Strawberry Production in South Dakota

S.A. McCrory
STRAWBERRY

PRODUCTION IN

SOUTH DAKOTA

HORTICULTURE-FORESTRY
DEPARTMENT

AGRICULTURAL
EXPERIMENT STATION

SOUTH DAKOTA
STATE COLLEGE, BROOKINGS
<table>
<thead>
<tr>
<th>Variety</th>
<th>Adaptation</th>
<th>Winter Hardiness</th>
<th>Plant Making Ability</th>
<th>Season</th>
<th>Size</th>
<th>Quality</th>
<th>General Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aberdeen</td>
<td>Poor</td>
<td>Fair</td>
<td>Good</td>
<td>Mid-season</td>
<td>Medium</td>
<td>Fair</td>
<td>Poor</td>
</tr>
<tr>
<td>Ambrosia</td>
<td>Poor</td>
<td>Fair</td>
<td>Good</td>
<td>Late</td>
<td>Large</td>
<td>Fair</td>
<td>Fair</td>
</tr>
<tr>
<td>Armor</td>
<td>Fair</td>
<td>Fair</td>
<td>Good</td>
<td>Late</td>
<td>Large</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Blahemore</td>
<td>Poor</td>
<td>Poor</td>
<td>Good</td>
<td>Mid-season</td>
<td>Medium</td>
<td>Fair</td>
<td>Poor</td>
</tr>
<tr>
<td>Catshill</td>
<td>Fair</td>
<td>Fair</td>
<td>Good</td>
<td>Mid-season</td>
<td>Medium</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td>Dorsett</td>
<td>Poor</td>
<td>Poor</td>
<td>Good</td>
<td>Mid-season</td>
<td>Medium</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Earlidawn</td>
<td>Poor</td>
<td>Fair</td>
<td>Poor</td>
<td>Early</td>
<td>Medium</td>
<td>Poor</td>
<td>Poor</td>
</tr>
<tr>
<td>Empire</td>
<td>Fair</td>
<td>Fair</td>
<td>Fair</td>
<td>Early</td>
<td>Large</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td>Erie</td>
<td>Fair</td>
<td>Good</td>
<td>Good</td>
<td>Late</td>
<td>Large</td>
<td>Fair</td>
<td>Poor</td>
</tr>
<tr>
<td>Fairland</td>
<td>Fair</td>
<td>Poor</td>
<td>Fair</td>
<td>Mid-season</td>
<td>Medium</td>
<td>Good</td>
<td>Poor</td>
</tr>
<tr>
<td>Fairpeake</td>
<td>Poor</td>
<td>Poor</td>
<td>Fair</td>
<td>Mid-season</td>
<td>Medium</td>
<td>Good</td>
<td>Poor</td>
</tr>
<tr>
<td>Fairfax</td>
<td>Poor</td>
<td>Poor</td>
<td>Fair</td>
<td>Mid-season</td>
<td>Large</td>
<td>Good</td>
<td>Poor</td>
</tr>
<tr>
<td>Jerseybelle</td>
<td>Fair</td>
<td>Fair</td>
<td>Poor</td>
<td>Late</td>
<td>Large</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td>Pathfinder</td>
<td>Fair</td>
<td>Fair</td>
<td>Good</td>
<td>Mid-season</td>
<td>Medium</td>
<td>Fair</td>
<td>Poor</td>
</tr>
<tr>
<td>Pocahontas</td>
<td>Good</td>
<td>Fair</td>
<td>Good</td>
<td>Mid-season</td>
<td>Large</td>
<td>Fair</td>
<td>Good</td>
</tr>
<tr>
<td>Premier</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Early</td>
<td>Medium</td>
<td>Fair</td>
<td>Good</td>
</tr>
<tr>
<td>Redstar</td>
<td>Poor</td>
<td>Poor</td>
<td>Poor</td>
<td>Late</td>
<td>Large</td>
<td>Good</td>
<td>Poor</td>
</tr>
<tr>
<td>Robinson</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Late</td>
<td>Large</td>
<td>Fair</td>
<td>Good</td>
</tr>
<tr>
<td>Senator Dunlap</td>
<td>Good</td>
<td>Good</td>
<td>Mid-season</td>
<td>Medium</td>
<td>Fair</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Sparkle</td>
<td>Good</td>
<td>Fair</td>
<td>Good</td>
<td>Mid-season</td>
<td>Medium</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>Tennessee Beauty</td>
<td>Fair</td>
<td>Good</td>
<td>Good</td>
<td>Mid-season</td>
<td>Medium</td>
<td>Poor</td>
<td>Fair</td>
</tr>
<tr>
<td>Vermilion</td>
<td>Fair</td>
<td>Good</td>
<td>Fair</td>
<td>Mid-season</td>
<td>Medium</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td>Oglala</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Mid-season</td>
<td>Small</td>
<td>Good</td>
<td>Fair</td>
</tr>
</tbody>
</table>
Strawberry Production
in South Dakota

By S. A. McCrory

Commercial strawberry production offers much promise in South Dakota. Most of the strawberries sold in local food stores are shipped from other areas, including California, Minnesota, and Wisconsin.

Dealers have expressed a preference for the locally-grown berry. It has two big advantages—it is usually fresher and it is produced when the peak of strawberry production in other areas has passed.

In 1950, a USDA report showed only 50 acres of strawberries in the state. The same report showed great fluctuation in acreage over a 30-year period. No doubt weather and economic conditions had something to do with the fluctuation. However, no information indicates that a surplus has ever been produced or that there has ever been a marketing problem. The present acreage could be greatly increased without danger of creating a surplus in the state.

Cost, Yield, and Profit

The strawberry is a high income crop and therefore high production cost per acre can be justified. It is a "family type" enterprise; all members of the family can contribute to production.

The cost of growing an acre of strawberries will vary among growers. Based on information collected from experimental plantings, 240 hours of labor are necessary to produce and harvest an acre of strawberries. The method of harvesting and marketing will influence the labor needs. Also the labor cost will be greater on a small planting than on a larger unit. The cost of 5,000 virus free plants will be about $75. This quantity and cost will vary some with varieties but is about

1Horticulturist, Agricultural Experiment Station, South Dakota State College.
average. Land, cultivating equipment, fertilizer, crates, and boxes and irrigation equipment may serve more than one purpose and are difficult to assess at a fixed cost.

The greatest yield may be expected 1 year after planting. If a planting is retained 2 years the cost of production is less. Yield data for any 1 year may be misleading but first year yields from experimental plots have been as high as 7,200 quarts per acre, with 4,000 about average. Yields from a 2 year old planting have generally been about one-third less than the first year.

Profit from a strawberry planting has usually been in proportion to the care given. Assuming that average to good practices are followed, an acre of strawberries will net a profit of $1,000 per acre-year period. To have a profitable crop, a grower must be timely in all his operations. Soil preparation, ordering plants, planting, weeding, de-blooming, watering, mulching, picking, and many other operations must be done at the right time. Neglecting any one essential may drastically reduce profit.

Most prospective growers are concerned with the available labor supply and market outlet. Some growers have solved both problems by selling the crop on a “pick yourself” basis. Established growers have made sales by this method over a large area and reduced the labor problem at harvest time. Grower experience suggests that 1 acre per 1,000 people will be consumed locally.

Selecting a Variety

New varieties are being introduced continuously. The fact that a

Matted rows show varietal differences in plant making ability.
new variety is well adapted to a
given area does not prove it will pro-
duce equally well in other areas.
Soil, moisture, and climatic condi-
tions will determine the perform-
ance of any variety. To test a new
variety it may be planted beside
standard varieties of known per-
formance for comparison. Generally
a 2 to 3 year test will enable a grow-
er to select varieties that fulfill his
requirements. It is more important
to select a variety on a basis of cli-
matic adaptation than some charac-
teristics that may be pleasing to the
grower.

**Climatic Influence**

Environmental factors affect
plant behavior. There is an interrela-
tion of temperature and day length
that determines runner and fruit
bud formation. Conditions subject
plants to a short growing season and
at times extreme temperatures. Ear-
ier studies suggest that some varie-
ties such as Premier harden them-
selves for winter early and can
therefore be covered with a mulch
early. Other varieties, such as Sena-
tor Dunlap, continue to develop
winter hardiness until late in the fall
and benefit from a delayed mulch-
ing.

The rest period of strawberry
plants is associated with tempera-
ture and day length. Only varieties
able to enter the rest period and to
remain dormant during the winter
months are likely to be dependable
bearers. Cheyenne, Sioux, and Radi-
ance were developed to withstand
low temperatures. These varieties
may be successful in parts of the
Great Plains area where other varie-
ties fail. Their small size fruit makes
them less desirable than Premier,
Senator Dunlap, Vermillion, Spar-
kle, and Robinson which grow in
Eastern South Dakota.

**Soil and Moisture**

Strawberry varieties differ in their
adaptation to soil, fertility, and
moisture. The Wayzatta variety will
make few or no runners when grown
on dry soil. When grown on very
fertile soil, Robinson will make so
many runners that little fruit is pro-
duced. Premier, Senator Dunlap,
and Gem are adapted to a wide
range of soil conditions and are capa-
ble of producing runners when the
moisture supply is well below the
optimum.

**Ripening Period**

The ripening season for most
strawberry varieties is short in South
Dakota. The back cover shows dis-
tribution of the picking season for
leading varieties in one season. The
harvest may last but a few days
with a large percentage of the fruit
being harvested by a few pickings,
or it may be extended over a longer
period.

Everbearing varieties may show
a variation in the percentage of the
total yield that is produced in the
fall crop. Table 1 compares two
everbearing varieties in this respect.

**Plant Making Ability**

The ability of varieties to make
runners and produce fruit the fol-
lowing year is shown in tables 2
and 3. The plants were set the last
week in April and counts were made
on August 8. Soil fertility was aver-
Table 1. Comparative Summer and Fall Yield of Two Everbearing Strawberry Varieties

<table>
<thead>
<tr>
<th>Variety</th>
<th>1st year Fall</th>
<th>2nd year Summer</th>
<th>2nd year Fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastodon</td>
<td>15.8</td>
<td>47.5</td>
<td>16.2</td>
</tr>
<tr>
<td>Gem</td>
<td>25.8</td>
<td>64.4</td>
<td>47.8</td>
</tr>
</tbody>
</table>

*Gem produced 43% of its crop the second year in the fall while Mastodon produced 25% of its crop at that season.

Many varieties are regional in their adaptation and may largely determine the success or failure of the strawberry grower. A research project designed to evaluate varieties was started in 1944, and since that time the more important varieties have been grown for observation. Those showing promise have been observed over a longer period and in greater detail.

Like all crops, strawberry varieties have great differences in characteristics. The ability to make runners, survive winter conditions, and produce a good yield of quality fruit were considered. Descriptions given here are designed to aid growers in selecting varieties that will do well under South Dakota climatic conditions and serve the purpose for which the crop is intended.

For local sales the fruit should be

Table 2. Average Strawberry Runners per Plant From Four Treatments

<table>
<thead>
<tr>
<th>Variety</th>
<th>Check</th>
<th>Irrigated</th>
<th>Irrigated 6-10-4</th>
<th>6-10-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fairland</td>
<td>9.9</td>
<td>11.1</td>
<td>12.3</td>
<td>15.2</td>
</tr>
<tr>
<td>Senator Dunlap</td>
<td>8.7</td>
<td>13</td>
<td>13</td>
<td>13.1</td>
</tr>
<tr>
<td>Erie</td>
<td>8.2</td>
<td>11</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>Super perfection</td>
<td>8.1</td>
<td>9.5</td>
<td>7.7</td>
<td>12.3</td>
</tr>
<tr>
<td>Vermillion</td>
<td>8</td>
<td>7</td>
<td>8.5</td>
<td>9.1</td>
</tr>
<tr>
<td>Empire</td>
<td>7.4</td>
<td>8.1</td>
<td>13.1</td>
<td>13.4</td>
</tr>
<tr>
<td>Premier</td>
<td>6</td>
<td>7.2</td>
<td>9.4</td>
<td>11.5</td>
</tr>
<tr>
<td>Sparkle</td>
<td>4.5</td>
<td>4.5</td>
<td>10.1</td>
<td>9.2</td>
</tr>
<tr>
<td>Redrich</td>
<td>4.5</td>
<td>6</td>
<td>7.5</td>
<td>7.5</td>
</tr>
<tr>
<td>Redstar</td>
<td>2</td>
<td>2</td>
<td>3.4</td>
<td>4.5</td>
</tr>
<tr>
<td>Fairpeak</td>
<td>2</td>
<td>2.5</td>
<td>3.4</td>
<td>4.2</td>
</tr>
</tbody>
</table>
attractive, large, and of good quality. It need not be so firm or have other characteristics required for shipping. A variety should have the ability to set runners with existing climatic conditions. It must also be able to tolerate winter conditions without serious loss.

Some varieties that have been tested were so poorly adapted that they are not described here. Some of those described are not recommended for planting. They appear in alphabetical order with Senator Dunlap and Premier used as standards for comparison.

### June Bearing Varieties

**Aberdeen** is an old variety and is not offered for sale by many plant growers. It ripened with the mid-season varieties. The first fruit to ripen was of medium size, but the last of the crop was very small. The fruit was a very light red and too soft for commercial purposes. The plants made runners in fairly good numbers and were vigorous. The variety did not show winter hardiness or other characteristics desired of a variety to be grown here. There are many varieties better than Aberdeen.

**Ambrosia** was one of the latest maturing varieties, which may be a reason for growing it. The blossoms were also late in opening, which may enable this variety to escape late frost injury. The fruit was large and attractive but lacked the quality desired. Plants of this variety showed some winter injury for the 2 years they were observed.

**Armor** was a late variety but a few days earlier than Ambrosia. The fruit was large, irregular, and round to blunt in shape. The color was attractive but not a deep red. The quality was good and the berries were firm enough to be handled without damage. The plants survived the winters well under mulch protection. Armor produced vigorous runners well. This variety was a good producer but the harvest season was not as long as for some var-
ieties. On a limited testing program, Armor appeared to have promise as a variety to ripen just after Senator Dunlap.

Blakemore has been one of the most popular varieties in the southern and central states. Because of its high producing ability in that area it was included in the local test plots. One good crop was produced in the 4 years it was under observation. Climatic conditions caused severe plant loss. For that reason it is not considered a dependable variety to plant in South Dakota.

Catskill has long been a leading variety for many of the commercial strawberry growing areas. The bright red fruit matured in mid-season and was of good quality. Yields were not equal to Senator Dunlap but were better than Premier. The "caps" remained green and were easily removed from the berry. The plant was a strong grower and made ample runners when sufficient moisture was available. It suffered from winter injury unless well protected by a mulch. However, for the grower who will attend to the details essential to good strawberry culture, Catskill is a mid-season variety worth considering. The fruit stems were tolerant to abuse by pickers.

Dorsett was an early variety, ripening 3 to 4 days later than Premier. The fruit was of good quality, firm, and attractive. Unfortunately many of the berries were poorly developed and many were culls. Dorsett was a good plant maker and under favorable growing conditions set too many plants. Yields have never been as high with Dorsett as with many other varieties.

Earlidawn ripened fruit earlier than any variety tested which appeared to be its outstanding characteristic. The fruit was very attractive and firm. Its firmness will permit much handling without damage. An objectional feature was the tart fruit. When grown at Brookings it was a sparse plant maker even when given supplemental water. Because of this weakness the plants should be given close spacing and provided with ample moisture if a good row is to be obtained. Other than for earliness there seems to be no reason for planting this variety.

Empire was an early maturing berry ripening about 2 days later than Premier. The fruit was large, very attractive, had good quality, and was firm and easy to pick. The plants were large and vigorous, requiring much space per plant. This variety appeared to be injured from high temperatures and drought. It was observed only where irrigation was practiced and under such conditions has produced an abundance of runners. From this limited test, Empire appears to have promise where a high quality, attractive fruit is desired.

Erie was grown in an observation planting for 2 seasons and then placed in a replicated planting for 2 years. Only one good crop was produced in the 4 years it was observed. The plants grew well and made excessive runners late in the growing season. Erie can not be highly recommended for planting in South Dakota.

Fairland was a high quality variety, but was not a good producer because of winter injury. It never grew
Strawberry Production in South Dakota

well at Brookings and information
to accurately describe it could not
be collected.

**Fairpeake** was similar to Fair­
land. This variety did not appear
well adapted to local growing con­
ditions.

**Jerseybelle** is a new, late matur­
ing variety that was observed for
two seasons in the test plots. The
fruit was very large, attractive, and
of good quality. The yields have
been only fair but the size, quality
and attractiveness may be more im­
portant than total yield. To set
enough runners the plants required
good care and supplemental mois­
ture. This variety may have a place
in a home planting or for a com­
mercial grower who grows for a
select trade.

**Pathfinder** is an older variety now
largely replaced by better varieties.

**Pocahontas** is fairly new and
looked promising in the test plots. It
was a mid-season variety, ripening
about the same time as Senator
Dunlap. The fruit was round, attrac­
tive, firm, and of fair quality. The
fruit ripened over a long period
with fair size to the end of the pick­
ning season. The fruit spurs were rig­
id and stood erect, keeping the
fruit off the ground. Pocahontas was
a fairly good plant maker each year
but less inclined to set an excessive
number of plants. Plants survived
the winter without apparent injury
when protected by a straw mulch.
This variety is worth a trial as a mid­
season variety.

**Premier** is also known as Howard
17. The fruit of Premier ripened ear­
ly and was the earliest good quality
variety observed in this test. The
first fruit to ripen was of average
size but the last of the crop was fre­
quently too small to be of value. The
long, pointed fruit was an attractive
color, of good quality, and firm.
Virus free Premier plants were
strong, vigorous growers and set
runners freely. The variety was well
adapted to local conditions and sur­
vived winter temperatures well.
This variety has been able to “hard­
en” the plants early for winter and
could therefore be mulched earlier
than any variety observed. Premier
has long been considered more toler­
ant to frost than other varieties. This
may be due, at least in part, to the
long blooming period. Premier was
a good variety for the early season
and was suitable for both home and
commercial purposes.

**Redstar** was one of the very late
maturing varieties. The fruit was
large and attractive. The firm fruit
was of good quality making it well
adapted for both commercial and
home use. The late blooming habit
provided some frost protection. Red­
star did not make many runners and
few plants were set. This weakness
was overcome in part by irrigation
and fertilizer but under good grow­
ing conditions it was a poor plant
maker. For the grower interested in
a late maturing variety Redstar may
have a place.

**Robinson** was a late season varie­
ty ripening most of its fruit during
the first 2 weeks of July. The fruit
was large and bright red. Because
of the soft nature of the fruit it did
not stand much handling. Quality
was only fair and during wet weath­
er many berries decayed. Near
the end of the harvest the small
fruit was objectionable. Robinson plants were hardy and relatively free of foliage diseases. Robinson always set many plants and with favorable growing conditions produced too many. Robinson was not as dependable as were some varieties and failed to produce a good yield if climatic conditions were not favorable. However, its good points are great enough to recommend it for a late maturing variety.

**Senator Dunlap** has been the variety most likely to produce a good crop in South Dakota. The berries were medium in size, frequently soft, and of fair quality. The yield has consistently been greater than any other variety with which it has been compared. It was a good plant maker, even with limited rainfall. It was very winter hardy and will tolerate much cold weather before mulching in the fall. Senator Dunlap should make up at least a part of every strawberry planting as a mid-season variety.

**Sparkle** was well named as the fruit was so bright and attractive it did sparkle. This medium size fruit ripened late and the blossoms sometimes escaped frost damage. The fruit was firm and suffered little mechanical injury. Fully ripened fruit darkened and was less attractive. The plants were vigorous and set runners in sufficient quantity. Sparkle survived the winter without apparent injury when properly mulched. It is a promising late variety for both home and commercial planting.

**Tennessee Beauty** was observed two seasons in the test plots. The fruit was round, of medium size, and ripened a few days later than Senator Dunlap. The quality was only fair but the fruit was so firm that it withstood more handling without injury than any variety tested. In this limited test it appeared to have great enough winter hardiness to recommend it for planting in South Dakota.

**Vermilion** was a promising variety. The fruit ripened in mid-season but over a longer period than most varieties. The medium sized fruit was attractive and of good quality. The plants were vigorous, erect growers, and survived winter conditions well. The fruit was easy to harvest and retained its size to the end of harvest better than most varieties. When well grown, enough plants were produced to make an ideal row. Yields were high, second only to Senator Dunlap. Vermilion is a good mid-season variety for South Dakota.

**Everbearing Varieties**

**Evermore** was developed by the Minnesota Experiment Station and for a time was popular in the northern area. It appeared to be rather exacting in its requirements. At times the variety looked very promising but another year was less desirable. Few plants of Evermore are to be found now, which suggests it has not been well accepted by growers.

**Gem**, an old everbearing variety, is the most commonly planted everbearing in South Dakota. The fruit was round, light in color, and firm enough to stand considerable handling. The tart flavor was sometimes objectionable but the quality was
generally acceptable. The fruit was produced on short stems causing much of the fruit to be dirty or decayed. The plants did not produce many leaves with the fruit fully exposed to birds. While Gem is considered a winter hardy variety, it frequently showed much winter injury. Like many everbearing varieties, it did not make as many plants as are desired. It was subject to virus diseases with an accompanying loss of vigor. The variety appears best adapted for home use.

Superfection was identical to Gem.

Red Rich was a very high quality variety. The large, dark red fruit had eye appeal, was fairly firm, and produced a good yield. The seeds were large and prominent, making it a little objectionable. The plants were large and vigorous, producing plenty of runners. Red Rich has shown ample winter hardiness.

Streamliner was observed only two seasons but deserves consideration. The fruit was of medium size, good quality, and firm. The yields were good and the plants were vigorous and produced ample runners. No winter injury was apparent. This everbearing variety is worth planting for trial.
QUANTITY AND DURATION OF PRODUCTION OF NINE STRAWBERRY VARIETIES

POCAHONTAS
PREMIER
ROBINSON
SENIOR DUNLOP
AMBROSIA
ARMOR
CATSKILL
ERIE
VERMILION

JUNE
JULY