil, which must be replaced through the use of stable manure, green manure, or cover crops. A good coating of manure applied in fall or winter will prevent erosion, hold snow and conserve moisture. Cover crops are less desirable because they require moisture for growth. If plowed under while green and succulent, they are valuable.

### Protection

Apple trees especially must be protected from rabbits and mice during fall, winter and spring. Wrapping trunk and lower branches of each tree with burlap or fine wire is effective. Poisoned grain and repellants are also used.

The roots of young trees are often protected through the winter by piling soil, old manure, hay or straw around the trunk late in the fall, and removing it early in the spring.

Strawberries should have winter protection by covering with six inches of clean straw after heavy frosts and just before freeze-up. In the spring, the straw is raked off to form a mulch on each side of the row of berries.

## Disease and Insect Control\*

Fruits are damaged by various insects and diseases which become more abundant as fruit production increases. For practical purposes, all such parasites may be grouped into three classes: (1) Fungus diseases; (2) biting and chewing insects, and (3) sucking insects.

### Diseases

Apples may be afflicted by—

**Apple Scab**—velvety olive brown to black webby spots on leaves, flowers and fruits, distorting the fruit. Reduce infection by eliminating infected fallen leaves and fruit and spraying.

**Apple Blotch**—Irregular brown spots on fruit, small yellow to light brown spots on leaves, or purple to brown cankers on small twigs. Infected fruit drops prematurely. Spraying helps control.

**Apple Rust** occurs as yellow to orange swollen spots with black pimples on upper surface of apple leaves and as green to reddish brown galls two inches or less in diameter on red cedars. Easily controlled by removing red cedar within one-fourth mile. Picking of all cedar galls by April 1 each year will prevent the disease on apples.

**Fire Blight of Apples and Pears**—Blossoms, spurs, new leaves and twigs become limp, blackened and then dry out. Dead leaves hang on and cankers develop on branches. Control by pruning all infected parts well below the infection, with disinfectant knife.

**Brown Rot of Plums**—Fruit becomes affected when nearly mature, rots completely, then shrivels and dries up forming "mummies." Disease also produces cankers on

twigs and branches. Fruit infections occur through wounds frequently made by plum curculio. Control by destruction of mummies on tree and ground, pruning out of cankerous branches, spraying with lime sulphur and Bordeaux mixture, and controlling curculio.

**"Pockets" of Plum and Sandcherry**—Enlarged bladder-like elongated fruits and enlarged reddish-colored leaves and growing twigs which finally decay. Infection of bud scales takes place as they swell and begin to grow in spring. Control is obtained by uniformly covering each bud before it swells with fine mist spray of lime-sulphur, applied with pressure sprayer.

**Leaf Blight or Yellow-Leaf**—of cherries, sand-cherries and plums—spotting, yellowing and falling of leaves as fruit matures, weakening the tree, making them more subject to winter injury. Control by destroying fallen leaves, and protecting new leaves by two sprays of Bordeaux mixture, one after cherries well set, another after harvest.

**Anthraxnose** of raspberries is characterized first by purple, later gray, merging spots, finally with pits at centers, on current season's canes, causing reduced yield the next season. The disease hangs on in old patches. Control: Plants should be bought from reputable nurserymen whose stock undergoes careful inspection for disease. Disease is controlled by spraying with lime-sulphur 1-15 as buds are swelling.

**Strawberry Diseases**, the leaf spots and virus diseases causing "yellows" and "crinkle" leaves are spread by aphids. Diseased plants should be pulled from old beds. New beds should be set with disease-free plants and old beds plowed up.

\* These recommendations are by Dr. W. F. Bucholtz, pathologist of the South Dakota Agricultural Experiment Station; and George I. Gilbertson, State College extension entomologist.



## Insects

The more serious insect pests include the codling moth whose eggs hatch into the apple maggot, the plum curculio, grape vine leaf hoppers, aphids or plant lice, and scale insects. The three latter kinds are sucking

insects which are killed only by a contact spray such as Black Leaf 40. A stomach poison such as lead arsenate is used for chewing insects like codling moth and curculio.

## Apple Spray Schedule

### When and What To Use:

**1st or Dormant Spray**—apply spray in the spring before the buds open and while temperature is above freezing.

Liquid Lime Sulphur (33 degrees Baume), 1 gal.; Water, 9 gal.

Spray intended for scale insects, mites and over-wintering fungus diseases.

**2nd or Petal Fall Spray**—applied when 90 percent of petals have dropped from blossoms.

Liquid Lime Sulphur (33 degrees Baume), 1 gal.; Lead Arsenate, 1 lb.; Water, 40 gal.\*

Spray intended for codling moth, leaf chewing caterpillars and certain plant diseases.

**3rd or Summer Spray**—Spray is ordinarily applied last week in June.

Liquid Lime Sulphur (33 degrees Baume), 1 gal.; Lead Arsenate, 1 lb.; Water, 40 Gal.

Spray is intended for apple maggots, leaf chewing insects and plant diseases.

When plant lice are present in injurious numbers, Black Leaf 40 may safely be added to the above sprays at the rate of  $\frac{1}{2}$  pint to 40 gallons.

\* For disease control, Bordeaux mixture may be substituted for Lime Sulphur in any but dormant spray. Mix as per directions on carton.

## General Spraying Program for Plums and Sandcherries

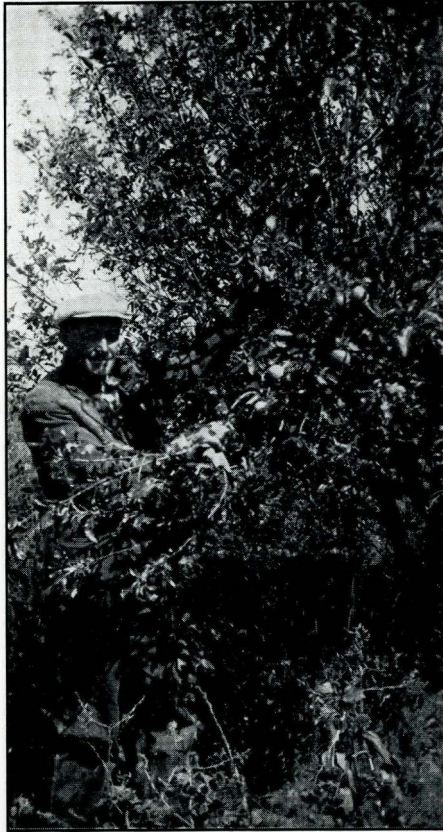
**First Spray:** Before blossoms open spray with one part Commercial liquid lime sulphur diluted with 9 parts of water. Spray helps to control fungus diseases including "pockets," scale insects, gall mites and plant lice.

**Second Spray:** Shortly after the petals fall, spray with 1 part Commercial liquid lime sulphur diluted with 40 parts of water. This helps to control leaf blight or yellow leaf. To destroy curculio or case-bearing in-

sects, add 1 lb. of lead arsenate powder to each 40 gal. of spray.

**Third Spray:** In about two weeks repeat the second spray. Spray helps to control brown rot, pocket, scab, shot hole fungus brown rot, yellow leaf and curculio.

**Fourth Spray:** If weather is rainy and warm repeat third spray two or four weeks after third spray was applied. Spray helps to control the fungus diseases enumerated above and take care of feeding insects.



This 40-year old apple orchard near New Underwood in Eastern Pennington county has survived the drouth because of the painstaking care it has received.

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