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Growing Blueberries *(Vaccinium spp.)* in Raised Beds and Containers in Home or Urban Landscapes

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Naturally flavorful, blueberries have made a statement in the culinary arts as a popular ingredient due to their sweet-tart flavor and subtle pleasant aroma. For gardeners, blueberry bushes can be a fun addition to a home garden, patio, balcony, or porch because of their sweet fruit flavor, and aesthetic appeal. Blueberries are one of the longest-lived perennial fruit plants as it can produce fruit for over 30 years! In the spring, shrubs bloom with white, whitish pink, or whitish yellow blossoms. In summer, they produce edible berries and often exhibit bright cherry red foliage in Fall. Unfortunately, blueberries require pH 4.0–5.5 soils and most Nebraska soils are too high in pH for blueberry in-ground culture. While Nebraska soils could be amended with elemental sulfur at planting and then yearly, there are easier solutions. By using raised beds or pots containing soil or soilless mix (4.0 to 5.5 pH range) and selecting specific cultivars, blueberry cultivation in Nebraska can be achieved.

Figure 1. Blueberry Peach Sorbet® cultivar in flower. Photo E.T. Paparozzi

Species and Cultivar Selection

Blueberries belong to the genus Vaccinium in the Family Ericaceae along with rhododendrons and heathers. There are many different types of blueberry species that can be categorized into primary, minor, and native species. You may have heard of native members of the genus Vaccinium by common names such as Huckleberry and Bilberry. Primary blueberry species include *Vaccinium angustifolium Ait.* (lowbush blueberry), *Vaccinium virgatum* (rabbiteye blueberry), and *Vaccinium corymbosum L.* (highbush blueberry). However, in Nebraska, rabbiteye blueberries do not grow well and are not recommended.

While some blueberry species can reach heights taller than 12 feet, species and cultivars grown in Nebraska have a lower growth habit (Tables 1 and 2). Each species has distinguishing characteristics and flavors.

Northern highbush (*V. corymbosum*) cultivars are preferred by home gardeners and the most commonly found at grocers as they provide the highest and most consistent yield of all types. They prefer temperate zones where temperatures do not drop below -20°F. These blueberries have the potential to grow 6 to 8 feet tall and 5 feet in width at maturity if given adequate sunlight and proper soil conditions.

Table 1. Types and cultivars of Northern high bush blueberries (Vaccinium corymbosum L.) to consider for raised bed culture.

Cultivar	Height (ft)	Width (ft)	Fruit Quality	Harvest Season	Notes
Bluecrop	4	7	Good; tart if picked early	Early to Midseason	Large and very firm fruit. Vigorous, upright, spreading bush. Moderately resistant to viruses, mummy berry, & powdery mildew.
Bluejay	4	7	Mild flavor	Early to Midseason	Medium to large, firm fruit. Upright, slightly spreading bush.
Blueray	4	7	Very-good flavor	Early to Midseason	Large and firm fruit. Upright spreading bush.
Bluetta	4	7	Fair flavor	Early	Small to medium, soft fruit. Short, compact, spreading bush.
Duke	4	7	Fair flavor; improves with refrigeration	Early	Medium-sized, firm fruit. Upright, productive bush.
Elliott	4	7	Good flavor if allowed to fully ripen on the plant	Very Late	Small to medium fruit; stores well. Vigorous, upright bush.
Jersey	4	7	Sweet flavor	Late	Small to medium, firm fruit. Vigorous, upright bush.
Patriot	3	7	Very-good flavor	Early	Medium to large, firm fruit. Medium size, low growing bush; is more tolerant of heavier soils. Moderately resistant to *Phytophthora* root rot. Works in the landscape or as a hedge.
Rubel	4	7	Very-good flavor	Late	Small and firm fruit. Vigorous, upright bush. Foliage develops fall color suitable for landscaping.
Toro	4	7	Good flavor	Midseason	Large and firm fruit. Vigorous, upright bush.

Table 2. Types and cultivars of half-high blueberry cultivars to consider for raised bed culture

Cultivar	Height (ft)	Width (ft)	Fruit Quality	Harvest Season	Notes
Northblue	3	7	Very-good flavor	Midseason	Medium to large, firm fruit. Vigorous.
North Country	3	7	Sweet mild flavor	Midseason	Small to medium, soft fruit. Moderately vigorous.
Northland	3	7	Sweet flavor	Midseason	Medium and very-soft fruit. Grows to 4 ft. with flexible canes.
Northsky	3	7	Very-good flavor	Midseason	Small, firm fruit. Bush is usually less than 2 ft. with dense branching.
Polaris	4	4	Very-good flavor	Early	Medium-sized firm fruit. Moderately vigorous to 3ft. Slightly spreading bush.
St. Cloud	5	4	Good flavor	Midseason	Medium-sized, firm fruit. One of the tallest of the half-highs. Stores well.

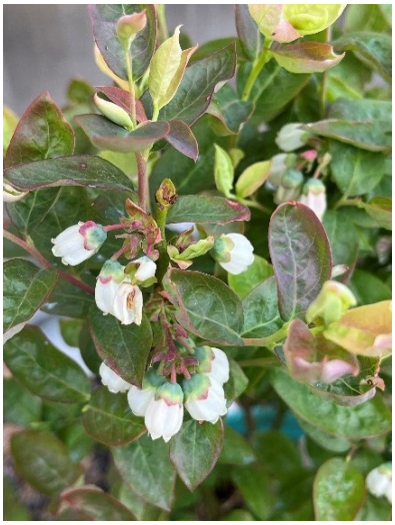

Figure 2. Up close picture of Peach Sorbet® flowering. Photo E.T.P

Lowbush blueberries (*V. angustifolium*) are grown in the coldest regions of the U.S. (Northeast, Upper Midwest) and at higher elevations. As the name indicates this type is the lowest/shortest in stature and is more difficult to manage and thus, may be more difficult to manage and harvest.

Half hybrid blueberries are a result of crosses between northern highbush and lowbush types bred to withstand mid-winter temperatures that can drop from -35°F to -45°F. The insulating winter snow protects fruiting buds that are low on the bushes. These fruiting buds produce small to medium-sized berries, depending upon the cultivar. Lowbush and half-high cultivars tend to be more winter hardy than northern highbush, but winter survival of flower buds depends primarily on snow cover.

Site Selection

It takes blueberry plants about 2–3 years to become established, with fruit harvesting beginning in the third or fourth growing season. However, for maximum production shrubs require six to eight years to mature. During midwinter, blueberries can withstand cold temperatures of -20°F. The buds of some blueberries survive temperatures to at least -35 °F, but open flowers can be damaged or killed by late spring frosts, so frost protection must be provided.

Table 3. Types and cultivars of lowbush (Vaccinium angustifolium Ait.) cultivars—

Cultivar	Height (Ft)	Width (Ft)	Fruit Quality	Harvest Season	Notes
Blomidon	1–2	2–3	Very good	Midseason	Large fruit. A hardy shrub with upright spreading stems.
Brunswick	1	3	Flavorful and sweet	Early to Midseason	Works well as a groundcover; blue-green foliage turns bronze, scarlet, and crimson in fall. Able to grow in dry, acidic, sandy, and nutrient-poor soils.
Burgundy	1–2	2–3	Old-fashioned sweet blueberry flavor	Early to Midseason	Works well as a groundcover or low fence. New growth is a coppery burgundy color. Fruit is the size of a pea. Large quantities of white bell-shaped blooms in spring.
Tophat	2	2	Sweet and rich, but tart, wild blueberry flavor	Midseason	Works well as a groundcover or low fence. May be planted in containers for creating bonsai. Needs full sun. Used in baking.
Sour Top or Velvetleaf	1–2	1–2	Less sweet	Late	Fruits are smaller, less sweet, and bright blue with a waxy coating.

Site-specific factors when choosing an area for raised beds include suitable soil pH, well-aerated soils, full sun, and access to irrigation. Additionally, there should be good air circulation. Locations that are elevated are more suited for blueberry growth than low-lying sites. This is because low-lying areas curtail air movements and may have shade from buildings, fences, trees, or other surroundings.

Raised Beds—Structure and Spacing

Raised beds work well for blueberries because blueberry plants have shallow root systems and acidic soil requirement. Additionally, raised bed gardening provides benefits to conventional gardening in that the smaller size requires less management, and raised beds warm up more quickly in the spring. This allows planting to occur earlier in the year. Raised beds drain more readily for heathier roots but require routine irrigation and mulching for consistency in plant water availability.

Figure 3. Wooden raised garden bed Photo C.J.J.

There are two options when it comes to raised beds—you can purchase one that is already constructed or build it yourself. Purchasing raised beds can help alleviate the stress of building one. Manufactured raised beds often have no bottom barrier and thus roots may grow out of the bed. This would defeat the purpose of modifying the soil/soilless mix pH. To provide a barrier underneath, you can use any of these materials as liners: cardboard, weed fabric, old newspapers (sterile), or garbage bags. However, it should be noted that cardboard and newspapers will disintegrate, and garbage bags will limit bed drainage. Soil/soilless mix should be tested yearly to ensure pH levels remain acidic.

When constructing raised beds, it is recommended to incorporate high-quality soil/soilless materials to assist with drainage, structure, and overall plant health. In a home garden, blueberries can be grown in a raised bed that is 3 feet wide and 3 feet deep and as long as needed for the number of plants. Generally, bushes should be planted 3 feet apart. Before constructing a raised bed, the design should be thoughtfully considered for structural support. The framework for this structure can be made from several types of materials such as landscape timbers, planking, rock, manufactured blocks, stones or bricks. If wood products are used, they should be treated with wood preservatives to prolong the life of the structure because wood rot can be problematic over time.

One unique solution to purchasing a raised bed is converting a water trough, (Figure 4) which can be found at farm and hardware stores, into a raised garden bed. Make drainage holes six to eight inches apart along the bottom with a one-half-inch drill bit. Level the trough onto wooden

Figure 4. Water trough converted to a raised bed. Photo C. J. J

Figure 5. Water trough converted into raised bed. Photo C. J. J.

slats or bricks to the desired height. Afterward, fill the trough with the appropriate amount of growing medium (soil or purchased bag mix). To create a drainage layer at the bottom, gravel can be added prior to the addition of soil/soilless mixture.

Preparing the Growing Medium

Ideal soil conditions for blueberries are fertile, well-drained sandy loam or clay loam soils with moderate water-holding capacity. Blueberries require a soil pH of 4.0 to 5.5. Because most Nebraska soils have higher pH, raised beds should be used. The growing medium for raised beds will have to be prepared to attain the proper soil conditions. Nebraska soils can be used if you know the pH. In this case, fill 1/3 of the volume of the bed with soil and then 1/3 peat moss and 1/3 shredded pine bark. After mixing, a sample should be sent to a lab for soil testing to be sure the pH is 4.0–5.5.

To prepare an acidic soilless growing medium, use a mix of one-part peat moss and one-part shredded pine bark. Another growing medium that works well is a mix of two parts coir (shredded coconut husks), two parts peat moss, and one part perlite (Pandian & Harbut, 2010). Mix well together and test pH levels. For at home soil testing, home soil test kits can be purchased at any hardware or big box store. The last option in achieving acidic soil for your blueberries is using one-part potting soil with one-part peat moss. After the planting medium is mixed, thoroughly wet it before placing it in the bed (DeMarsay, 2022).

Irrigation and Mulching

Blueberries need at least one inch of water per week (65 gallons per 100 square feet), applied through hand watering or irrigation in the event of low rainfall. Through the use of mulches and irrigation, adequate moisture levels are maintained for consistent growth and high fruit yields. There are many different types of irrigation systems that can be utilized; selection is dependent upon the situation. Blueberries perform best when less than half of the available water has been depleted. Remember that each type of irrigation system provides varying amounts of water for a period of time and that overwatering can be avoided by understanding the chosen irrigation system and creating a uniform irrigation schedule.

Irrigation systems used in blueberry production include overhead irrigation (sprinklers), drip irrigation, micro-irrigation and rotary irrigation. Raised beds may not accommodate overhead irrigation but hand watering may work well. For larger beds, drip irrigation systems should be used as they apply less water and more efficiently. Drip tubes and soaker hoses can readily be purchased at local box stores, nurseries, and garden centers. Micro-irrigation systems water plants by using low pressures and have low flow rates (usually no more than 15 psi and no more than 60 gph). The four types of micro-irrigation systems include drip emitters, bubblers, drip tubing, and micro sprays. The use of a drip or bubbler micro-irrigation system can reduce disease by keeping the foliage dry. Additionally, micro-irrigation reduces excessive weed growth by distributing water directly to desired plants instead of open areas.

Mulching provides temperature control, maintains moisture, reduces weeds, and improves soil condition over time. There are many materials that can be used as mulch, however

a mixture of coarse and fine particles is ideal. Mulches may be purchased in bags or in bulk but can be easily be made at home using composed yard waste. Decomposed sawdust/chip mixtures should not be used because they tend to make nitrogen unavailable to plants. Blueberry shrubs should be mulched with a 2–4-inch layer for bark-based mulches, while straw mulches should be at a depth of 6 inches. The layer should be replenished as needed.

Fertilization

Compared to other plants, blueberries do not require much fertilizer. Excess fertilizer can easily cause damage to the roots and leaves (called over fertilization). Over fertilization indicators from salt burn to the roots includes shoot dieback and leaf scorch (Smith & Jacobs, 2019) Fertilization should not occur until four to six weeks after initial planting. Dry, granular fertilizer should always be sprinkled on the top of the soil/soilless mix as blueberry plants tend to have a shallow rooting system. Fertilizer selection is dependent upon pH testing of the soil or growing substrate. Keep in mind that blueberries require ammoniacal sources of nitrogen (N) such as ammonium sulfate (recommended), ammonium nitrate, or urea. Be sure to also avoid chlorinated compounds such as muriate of potash (KCl) and magnesium chloride ($MgCl_2$). Always apply the lowest recommended rate on the bag/container.

Maintenance and Pruning

Maintaining a raised bed garden involves weeding, irrigating, pruning, replacing decomposed mulch, and removing spent plants. Taking note of this, it may be beneficial to daily monitor beds—at least for the first year.

Blueberries flower on second year wood. After the shoot has flowered it will not reflower. This indicates that it is time to prune. Pruning of mature blueberry plants occurs in late winter or early spring with the removal of any dead, damaged, or diseased growths, followed by the removal of one-third of the oldest growth. Weak, twiggy growth near the base of the plant should be removed in addition to excess shoot growth in the center of the plant. Also, remove all canes that are not erect, as well as the oldest canes at ground level (Pavlis & Sciarappa, 2005).

Frost Protection

Temperate fruits typically go into a state of dormancy as induced by shortening day-length and decreasing temperatures that occur in fall. Plant functions slow until full dormancy during winter. Fully dormant plants become quite cold hardy and seldom suffer injury from cold temperatures (Lyrene & Williamson, 2006). There is a need for frost protection as blueberry plants that have met their rest period and become exposed to warm temperatures may break dormancy early in the spring season. Late spring freezes are not uncommon and can cause plant injury and poor yields because most blueberry cultivars grow flower buds first, then the vegetative buds. The flowers and small fruits of blueberries are generally the only parts of the plant that are damaged by frost in the spring (Synder et al., 2005). Frost protection ensures that the flower buds remain intact to allow pollination and fruit development.

Cultivar selection and site selection play a major role in frost protection. Cultivar selection plays a role in frost protection due to the timing of flowering. Explore the cultivars in Tables 1–6. When selecting a cultivar, keep in mind that the later the cultivar flowers, the later they tend to ripen.

In the site selection process, consider that some environmental factors that affect frost occurrence can be more challenging in particular areas. A few environmental factors to take into account are wind speeds, air temperature, or the microclimate.

Blueberry Cultivars for Planting in Containers

Container production of blueberry plants is a great option for homeowners who have limited space and want flavorful, homegrown fruits straight from their patio or balcony. The options of locations of where plants can be grown are numerous. For example, containers can be placed or hung on patios, balconies, and decks. The reason for growing blueberries in containers is maybe the same as for raised beds, just smaller spaces. Growing in containers allows for better accessibility and makes it feasible to address weather, watering inputs, and low pH soil requirements. Also, containers can aid as a decorative piece in addition to a luscious landscape. There are specific cultivars on the market for planting in containers or hanging baskets (Tables 4, 5, 6, 7).

Conditions for Container Growing of Blueberries

Containerized blueberries should be placed in areas where plants can get at least 4 hours of direct sunlight, protected from high winds, and where they can be easily reposi-

Table 4. Northern Highbush blueberries cultivars and varieties recommended for containers.

Cultivar	Height (Ft)	Width (Ft)	Fruit Quality	Harvest Season	Notes
Patriot	3	7	Very good flavor	Early	Medium to large, firm fruit. Medium size, low growing bush; is more tolerant of heavier soils. Moderately resistant to *Phytophthora* root rot. Works in the landscape or as a hedge.
*Peach Sorbet® 'ZF06–043'	1 ½	2	Medium berries with a sweet tropical essence.	Midseason	Plants keep leaves through winter when the foliage transitions to a rich eggplant purple.
*Pink Icing™ 'ZF06–079'	3	4	Large berries with a sweet and robust flavor.	Midseason	Beautiful year-round foliage.
*Silver Dollar® 'ZF06–089'	2	3	Medium berries with a sweet pineapple flavor.	Summer to Fall	Foliage resembles Eucalyptus.

*Bushel and Berry® product

' Patent Name

Table 5. Half-High blueberry cultivar recommended for containers.

Cultivar	Height (Ft)	Width (Ft)	Fruit Quality	Harvest Season	Notes
Northsky	3	7	Very good flavor	Midseason	Small, firm fruit. Bush is usually less than 2 ft. tall with dense branching.

Table 6. Semi-Dwarf blueberry cultivars recommended for containers.

Cultivar	Height (FT)	Width (FT)	Fruit Quality	Harvest Season	Notes
*BerryBux® OR Blueberry Glaze® 'ZF08–095'	2–3	2–3	Small berries with an aromatic taste	Summer	Small berries that have an aromatic taste. Needs very little pruning. Looks like a boxwood shrub and can be used as a hedge. Leaves dark green with a glossy. In the spring, white and pink flowers emerge

*Bushel and Berry® product

'' Patent Name

Table 7. Dwarf blueberry cultivars recommended for containers.

Cultivar	Height (FT)	Width (FT)	Fruit Quality	Harvest Season	Notes
*Jelly Bean® 'ZF06–179'	1	2	Medium to large berries with homemade jelly flavor.	Midseason	Beautiful year-round foliage. Prune annually during winter dormancy.
Midnight Cascade 'FC12–187'	1–1.4	2	Medium berries that have vanilla flavors.	Summer to fall	Good in hanging baskets.
Perpetua	4	5	Small berries that are sweet.	Midseason to Late	Dark green leaves turn deep red and green in the winter. Gives two crops in mid- and late season.
*Sapphire Cascade™	1–1.4	2	Medium berries with a sweet taste.	Summer to fall	Performs well in hanging baskets.

*Bushel and Berry® product

'' Patent Name

tioned or moved to provide for winter protection. Some cultivars are less hardy and blueberries in containers can be easily moved into protected locations like an unheated shed or garage. Keeping plants in a semi-moist and cool location will discourage cold temperature injury or plant death from frozen roots.

The minimum dimension of a container should be 18 to 24 inches wide and 12 to 16 inches deep. Selecting a pot that is larger than the plant root system is recommended. In addition, when plants are potted there should be room for about an inch of organic mulch on top to help keep roots moist (Hill & Perry, 2011). Plants may be grown directly into an ornamental container or alternatively in a lightweight plastic container placed into a glazed ceramic or clay pot that can easily removed for winter storage.

Figure 6. Ceramic Container. Photo C.J.J.

Understanding the different types of containers on the market is important. Pot-like containers are available in glazed ceramic, terracotta (clay), untreated wood, metal, and plastic. Pots that are made from glazed ceramic materials tend to last longer and are waterproof. Also, glazed ceramic containers are better at absorbing water and won't dry out as quickly because of their ability to retain moisture. As a result, glazed ceramic pots have been found to survive the cold better than unglazed terracotta ones. However, glazed ceramic containers can be heavy and prone to cracking from the extensive root growth of plants. Terracotta or clay is a material that has been extensively used in historical artifacts and is still used today in gardening. Containers that are terracotta have an earthy red appearance that can stain easily. Due to the clay material, it has a semi-porous surface that allows the soil to breathe. There are containers that are non-porous meaning they hold water longer

but restrict air movement making a drainage hole a necessity for healthy plant growth. Types of non-porous containers include metal, plastic, and glazed ceramic containers. Although there are some setbacks when it comes to air movement there are some positive attributes to non-porous containers. For example, both metal and plastic can be light weight and durable.

Self-Watering Containers

An option for container gardening is purchasing a self-watering container or converting traditional pots into self-watering containers. This method can be used to save time and help conserve water and nutrients. An example of a self-watering container is with a reservoir of water (that you fill) that involves a small cup or saucer at the bottom of the container. This keeps the soil moist as needed. Water molecules from the reservoir are pulled upward by capillary action and then absorbed by roots from the soil. A major contributing factor to this phenomenon is cohesion, in which water molecules stay close together, and adhesion, in which water molecules adhere to other substances. This is a great alternative if you do not have a dependable irrigation system or don't want to have to hand water. As previously mentioned, self-watering containers can either be purchased or converted from traditional pots. There are YouTube videos and on-line instructions that show different methods of converting traditional containers into self-watering pots.

Growing Medium and Fertilizer

As mentioned earlier, an acidic, light weight, soilless growing medium (one-part peat moss and one-part shredded pine bark or two-parts perlite) works well for growing blueberries in containers. Commercial bag mixes with these proportions are readily available. Fertilization of containers should only occur once per year and in the early spring. For a newly planted bush, apply fertilizer about 4 weeks after planting. Use approximately ¼—½ cup of a dry granular fertilizer per container.

Over-wintering of container blueberries

Once the blueberry bushes have lost their leaves, you will need to protect them (specifically the roots) from Nebraska's low winter temperatures. So, it is best to move them into a storage shed or unheated garage to overwinter them. Blueberries only require approximately 450 hours of temperatures below 45°F in order to flower and fruit. So, as soon as the weather gets warm in the spring, you can move them back outside.

Harvest of Raised-Bed or Container Blueberries

It takes two to five years for a blueberry plant to bear fruit, depending upon the cultivar and environmental conditions. For growing in containers, some commercially available plants are ready to bear fruit. After the berries have completely turned blue and are springy when gently squeezed, berries are ready for picking. This occurs between July and September. Once the first berries turn blue, the rest of the berries are picked every four to five days over a 14 day period to maximize fruit size and sugar level. Blueberries should be picked in the morning after the dew has evaporated. If picked in the afternoon, the berries will contain field heat, which will reduce storage life. Fresh berries have a 7–10-day shelf life if they are kept in a refrigerator. Chill berries immediately after harvest in a 34°F refrigerator.

Pests and Diseases

Blueberries require the least amount of pesticides of all popular fruit crops recommended for home gardens. As a result, treatments recommended for various times during the season should not be applied until a specific pest problem emerges. It is not at all unusual for blueberries to remain relatively pest-free for 5 to 8 years or longer after planting. Listed below are common pests and diseases that a home blueberry grower may encounter.

Pests

Blueberry aphids, (*Illinoia pepperi*) are small, green-colored, soft-bodied insects of about 2 millimeters in length and can become a serious problem if left untreated. Primarily, aphid damage is centralized on the leaves and shoots of the plant. The damage consists of deformed leaves, debilitation of plants, and secretion of honeydew. Inspect undersides of leaves for aphids, paying particular attention to young shoots at the base of the bush because aphids can be responsible for the transmission of the blueberry shoestring virus (BBSSV) and blueberry scorch virus (BISV). Controlling aphids depends on the size of infestations. Insecticidal soap can be used for small populations. It is important to rotate modes of action to reduce the risk of insecticide resistance.

Cherry fruitworm (*Grapholita packardi*) and cranberry fruitworm (*Acrobasis vaccinii*) are both fruitworms whose larvae bore into berries. The cherry fruitworm is a small pink worm with a brown head that when entering the fruit eats all contents inside the skin, leaving only its frass in exchange, which makes it trickier than the cranberry fruitworm. The cranberry fruitworm is yellow green with a yellow head and causes fruit to be webbed together and includes the presence

of its frass (excrement) in the webbing. Both insects can be controlled with labeled insecticides at petal fall and 10 days later if they become a problem.

Leafrollers (*Archips argyrospilus*, *Choristeneura rosaceana*, and *Argyrotaenia velutinana*) are moths whose larvae create webs and feed on the foliage and fruit. Fruits and leaves are vulnerable to fungi and bacteria during the larval stage due to injuries caused by larval feeding. Leafroller adults can be managed through monitoring with winged traps baited with pheromones. Additionally, hang ropes with pheromones or other devices that disperse pheromones on blueberry plantings to disrupt leafroller mating.

Scale can also attack blueberries. There are four species; three of them develop on the leaves, while one develops underground. Scale (Putnam scale, *Diaspidiotus ancylus*; Lecanium scale, *Lecanium* spp.; and Terrapin scale, *Lecanium nigrofasciatum*) can weaken plants by feeding on the phloem and accumulating honeydew, which causes sooty mold to grow on the stems. Prevention measures consist of adequate fertilization and irrigation as this will help to reduce the effects and movement of ground scales.

Japanese beetles (*Popillia japonica*) are determined pests. Adult Japanese beetles feed on the foliage and flowers, leaving them skeletonized. The larvae feed on grass roots near blueberry plantings and stay in the ground during their development until the next summer.

The blueberry flea beetle (*Altica sylvia Malloch*) is a shiny bronzed-colored beetle that causes leaf damage. These beetles can be distinguished in their adult life cycle due to their oval-shaped body and distinctive jumping behavior. Flea beetle larvae feed on blueberry leaves and blossoms.

Spotted wing drosophila (SWD) is a common pest of most soft fruits. Eggs can be found in riper berries that are still attached to plants. SWD are able to do this by burrowing through the berries which makes them aesthetically unappealing and soft. Best management practices include detection, sanitation, and insecticides (Minnesota, 2015).

Birds will consume blueberry fruit during the harvest season. Other vertebrate pests such as rabbits, deer and voles may nibble down the stems blueberry plants, particularly in the late fall and winter. This can affect the health of the plant by stunting its growth. Plants can be protected by nettings, chicken wire or similar fencing (Tepe et al., 2020).

Diseases

If disease is suspected, becomes severe, and if a fungicide is being considered, please reach out to UNL Plant & Pest Diagnostic Clinic. A correct diagnosis is the first step to developing an efficient and effective management strategy.

Mummy berry (*Monilinia vaccinii-corymbosi*) is a fungal disease in which infected flowers, shoots, and leaves turn brown and die. When berries are initially infected, they appear normal, however, as time progresses the berries turn tan color with white fungal growth inside the berries. The best methods of control are planting resistant cultivars, sanitation, and removal of infected berries to prevent further spreading. Also, collect and remove any mummified fruit from the base of the blueberry bush in early spring before bud break.

Phytophthora root rot (*Phytophthora cinnamomi*) has been observed in areas that have poor drainage or low-lying areas. Noticeable above ground symptoms include yellowing or reddening of leaves with no new indications of new growth. These symptoms are early onset of disease development. Management of this disease includes cultural controls; avoid planting in areas that have poor drainage, and avoid excessive irrigation when soil temperatures are high. Prior to any application of fungicide, please contact UNL Plant and Pest Diagnostic Clinic if disease is suspected, becomes severe, and if a fungicide is to being considered.

Leaf spot diseases (*Septoria albopunctata, Gloeosporium minus, Gloeocercospora inconspicua*) occur more in southern parts of the United States. Causal agents *Septoria* and *Gloeocercospora* spot can be identified by small to medium brown leaf spots with purplish margins. As for *Gleosporium*, spots appear as larger irregular reddish-brown lesions. Leaf spots are found on immature leaves in mid-to-late season, especially during wet weather.

Stem canker *(Botryosphaeria corticis*) is a disease that specifically targets highbush blueberries in wet conditions. A series of small red lesions appear at the beginning of the infection that swells over the course of 6 months and become broadly conical in shape. Approximately 2 to 3 years after the start of the disease, large swollen stem cankers develop with deep cracks and many fruiting bodies. Disease management includes planting resistant cultivars, using disease-free planting material, and pruning infected canes (Schilder et al., 2015).

Powdery mildew (*Erysiphe vaccinii*) is a fungal disease that usually becomes noticeable in midsummer. Leaves have a light green appearance with yellow or reddish areas and puckering. On the top surface of the leaf, white fungal growth occurs with the undersides of the leaf exhibiting water-soaked spotting. Preventive measures include planting resistant cultivars and reduction of humidity. Unless disease is severe, fungicides are not recommended (Schilder et al., 2015).

Botrytis blossom blight, twig blight, and fruit rot are all diseases caused by the same fungus, *Botrytis cinerea*. Out of the three diseases listed, botrytis blight and fruit rot are minor but can cause serious damage under cool wet condi-

tions. There is a noticeable blight on the blossoms and soon abundant gray mold appears on the blossoms that have been infected with botrytis. Other symptoms of infection with characteristic features of botrytis are blighted twigs, tan-brown irregular lesions on leaves, and berries covered with fluffy gray mold after harvest (W. O. Cline & Schilder, 2006). To prevent infection, regularly prune each bush to reduce humidity in the canopy, follow recommended rates for fertilization in the spring, and apply appropriate fungicides during bloom and fruit ripening (Schilder et al., 2015).

Summary

Blueberries' positive impact on cuisine, culture , and health is undeniable. However, growing these fruits in the home landscape can be a challenge as some of Nebraska's native soils are too alkaline. Therefore, raised beds and containers present several valuable options to growing blueberries in any Nebraska home landscape

Educational and Plant Sources

The following are some vendors of various blueberry plants suitable for home growers, in addition to those which might be found at many nurseries and garden centers in Nebraska. Nurseries that belong to the Nebraska Nursery and Landscape Association can be found at https://nebraskanurseryandlandscapeassociation.com/.

Bushel and Berry®

Website: https://www.bushelandberry.com/

Campbell's Nursery

Lincoln, Nebraska

Tel: 402.483.7891

Website: campbellsnursery.com

Double A Vineyards

Fredonia, New York

Tel: 716.672.8493

Website: doubleavineyards.com/blueberry-plants-for-sale

Earl May Garden Center

Lincoln, Nebraska

Tel: (402) 489-7168

Website:
https://www.earlmay.com/lincoln-ne-east-garden-center

Gurney's Seed & Nursery Co.

Tipp City, Ohio

Website: gurneys.com/category/blueberry-plants

Email: service@gurneys.com

Hartmann's Plant Company

Lacota, Michigan

Tel: 616.253.4281

Website: hartmannsplantcompany.com

Email: info@hartmannsplantcompany.com

Plants Unlimited

Rockport, ME

Tel: 207.594.7754

Website: plants-unlimited.com

Email: info@plants-unlimited.com

- Brunswick and Burgundy cultivars

Raintree Nursery

Morton, WA

Tel: 800.391.8892

Website: raintreenursery.com

Email: customerservice@raintreenursery.com

- Brunswick and Burgundy cultivars

Stark Brothers Nursery

Louisiana, MO 63353

Tel: 800.325.4180

Website: https://www.starkbros.com

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