FRUIT TREES AND SMALL FRUITS

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The growing of fruit crops is becoming more and more prevalent for the average homeowner, whether they are city dwellers or reside on small acreages in suburban areas. Fruit trees and fruit bearing shrubs often have landscape value, making them even more attractive to homeowners. In response to increased demand, more nursery inventories include fruit trees, berry plants, and other plants producing edible crops. Nursery professionals should be knowledgeable of these plants and be prepared to answer questions concerning pollination, fruit maturity dates, pruning, planting, and control of insects and diseases.

Upon planting, bare root (BR) fruit trees should be checked for signs of desiccation. Branch tips that are shriveled should be removed. The entire tree may be soaked in water for up to 12 hours to re-hydrate, but never soak a tree for more than 24 hours.

At the time of planting, BR trees must be kept moist at all times. Make the planting hole large enough to easily accommodate the entire root system without bending or curling any roots. The graft union should be at least two inches above ground level to prevent future scion rooting. Scion rooting will cause dwarf trees to become full-sized and therefore, negate the advantage of a dwarfing rootstock. Fill the hole with topsoil, leaving a shallow depression around the tree to catch and hold water. Watering should be done frequently for the first season and it is especially important during the first few weeks after planting since new roots are being established.

Newly planted trees should be pruned in the spring just before growth begins. If non-branched trees are planted, cut the main stem back to a strong bud, four to five feet above the ground, depending on the size of the tree being planted. If branched trees are planted, select three or four of the lower branches that are 2.5 to three feet above the ground to become the main scaffold limbs. All other lower branches should be removed, as well as any competing leaders in the top of the tree. Only short branches should be left above the three to four lower branches selected as scaffold branches.

If bare root trees are to be planted in containers, ensure that the container is large enough to prevent crowding of the roots. A #5 container is usually sufficient for one or two-year old trees. A well-drained container growing medium high in organic matter should be used. After trees are containerized or planted, they should be thoroughly watered several times.

Pruning is the key to good fruit tree management. Most horticulturists recognize three classes of pruning: training, maintenance, and corrective pruning. Training is done primarily to obtain the framework of branches for convenient harvesting, efficient spraying, and good fruit production. The most common methods of pruning fruit trees are open center and central leader. The central leader structure is the preferred method of fruit tree training.

Dead or damaged branches should be removed in the nursery to improve the overall appearance of the tree. When the tree is planted, it should be cut back to balance the root to shoot ratio and to encourage proper growth. All but four or five side branches should be removed in order to begin the development of scaffold branches. Pruning varies considerably from person to person, however, there should be logical reasons for each cut. Improper pruning could reduce fruit production.

Maintenance pruning is used to improve fruit quality by reducing shading and letting more light into the tree. Corrective pruning is sometimes needed to reduce tree size and to correct or remove undesirable limbs. It is also used to rejuvenate older trees, or trees that have been injured. Selective pruning is required to top bud or graft new varieties onto a tree.

If vegetative growth is satisfactory and leaves appear vigorous and dark green, fertilization is not required. If growth is slow and leaves are small and light green, a complete fertilizer such as 10-10-10 should be applied at the rate of 1/2 pound for each year of the trees' age, up to a maximum of six pounds per tree. A 50% slow release fertilizer such as 18-18-8 may also be used at the rate of 1/2 to one pound for each year of the tree’s age up to a maximum of six pounds per tree.

Apply fertilizer in early spring before growth starts. Spread it evenly around the tree beginning approximately three feet from the trunk and extending slightly beyond the spread of the branches.

Many young fruit trees are lost each year to girdling by rabbits and mice. To prevent girdling, enclose the base of the trunk with a cylinder of ¾-inch mesh hardware cloth or a plastic trunk guard. Make this cylinder at least six to eight inches in diameter and extend it from an inch below the soil level to the first branch. Young trees should also have their trunks protected from sunscald during the winter by wrapping trunks with tree wrap or by using trunk guards. Wrap the trunk from the soil surface to the lowest branch. This process is usually only required for the first five to six years when the bark is thinner and more susceptible to sunscald.

Tree and shrub fruits are affected by several insects and diseases. The spray schedule found in the University of Minnesota Home Fruit Spray Guide cited in the references at the end of this chapter provides treatment procedures. Several general purpose fruit sprays are available for home and commercial use. Also refer to the Insect Management chapter and the Disease Management chapter in this manual.

The old Minnesota Fruit Tree Zones have been revised by the University of Minnesota. These hardiness zones are now closely aligned with the USDA National Hardiness Zones. Therefore, the hardiness zones cited for the various varieties in this publication refer to the National Plant Hardiness Zones.

Apples

Apples are among the most cold tolerant of fruit trees, but climate adaptability varies according to variety. Best growth and fruit production is obtained in deep, well-drained soils that are lightly fertilized with a balanced fertilizer. Most varieties need cross-pollination to set fruit.

Apple varieties differ in hardiness, and not all varieties are suitable for Minnesota's climate. Apple varieties also differ in fruit characteristics, such as size, shape, color, flavor, and cooking and storage quality. Varieties recommended for hardiness and fruit characteristics are described below.

'Beacon' – This is an early maturing apple that was introduced in 1936 by the University of Minnesota. The apple is good for fresh eating and sauce. The tree is hardy and very vigorous. The tree tends toward annual production, but the fruit ripens unevenly and drops easily upon ripening. The fruit also has a tough skin and does not store well. It is susceptible to both fire blight and cedar-apple rust. This variety may be grown in Zones 3a to 4b, but it is declining in popularity.

`Centennial Crabapple' – This early-season variety is a large fruit crabapple that was established by the University of Minnesota. It has an excellent flavor and is good for fresh eating and sauce. The tree is very winter hardy, is a vigorous grower, and has a small to medium mature size. Centennial crabapple is suitable for Zones 3a to 4b.

`Chestnut' Crabapple – This is a large fruited crabapple introduced by the University of Minnesota in 1946. It has a light red to yellow color. The flesh is firm, fine grained, crisp, juicy, and has an excellent flavor. It is very good for fresh eating. It is a strong vigorous tree with wide spreading branches. It can be grown in Zones 3a to 4b.

`Connell Red' – Connell Red is a color mutation of Fireside and is, therefore, very similar to Fireside, except that it has a more complete red color and matures slightly earlier. It is suitable for Zones 3b to 4b.

`Fireside' – This late-maturing variety was introduced by the University of Minnesota in 1943. The fruit is large and lightly striped or splashed with dark red. The texture is firm and moderately juicy. The fruit is sweet, but mild, and is good for fresh eating, salad and sauce; it stores quite well. It is suitable for Zones 3b to 4b.

'Haralred®' – This sport of Haralson apple was discovered by Louis Lautz, an apple grower in La Crescent, MN, and introduced by Bailey Nurseries in 1983. The fruit is redder and matures earlier than the standard Haralson. It retains all the good qualities of Haralson: juicy, tart, firm, good keeping quality, extremely hardy, and fireblight resistant. Harelred® is hardy in Zones 3b to 4b.

`Haralson' – This all-purpose apple was introduced by the University of Minnesota in 1922. It has medium sized apples, which are striped and red in color. The white, firm flesh is crisp and juicy with a distinctive tart flavor. The apple is good for pie, sauce, freezing, fresh eating, and baking. It stores very well. The tree is hardy and vigorous, but relatively small. It has a strongly developed central leader and wide-angled

lateral branches and can be highly productive. It tends strongly toward biennial bearing, which may affect fruit size and yield in alternate years. It is only slightly susceptible to fire blight and cedar-apple rust, but is prone to russetting. This is the second most popular variety in Minnesota and can be grown in Zones 3b to 4b.

`Honeycrisp' – This highly popular cultivar was introduced by the University of Minnesota in 1991. The tree has above average resistance to apple scab. The fruit is medium to large and is 50% to 90% mottled red over a yellow background. The exceptionally crisp and juicy texture is the most outstanding feature of this variety. Harvest may extend from the third week in September to early October with optimum maturity usually occurring in about the fourth week of September. It maintains its high quality up to seven months in refrigerated storage. Fruit quality is outstanding for fresh eating and salads, and is good for pie, sauce, and freezing. It has become the most popular variety in Minnesota. This variety can be grown in Zones 3b to 4b.

`Honeygold' – This variety was introduced by the University of Minnesota in 1970. It provides a Golden Delicious type of apple for Minnesota and other northern areas where Golden Delicious is not adapted. It is a cross between Golden Delicious and Haralson. The fruit is medium sized, yellow, and often has an attractive red blush. The skin may be speckled with lenticels. The flesh is moderately crisp, juicy, and has an excellent sweet flavor. Fruit quality is good for fresh eating, pie, sauce, and freezing. The tree is susceptible to Fireblight, and the fruit is susceptible to bruising. It can be grown in Zones 4a to 4b.

`Keepsake' – This late maturing apple was introduced in 1979 by the University of Minnesota. The fruit is small to medium in size and red in color. The cream-colored flesh is firm and crisp. Its very long storage capacity makes Keepsake ideal for home orchard use. It is also good for salad and sauce, and it has a very unique aromatic flavor for fresh eating. Trees are fully hardy in central Minnesota, but fruit may not fully ripen in the northern areas because of its late maturity. It is moderately resistant to fireblight and cedar-apple rust. This variety is suitable for Zones 3b to 4b.

'Northwestern Greening' – This is a green cooking apple which originated in Wisconsin. The fruit is very large, round and somewhat attractive. The flesh is yellowish and firm. It is poor for fresh eating, but is good for pie and sauce. It is being replaced by newer dual purpose varieties that are good for fresh eating and cooking. The tree is large, vigorous, and annual bearing, and it is resistant to Fireblight. This variety is suitable for Zones 3b to 4b.

`Red Baron' – This mid-season apple was developed at the University of Minnesota and released in 1970. The flesh has a pleasantly sweet, but mild flavor. This apple is good for fresh eating, and sauce. The tree grows well, has strong limbs, and has a moderate resistance to Fireblight. This variety is suitable for Zones 3b to 4b.

`Regent' – This high-quality apple resulted from a cross between Red Duchess and Red Delicious. It was introduced in 1964 by the University of Minnesota. It has a crisp, juicy texture and a very good sprightly flavor. The tough skin resists bruising. The tree is somewhat susceptible to apple scab. The fruit is excellent for fresh eating, pie, sauce, freezing and baking. Although the tree lacks extreme winter hardiness, it is considered to be one of the higher quality apples for Minnesota. It can be grown in Zones 4a to 4b.

`State Fair' – State Fair is medium-sized, early season apple, with a striped red skin. It was introduced by the University of Minnesota in 1978. The flesh is crisp, juicy, and white with a moderately acid flavor. The apple is good for fresh eating as well as for pie and sauce and is considered one of the better early apples. The trees grow vigorously and are hardy in Zones 3b to 4b.

'SnowSweet' – This 2006 introduction from the University of Minnesota is a hybrid between Sharon and Connell Red. The fruit is medium to large and has a bronze-red blush that covers 70-85% of the surface. The outstanding flavor is sweet and low acid with rich overtones. The flesh is exceptionally white and slow to oxidize when cut. The fruit is good for fresh eating and sauce. It can be reliably grown in Zones 4a to 4b, and may be planted in Zone 3b.

`Sweet Sixteen' – This variety was introduced by the University of Minnesota in 1978. Sweet Sixteen apples are medium to large in size and have a mixture of yellow and red color. The flesh is fine textured and crisp and has a high sugar content. It is one of the best mid-season varieties available. The fruit has an unusual flavor when fully ripe ranging from cherry to licorice. The tree has a tendency for upright growth, which may delay bearing by a year or more compared

to other varieties. It is best grown on a dwarfing rootstock. It can be grown in Zones 3b to 4b.

`Whitney Crabapple' – Whitney crabapple is a large crabapple with red stripe over a yellow background. This crabapple is good for fresh eating, pickling, and sauce. The tree is very winter hardy and has a very upright symmetrical shape. It is moderately resistant to fireblight, but has intermediate susceptibility to cedar-apple rust. It can be grown in Zones 3a to 4b.

'Zestar' – Zestar is one of the best new varieties from the University of Minnesota, but this early season variety is best known for its outstanding sweet-tart flavor. The fruit is excellent for fresh eating, sauce and pie. It ripens late in August and stores longer than other early variety. It is generally considered to be the best early season variety for Minnesota. It is suitable for Zones 3b to 4b.

Pears

There are a number of pear cultivars developed in the Upper Midwest that can successfully be grown in Minnesota. To obtain fruit consistently, it is necessary to plant more than one pear variety for cross-pollination. Pears are often slow to begin fruiting, although this problem can be lessened by using dwarf rootstock. Pears have very few disease or insect problems and can often be grown without the use of chemical sprays in Minnesota.

'Gourmet' – Gourmet is a medium sized, good quality midseason pear developed by South Dakota State University. The flesh is firm but sweet and juicy when ripe. It is not suitable as a pollinator due to pollen sterility. It may be grown in Zones 4a to 4b.

'Luscious' – Luscious is a midseason pear of good
quality developed by South Dakota State University. The fruit is juicy and very sweet when ripe. It is very good for fresh eating and has shown some resistance to fire blight. It is not suitable as a pollinator due to pollen sterility. It may be grown in Zones 4a to 4b.

'Parker' – This midseason pear was developed in 1924 by the University of Minnesota. The fruit is large and the flesh is tender, juicy and of very good quality when fully ripe. The tree is somewhat susceptible to fire blight. It is a good pollinator and can be grown in Zones 4a to 4b.

'Patten' – Patten is a midseason pear developed in Iowa. The fruit is large and of good quality when ripe. The tree is somewhat susceptible to fire blight. It is a good pollinator and can be grown in Zones 4a to 4b.

'Summercrisp' – Summercrisp is an early season pear introduced by the University of Minnesota in 1985. Summercrisp is best when picked and eaten while still firm and crisp in mid August. It has a crisp, juicy flesh somewhat like an apple and a sweet flavor. The tree has shown some resistance to fire blight and is an excellent pollinator. It can be grown in Zones 4a to 4b.

'Ure' – Ure is an early season pear developed at the Morden Research Station in Manitoba, Canada. The fruit is small, but sweet and juicy when ripe. It may be used as a pollinator and can be grown in Zones 3b to 4a.

Stone Fruits

Several stone fruits are adapted to Minnesota conditions including apricots, plums, tart cherries, cherry plums, and Nanking cherries. Apricots, as well as some plums and cherries, bloom so early that late spring frosts are often a hazard. Many stone fruits require more than one variety to insure cross-pollination. Certain varieties are better pollinators than others. For hybrid plums, use Toka or 'South Dakota' for cross-pollination. For cherry plums, use Compass as a cross pollinator. Stone fruits prefer a deep, well-drained soil with good fertility. Good air drainage is important and frost pockets must be avoided. Protection from strong prevalent winds is preferred.

Cherry plums, plums, apricots, and tart cherries should be pruned to a central leader with six to eight well-spaced scaffold or side branches. Remove all narrow crotches and dead and diseased branches, and thin out any excessive growth.

'Moongold' and 'Sungold' Apricots – Two apricot varieties, Moongold and Sungold, were developed at the University of Minnesota. Both varieties are hardy in Zones 4a to 4b. Moongold and Sungold should be planted as a pair to ensure cross-pollination. Fruit production may be reduced by the late spring frosts, but the tree itself is an attractive landscape addition. The fruit is mild and sweet in Sungold and slightly acidic in Moongold. They bloom the third week of April and ripen in late July to early August.

Plums are of two general groups: hybrid plums, and European-type plums. Hybrid plums, the most common type planted in Minnesota, were derived by crossing native plums with high quality non-hardy

varieties. They require cross pollination since they are generally pollen sterile and, therefore, do not pollinate each other well. They usually require pollination from a good pollinator such as Toka or a wild plum. The European type plums are generally not hardy in Minnesota with the exception of Mt. Royal Plum. They are, however, self fertile and, therefore, do not require a second variety for pollination.

'Alderman' Plum – Alderman plum is an excellent hybrid plum for Minnesota. It was developed at the University of Minnesota and introduced in 1986. Alderman plum is a large, sweet hybrid type developed for northern climates. The fruit is clingstone and ripens in mid-August. The skin is burgundy-red with golden yellow flesh. Alderman plum will grow in Zones 4a to 4b.

'LaCrescent' Plum – LaCrescent plum is a vigorous growing. yellow-fruited variety resulting from several crosses of three varieties with Prunus Americana. The high quality fruit is medium-sized, and is sweet, and juicy. It is excellent for fresh eating and jams. The fruit is freestone and ripens in early August. It is hardy in Zones 4a to 4b.

'Pipestone' Plum – Pipestone plum is a very attractive red plum with a golden blush. The very large fruit is sweet and juicy with a yellow flesh of excellent quality. It is clingstone and ripens in early August. It is hardy in Zones 3a to 4b.

'Superior' Plum – Superior plum has a large fruit with
a dark red shin, which is good for fresh eating, jam, or jelly. The flesh is yellow, sweet, and juicy. It bears heavily and often sets fruit the first year. The fruit is clingstone and ripens in mid-August. It is hardy in Zones 4a to 4b.

'Toka' Plum – Toka plum is a South Dakota introduction. It is one of the best pollinators, although in some years the bloom time may not correlate well with all varieties. The fruit is medium sized and richly flavored with an apricot color. The fruit is clingstone and ripens in mid-August. It is hardy in Zones 3a to 4b.

'Underwood' Plum – Underwood plum is a vigorously growing tree with a horizontal spread. The red fruit is medium in size with a sweet and juicy flesh. It is clingstone and ripens in late July. It is hardy in Zones 4a to 4b.

'Mt. Royal' Plum – Mt. Royal plum is the only European plum that is considered reasonably hardy in Minnesota. The fruit is good as eaten off the tree, as well as for desserts, jam, and preserves. It is tender and juicy and very sweet. The fruit is freestone and ripens in mid-August. Mt. Royal plum is self-fertile and is hardy in Zones 4a to 4b.

Cherries

'North Star' and 'Meteor' Cherries – North Star and Meteor are two varieties of pie cherries developed by the University of Minnesota. They are both hardy in Zones 4a to 4b. They produce fruits of good size and quality. North Star and Meteor cherries are self-fertile and, therefore, do not require a second variety for cross pollination. These attractive small trees are worthy of wider use in the landscape.

Cherry Plums – Cherry plums owe their hardiness to the native sand cherry, which was crossed with several plum varieties to produce the cherry plum group. Generally, these cherry plums develop into small trees with fruits intermediate in size between the size of a sand cherry and a plum. The eating quality of cherry plums is fair. Cherry plums are hardy in Zones 4a to 4b.

Nanking Cherry – Nanking cherry is grown as a shrub approximately six to eight feet tall. Leaves are hairy and fruits are small and densely clustered along the stems. The fruits are good to eat and they make excellent jelly. Stems that are two to four years old are the most productive. To promote young stems each spring, cut the old unproductive stems back to the ground. It is best to plant several plants to ensure cross-pollination. Nanking cherry is hardy in Zones 4a to 4b.

Blueberries

Blueberry plants grow best in full sun. Since the root system is fibrous and shallow, a uniform, continuous moisture supply is required. Acidic, organic, light, well-drained soils are preferred while heavy, poorly drained soil should be avoided. The most critical factor for successful blueberry growth is soil pH. A soil pH of 4.5 to 5.5 is best. If the pH is higher than 5.8, growth and development is likely to be reduced and foliage may turn yellow. Plants will die if the pH remains too high for an extended period. Soil pH should be determined from a soil test before planting. When the pH is over 5.8, the existing soil should be replaced or mixed with acid peat. Even in soils with optimum pH, mixing acid peat into the back fill of new

plantings has proven beneficial in promoting growth in early years.

Mulching blueberries with acid peat, wood chips, sawdust, pine needles, or straw to a depth of two to four inches is recommended for controlling weeds, retaining moisture, adding organic matter and preventing root damage from cultivation. When sawdust mulch is used, fertilizer is needed to replace nitrogen used during decomposition of the sawdust.

Acid forming fertilizers such as ammonium sulfate should be applied to maintain soil acidity and supply nutrients. An application rate of two ounces of ammonium sulfate or 18-18-8 per young plant is recommended. This rate can be increased to four ounces on older plants. Apply fertilizer on top of the ground within the drip line of the plant in early spring as the buds break. Special fertilizers found at most garden centers for use with azaleas and rhododendrons will also work for blueberries. Fertilizers that contain nitrogen in the nitrate form or potassium in the chloride form are sometimes toxic to blueberry plants and should be avoided.

Some form of winter protection for shoots and flower buds is necessary for optimum productivity since temperatures from -25 to -30°F may cause injury. Natural snow cover offers the easiest and best protection. Covering plants with snow or mulching them with straw, hay, or leaves can help reduce winter injury and improve fruit production. Avoid cultural practices that contribute to late season growth.

Regular pruning of young plants is not essential, although dead and broken branches should be removed. If branching is not abundant in young plants, the longest stems may be cut back by one third in early spring. After the plant begins fruiting, thick dense growth should be reduced by thinning out the oldest stems to ground level or to a strong side shoot.

Blueberries have few insect and disease problems. With good sanitation, plantings should remain healthy. Protection from birds may be necessary during the fruit ripening period. Protection of the plants from rabbits and deer may also be necessary, especially when the plants are young.

Two or more cultivars should be planted in the immediate area because blueberries produce more and larger fruit when cross-pollinated by a different cultivar. Varieties recommended for Minnesota are described below and in Table 1.

'Chippewa' – The Chippewa blueberry was introduced in 1996 by the University of Minnesota. Chippewa is a self-compatible version of St. Cloud with fruit that ripens a week earlier than Northblue. It has a similar sweet berry and is more upright in growth habit than Northblue, but with yields similar to Northblue. Chippewa is a good plant for the home gardener, with large dark blue fruit and good blueberry flavor. It has glossy, dark green leaves that turn bright red in the fall. Plant height is 30-40 inches.

`Northblue' – Northblue is a University of Minnesota selection introduced in 1983. These plants will reach 30-40 inches tall and 40-50 inches in diameter. Berries are 3/4 to one inch in diameter with a dark blue color and a slightly tart flavor. They have glossy dark-green leaves that turn burgundy in the fall. It is the most self-fruitful of all the varieties, producing three to twelve pounds of fruit on mature plants. This is the main commercial cultivar and is also an attractive plant in the landscape.

`Northcountry' – A sibling of Northsky, this Northcountry cultivar was introduced by the University of Minnesota in 1986. These plants are larger and more productive than Northsky, producing two to seven pounds of fruit per plant when mature. Plants are 20-30 inches tall and 35-45 inches in diameter. Fruits are light blue, about 1/2 inch in diameter with a mild sweet, aromatic flavor that is similar to the wild lowbush blueberry. Fruits begin maturing about five days earlier than Northblue. This cultivar is recommended for home garden use. In the past, it has been planted in commercial plantings, but other cultivars such as Chippewa, Polaris, Northblue, Northland', and St. Cloud are now better suited to commercial plantings.

'Northland' – This cultivar was introduced from Michigan State University in 1965 for adaptation to the Upper Peninsula conditions where, due to its limber branches, it can withstand a heavy snow pack. It has been highly productive in Minnesota also with production similar to Northblue. The plants are 40 to 50 inches high and 45 to 60 inches in diameter. The fruits are about 1/2 inch in diameter with a mild flavor. Fruits begin maturing at the same time as Northblue. This cultivar is recommended for home garden or commercial use.

Table 1. Minnesota blueberry cultivars and their characteristics.

Cultivar	Yield Potential	Hardiness	Berry	Flavor	Firmness	Plant Size (ht x spread in feet)	Machine Harvest	Season
Chippewa	High	Excellent	Med-Large	Sweet	Good	4.5 x 4	Good	Mid
Northblue	High	Excellent	Large	Tart	Fair	3 x 4	Fair	Mid
Polaris	Med-High	Very good	Med	Sweet, Aromatic	Excellent	4 x 4	Good	Early
Northland	High	Very good	Med	Mild	Good	4 x 4	Fair	Mid
St Cloud	Med-High	Very good	Med	Sweet	Good	5 x 4	Good	Early
North-Country	Med	Very good	Small	Mild	Poor	2.5 x 4	Poor	Early
Northsky	Low	Very good	Small	Sweet	Poor	2 x 3	Poor	Mid
Patriot	Med	Good	Large	Tart, Aromatic	Good	4.5 x 4	Fair	Early
Jersey	Low-Med	Fair	Med	Mild	Good	5 x 5	Good	Late
Bluecrop	Low	Fair	Large	Sweet, Mild	V. good	5 x 5	Good	Mid

'Northsky' – This cultivar was introduced by the University of Minnesota in 1983. Plants are low in stature at 18-24 inches and spread 24-30 inches in diameter. Fruits have a sky-blue color and are about 1/2 inch in diameter with a mild sweet flavor. The leaves are dark green in the summer and orange-red in the fall. The stems are short and foliage is dense. This cultivar is mainly recommended for home garden use.

'Polaris' – The Polaris blueberry was introduced by the University of Minnesota in 1996. Plant height is 30-40 inches. Polaris has a very aromatic, firm berry with excellent flavor. The fruit will store up to six to eight weeks. The fruit is slightly smaller than Northblue with yields of 80-90 percent of the Northblue. It must be pollinated by another blueberry cultivar.

`St. Cloud' – This cultivar was introduced by the University of Minnesota in 1990. It is more upright in stature than the other cultivars, growing 30-50 inches tall and 30-40 inches in diameter. The fruits are 1/2 to 3/4 inches in diameter, dark blue, firm, with a sweet flavor and crisp texture. They mature five days earlier than fruits of Northblue and will store for three to four weeks in refrigeration. Yields range from three to twelve pounds of fruit per plant. St. Cloud requires a second cultivar for cross-pollination and is recommended for commercial or home garden use.

Raspberries

Raspberries grow well in most areas of Minnesota, although they are not well adapted to locations with hot, dry summers and severe winters. They belong to a large group of fruits known as brambles. The three main types are red, black, and purple; however, the red raspberry is the most popular in Minnesota.

Almost any soil is satisfactory for growing raspberries. Sites should be well drained, but not too sandy unless irrigation is available. A gently sloping area with good air drainage is important. Poor drainage often increases the chance of late spring frost injury and the occurrence of root rot diseases.

Raspberries should be planted in early spring. Roots should not be allowed to dry out from exposure to air. Set plants in the ground slightly deeper than they were in the nursery. Once planted, cut the tops to within six to eight inches of the ground to encourage the production of vigorous, new canes. Only the highest quality nursery stock should be used, so every effort should be made to select healthy, disease-free plants. The soil should have been cultivated the previous season and should be free of weeds, especially perennials such as quack grass. Liberal amounts of manure or other organic matter may be worked into the soil.

The two training systems for raspberries commonly used in Minnesota are:

1. Hedgerow – New plants are set 2.5 feet apart in rows six to nine feet apart. The spread of each row is limited by cultivation and pruning to about 1.5 feet wide. Without wire supports, cut back the canes to about four feet in the spring before growth starts. With support wires, posts should be 16 feet apart in the rows with a wire 3.5 feet high on both sides of the post. The canes are placed between the wires to prevent cane spread.

2. Hill – Raspberries are easier to keep weed-free if planted in hills instead of rows. Space plants four to six feet apart each way. In the spring, tie the canes with binder twine or strips of cloth to a stake driven into the center of the hill. Cut canes back to about five feet tall. Many red raspberry varieties are stout caned and may be grown in hills by tying the canes together about three feet from the ground and again about 18 inches higher.

Black and purple raspberries need not be tied. In early summer when the shoots have grown out about two feet, cut out the leader to induce the formation of many side branches. In the next season before growth starts, cut these side branches back to within 12 inches of the main cane. Fruit from pruned side branches is larger than from non-pruned side branches.

Raspberries are biennial, therefore, the canes grow vegetatively the first year, produce fruit the second year, then die. To thin red raspberries, remove the old canes as soon as the fruit is harvested. New canes should be thinned, leaving six to eight strong canes per foot of hedgerow or about seven strong canes per hill. Black and purple raspberries are thinned similar to red raspberries.

Fall-bearing varieties do not conform to the usual red raspberry pattern. The fall crop is produced on canes that developed during the current season. The following summer another crop is produced on those same canes. Healthy vigorous plants can produce heavy crops at both times. If only a fall crop is desired, cut the canes to the ground in early spring; this eliminates the summer crop completely. If both summer and fall crops are desired, thin the canes the same as for ordinary red raspberry varieties, following the summer harvest. The shoots that bear the fall crop should not be removed, as they will bear again the following summer. For maximum yields, fertilize raspberry plants every year. Use a balanced or complete fertilizer such as a 10-10-10 or 18-18-8, at the rate of five pounds per 100 feet of row length or about 1/2 cup around each hill. Broadcast the fertilizer between the rows and work it into the soil about May 1.

Although raspberries have few insect pests, diseases may sometimes be troublesome. For additional information see University of Minnesota Extension Bulletin - Home Fruit Spray Guide.

A successful raspberry planting should be free of weeds. Cultivation is effective, but must be repeated several times during the season. In addition to weed control, cultivation prevents canes from developing throughout the raspberry patch. Too much cane development results in competition for moisture, nutrients, and sunlight, and the berries are often small and inferior. Never cultivate deeper than three inches.

Chemical weed control is effective in raspberries. However, herbicides should only supplement cultivation. They are most useful in controlling certain annual and perennial weeds within the rows or hills. Cultivate between the rows when needed even though an herbicide is used. Always read the label on any chemical container thoroughly and follow the directions.

Raspberry varieties for Minnesota, and their characteristics are shown in Table 2.

Table 2. Minnesota raspberry varieties and their characteristics.

Cultivar	Type	Hardiness Zone	Harvest Season	Productivity	Fruit Size	Attractiveness	Firmness	Flavor	Freezing Quality
Latham	Red	3-4	Mid	Large	Good	Good	Fair	Good	Good
Boyne	Red	3-4	Early	Very Good	Medium	Good	Fair	Good	Good
Nova	Red	3-4	Mid	Very Good	Medium	Very Good	Good	Very Good	Very Good
Reveille	Red	4	Early	Very Good	Medium	Very Good	Fair	Fair	Fair
Newburgh	Red	4	Mid	Fair	Medium	Good	Good	Very Good	Fair
Festival	Red	3-4	Mid	Very Good	Medium	Very Good	Good	Good	Fair
Titan	Red	4-5	Mid-Late	Very Good	Very Large	Very Good	Superb	Fair	--
Haida	Red	4	Mid-;Late	Very Good	Medium	Superb	Very Good	Good	Very Good
Liberty	Red	3-4	Mid	Good	Medium	Fair	Poor	Good	--
Killarney	Red	3-4	Early	Good	Medium	Good	Fair	Good	Very Good
Canby	Red	4-5	Mid	Good	Large	Very Good	Very Good	Good	--
Royalty	Purple	4-5	Late	Very Good	Very Large	Fair	Fair	Good	--
Brandywine	Purple	4	Late	Very Good	Very Large	Good	Fair	Fair	--
Blackhawk	Black	4	Late	Fair	Medium	Good	Very Good	Very Good	--
Bristol	Black	4	Late	Fair	Medium	Good	Very Good	Very Good	--
Heritage	Fall, Red	4	Mid-Late	Very good	Medium	Very Good	Good	Good	Good
Fall Red	Fall, Red	3-4	Early	Good	Medium	Good	Poor	Good	Fair
Redwing	Fall, Red	3-4	Early	Very Good	Medium	Very Good	Fair	Good	Fair
Summit	Fall, Red	3-4	Early	Good	Medium	Very Good	Good	Good	--
Fallgold	Fall, Yellow	3-4	Early	Fair	Medium	Good	Poor	Superb	--
Autumn Bliss	Fall, Red	3-4	Early	Good	Medium	Very Good	Good	Superb	--
Autumn Britten	Fall, Fed	3-4	Early	Good	Medium	Very Good	Very Good	Very Good	--
Caroline	Fall, Red	4	Mid	Good	Large	Very Good	Very Good	Very Good	--
Polana	Fall, Fed	3-4	Early-Mid	Good	Medium	Fair	Fair	Fair	--
Double Delight	Fall, Red	3	Early	Fair	Medium	Good	Good	Very Good	--

--Indicates no testing available

Strawberries

The strawberry is easy to grow almost anywhere in Minnesota with a suitable site and adapted varieties. Plentiful fruit can be produced on small areas and the fruit can be processed into jam or it can be frozen for later use.

It is important to select good planting stock. Always buy plants that are free from insects, viruses, and other diseases. If possible, obtain plants from a local nursery. If the planting stock is from an old patch, transplant only the most vigorous young plants.

Strawberries should be planted on a higher site with enough slope to permit good air and water drainage. Cold air drainage into low flat lands makes frost injury to blossoms likely in low areas. Although ample moisture is desirable, standing water is harmful as plant vigor and growth are greatly retarded and disease problems are greatly increased. Strawberries grow well on many soils. They grow best on well-drained loams and sandy loams. Clay soils will produce good strawberries if sufficient organic matter is worked into the soil before planting. Avoid muck and peat soils for strawberries because in these low areas, frost injury is likely.

Strawberries grow best in a well-prepared soil that is free of weeds. If perennial weeds such as quack grass are a problem, an eradication program should be completed before strawberries are planted. Plow or spade under a liberal amount of well-rotted manure or organic matter at the rate of two bushels per 100 square feet. In addition, incorporate a balanced

commercial fertilizer such as 10-10-10 or 18-18-8 at the rate of ten pounds per 1000 square feet. Do not plant strawberries on newly plowed sod unless the land has been treated for white grubs. White grubs are very destructive to strawberries.

Plant strawberries in early spring as soon as the soil can be tilled. Set plants with the crown flush with the soil surface. Plants should be watered in immediately after planting. June-bearing plants are most often grown in a matted row system. Set plants 24 inches apart in rows spaced about four feet apart. Let the runners root during the summer to form a mat of plants two feet wide. The hill system is often used with everbearing varieties. Set mother plants 18 inches apart within the row. Space rows 18 inches apart and leave every fourth row unplanted, so that a walkway is available for harvesting. Remove all the runners, allowing only the original plant to grow.

Plant strawberry plants or crowns in early spring, using healthy dormant plants. It may also be possible to purchase plants growing in small containers for planting throughout the growing season. Runners emerge from July through early fall and form new plants by rooting down several inches from the original plant.

During the first year, the mother plants often produce flowers that develop into fruit. These flowers should be removed so that the plant will develop and grow vigorously. As fall approaches, the growing points in each crown change into flower buds. The new plants become dormant after the days become short and cool. Older leaves and many of the connecting runners die.

In the spring of the second year, the flower buds renew growth and develop into flowers, which produce mature fruit in about 30 days. The first flowers to open produce the largest fruit, often called the "king berries". As later flowers develop, the resulting fruits are successively smaller.

Successful strawberry culture requires that the bed be free of weeds. A bed kept free of weeds the first season will have few weeds developing prior to harvest time the next season. Hand cultivation is effective as well as is mulching or chemical weed control. Dacthal is effective in new and fruiting plantings for control of germinating weeds. It will not control emerged or perennial weeds. For specific information on insect and disease control, refer to University of Minnesota Extension Bulletin, Home Fruit Spray Guide, and the Insect Management chapter and the Disease Management chapter of this manual.
In Minnesota, mulching with straw is needed to protect strawberry plants from severe winter weather. Exposure to low temperatures can seriously reduce yields. The time to apply mulch varies with the season, but protection should be generally applied in November after several hard frosts.

Several hundred varieties of strawberries have been named over the years. Most varieties are not widely adapted and, therefore, perform best in or near regions where they were developed. Strawberry varieties recommended for Minnesota, and their characteristics are shown in Table 3.

Grapes

Grapes can be grown in almost any part of Minnesota if the site is suitable and the plant is an adapted variety. Grapes need full sunlight and warm temperatures to ripen, so a southern slope or the south side of a building or windbreak is best. Choose deep, porous, well-drained soil containing high amounts of organic matter. Sandy loams with organic matter are best. Plants should be planted in the spring unless containerized plants are used. Use hardy plants with a well-developed root system.

Space plants about eight feet apart and eight to ten feet between the rows. Before planting young vines, remove all but one of the most vigorous canes. Set plants in the ground slightly deeper than the previous planting. Grapes usually benefit from fertilization. Apply a bushel of rotted manure around each plant either in late fall or early spring. If manure is not available, apply 1/2 pound of 10-10-10 or 18-18-8 per plant early in the spring.

In early March as soon as weather permits, prune hardy grapes to a single upright trunk with selected lateral branches about 1/4 inch in diameter. In a two-wire trellis system, cut back the four young branches selected for the framework so each bears about ten buds. Tie canes permanently to the trellis

Cut back any short branches near the main trunk to one or two buds. These buds will develop a strong framework of branches for the next season.

Table 3. Minnesota strawberry cultivars and their characteristics.

Cultivar	Type	Season	Hardiness	Texture	Flavor	Wilt
Allstar	June	LM	F	VG	VG	RES
Annapolis	June	E	G	VG	G	SUS
Brunswick	June	E	G	VG	VG	U
Cavendish	June	M	VG	VG	VG	U
Crimson King	June	E	EXC	VG	F	SUS
Earliglow	June	E	F	EXC	EXC	RES
Evangline	June	E	G	VG	EXC	U
Ft. Laramie	Ever	--	EXC	F	F	INT
Glooscap	June	LM	EXC	VG	VG	INT
Gov. Simcoe	June	L	G	G	G	SUS
Honeoye	June	EM	G	G	G	SUS
Itasca	June	E	VG	G	G	U
Jewel	June	LM	G	VG	VG	SUS
Kent	June	LM	VG	VG	VG	SUS
Mesabi	June	LM	EXC	EXC	VG	U
Ogallala	Ever	--	EXC	G	G	U
Sable	June	E	EXC	VG	EXC	U
Sparkle	June	L	VG	G	G	SUS
Tribute	Neutral	--	VG	VG	G	RES
Tristar	Neutral	--	VG	VG	VG	RES
Veestar	June	E	G	G	VG	INT
Winona	June	L	VG	VG	VG	RES

Type: June = June Bearing; Ever = Ever Bearing; Neutral = Day-Neutral.
Season: E = early; EM = Early Midseason; LM = Late Mid-season; L = Late.
Hardiness, Texture, Flavor: F= Fair; G = Good; VG = Very Good; EXC= Excellent.
Wilt (Verticillium wilt): RES = Resistant; INT = Intermediate; SUS = Susceptible; U= Unknown.

Table 4. Minnesota grape varieties and their characteristics.

Variety	Origin	Relative Hardiness	Berry Color	Ripening Season	Principal Uses
Aurore	France	Tender	White	V. Early	W, T
Beta	MN	V. Hardy	Blue	Mid	J
Bluebell	U of M	Mod. Hardy	Blue	Early-Mid	T, J
Brianna	Swenson	Tender-Mod	White	Early-Mid	W
Canadice	NY	Tender	Red	Early-Mid	ST
Concord	MA	Tender-Mod	Blue	Late	J, T
De Chaunac	France	Tender	Blue	Mid-Late	W
Edelweiss	U of M	Tender-Mod	White	Early-Mid	T, W
Elvira	MO	Mod Hardy	White	Early-Mid	T, W
Esprit	Swenson	Tender-Mod	White	Late	W
Foch	France	Tender-Mod	Blue	Early	W
Fredonia	NY	Tender-Mod	Blue	Mid	T, J
Frontenac	U of M	V. Hardy	Blue	Mid	W
Frontenac gris	U of M	V. Hardy	White	Mid	W, J
Himrod	NY	Tender	White	Early	ST
Kay Gray	Swenson	Hardy	White	Early	W, T
La Crescent	U of M	V. Hardy	White	Mid	W, J
La Crosse	Swenson	Tender-Mod	White	Early-Mid	W
Mars	U of Ark	Tender-Mod	Red	Early-Mid	ST
Marquette	U of M	V. Hardy	Blue	Mid	W
Millot	France	Tender	Blue	Early	W
Reliance	U of Ark	Tender	Red	Mid	ST
St. Croix	Swenson	Hardy	Blue	Mid	W
St. Pepin	Swenson	Tender-Mod	White	Early-Mid	W, J
Seyval	France	Tender	White	Mid-Late	W
Swenson Red	U of M	Tender-Mod	Red	Mid	T
Valiant	SD	Hardy	Blue	Early	J, T
Van Buren	NY	Tender-Mod	Blue	Early	T, J
Vanessa	Ontario	Tender	Red	Mid	ST
Vignoles	France	Tender	White	Mid-Late	W
Worden	NY	Mod. Hardy	Blue	Early-Mid	T, J

Key for Principal Uses:
J = Juice or Jelly
T = Table
ST = Seedless Table
W = Wine

Key for Hardiness:
Tender = Requires winter protection everywhere in Minnesota.
Tender-Moderately Hardy = Can be grown without protection on good sites in southern Minnesota.
Hardy = Can be grown without protection throughout the southern two-thirds of Minnesota. Will require protection in northern Minnesota.
Very Hardy = Needs no winter protection in Minnesota.