

propagating highbush blueberries

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THE PROPAGATION OF BLUEBERRIES takes time, care and specialized structures. Also, a good source of true-to-name, nondiseased material is essential. The procedures are straightforward and not beyond the resources of the average grower. However, it is recommended that a grower start on a small scale to master the techniques properly.

This publication discusses the propagation of highbush blueberries by both hardwood and softwood cuttings. Most propagation is done with hardwood cuttings, as they are easiest to handle and are less perishable, but softwood cuttings allow more rapid multiplication of plants of special interest. When correctly done, both procedures yield high percentages of healthy plants.

HARDWOOD CUTTINGS

Propagation structures—Cuttings are generally rooted in frames placed in greenhouses or propagation boxes. A common frame size is 6 × 3 feet and 4 to 10 inches in height. (Dimensions vary greatly, depending on personal preference and materials on hand.) Bottoms can be added to the frames by stapling or nailing 1/8- to 1/4-inch mesh hardware cloth to their undersides. In recent years, growers



have also been propagating cuttings in plastic harvesting lugs. These are easier to carry because they are smaller (16 × 24 inches), and they are readily available wherever harvesting equipment is sold.

Propagation boxes are often used for rooting small numbers of cuttings. In this method, frames with bottoms are usually suspended inside wood or concrete forms so that there is a 4- to 6-inch gap between the frames and the ground (Figure 1). This protects the cuttings from the cold ground and allows for easy removal of groups of cut-

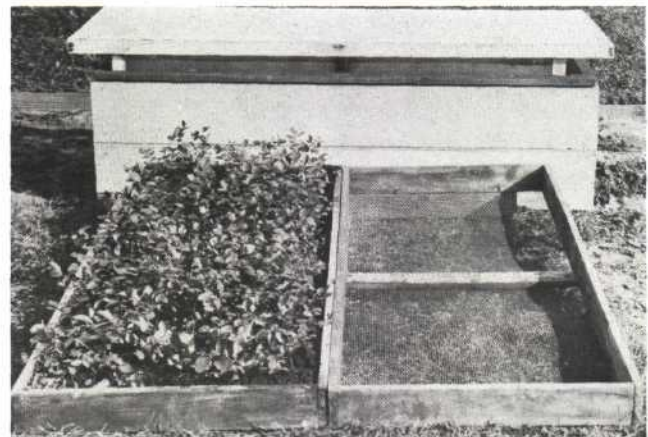


Figure 1. In the back of this picture is a propagating box with glass sash in place. In the front is an empty frame and one filled with cuttings.

tings once they are rooted. It also improves drainage and minimizes disease. The frames can also be placed directly on 6 to 8 inches of gravel. This keeps the cuttings above ground level, and by April they are free of frost and warmed at night as the gravel loses its accumulated heat.

The propagation boxes should be covered with panes of glass or plastic that are additionally covered by shading materials—7½-ounce burlap or any other material providing 60% transmittance of light is acceptable. Boxes should be set in the open sunlight in a location with good water drainage and where frequent inspections can be made.

Greenhouses are generally used for large scale propagation. Lugs or frames with bottoms can be set on a layer of gravel on the greenhouse floor, or frames without bottoms can be set directly on the ground and filled with 4 to 5 inches of aged sawdust. As with propagating boxes, light in the greenhouse should be kept at 60% sunlight.

Making and storing cuttings—Blueberries are propagated using shoots (“whips”) of the previous season’s growth that are 12 to 30 inches long. These should be taken from the field in winter or early spring after the plants

have had a rest period of 6 to 8 weeks of at least 45°F (generally by January 15 in Michigan). Whips are usually obtained in spring just before bud growth begins, but if cold storage is available, they can be gathered in the winter and stored at 30 to 40°F in boxes or plastic bags lined with moist sphagnum moss.

Proper selection of shoots is important for successful rooting. Do not use plants with observable disease, nutrient or injury symptoms (Figure 2). Cuttings should be taken from the past season’s growth and be well matured and firm. Do not use shoots formed late in the season, as they are poorly hardened; such shoots will have an off-white to brown pithy interior and are often shriveled at their tips. Also avoid highly branched shoots and those with flower buds. The optimum diameter for cuttings is ¼ inch. Cuttings of smaller diameter are easier to root, but the resulting plants need more time to establish themselves.

Cuttings are generally made 4 inches long (about 4 buds). The length of the cutting can be shortened when wood is scarce, but more attention must be paid to environmental conditions because less food reserves are available.

When making cuttings, avoid bruising or crushing of the tissue. The best-suited tools are a band saw, sharp knife or properly adjusted pruning shears. Ordinary pruning shears are likely to injure the cuttings, and therefore their blade must be thinned and sharpened, with a wooden bumper placed on the other jaw to avoid damage. Cuttings should be made in a draft-free area and placed immediately into moist sphagnum to avoid desiccation.

Percent rooting has been shown to decrease progressively as cuttings get closer to flower buds. The best rooting response is seen when the distal (top) cut is made directly above the highest bud and a slant cut is made just below the lowest bud. However, since bud orientation may be impractical on a large scale due to the extra amount of time involved, a band saw can be used to cut several whips simultaneously with only a nominal loss in rooting efficiency.

To make planting easier, cuttings can be bunched into groups of 50 with all their butts pointing in the same direction. If the cuttings are to be planted within a week to ten days, they can be stored upright in trays at 35 to 40°F in a ventilated area with moist sphagnum around the base of the bundles. For longer periods, the cuttings should be stored without sphagnum in polyethylene bags with all the air squeezed out. However, it is best if they are not kept longer than 3 weeks. Fungicide dips in weak solution can be used before storage to lower the chances of mold and blackening of the cuttings.

Rooting medium—Pure ground peat is generally used in Michigan for propagation. Mixtures of peat, sand and *Perlite* can also be used, but some varieties like *Bluecrop* root best in pure peat. The rooting medium should be soaked for 3 to 4 hours before planting to insure uniform moisture distribution. The medium should be at least 4



Figure 2. Examples of desirable and undesirable shoots for cuttings: A) poor shoot with external symptoms of winter injury; B) undesirable shoot with internal symptoms of winter injury; C) poor shoot with flower buds and D) healthy shoot ideal for propagation.

inches deep. Do not pack or firm the peat mixture before planting.

Planting cuttings—Planting is usually begun the middle of April in Michigan, or when the threat of severe freezing is over. Cuttings are generally pushed vertically into the medium until only their top buds are exposed and they are set 2 inches apart. The butts of cuttings should not be allowed to rest on the bottom of frames; if the frames are shallow, cuttings must be placed on a slant in the rooting medium, leaving one third of the wood exposed.

Blueberry cuttings take from 3 to 4 months to root. One to two weeks after planting, buds swell and shoot formation occurs. The cuttings will not grow after this initial surge until they begin to root; this occurs about the same time that the tip buds begin to green (mid-July in Michigan).

Watering—In relatively airtight propagation boxes, the glass sash should be propped up $\frac{1}{4}$ inch until rooting takes place. However, the propagation medium should be examined each day for moisture; when water can be squeezed out of the medium with moderate pressure between thumb and forefinger, moisture is adequate. When water is needed, it should be sprinkled over the cuttings in the morning before the heat of the day.

Cuttings are generally irrigated in the greenhouse with an intermittent mist. Water should be misted over the plants for 6 to 8 seconds in 3- to 5-minute intervals, with the lower rates being used on cooler, cloudy days. The system should be run from 10 a.m. to 5 p.m. each day until the plants root and 2 hours less after rooting. The plants can also be sprinkle-irrigated after they have rooted. The soil should be checked periodically to make sure that it has not become waterlogged; if it has, the amount of water applied should be decreased.

Sanitation—Loss from fungal infections can be severe if continuous sanitation procedures are not practiced. When propagation frames are checked for moisture, all the leaf litter that has fallen onto the soil and any cuttings that show signs of disease should be removed.

Several steps can be taken if fungal infections become established. Increase ventilation in sash systems, and reduce flow rates in intermittent mist systems (as long as wilting does not occur). Apply fungicides at weekly intervals, using soil drenches. Fungicides can injure plants if conditions become hot and humid, so apply these materials early in the morning, and rinse the leaves of cuttings with clean water to cut down on harmful residues.

Fertilization—Serious injury or death of the cuttings can occur when fertilizers of any kind are mixed into the planting medium. Do not start fertilization until the cuttings are well rooted.

Ammonium sulfate is commonly used for fertilization at a rate of 1 ounce per gallon of water, although any fertilizer containing nitrogen in the ammonium form can be applied. One gallon is sufficient for a 6- × 3-foot propaga-

tion frame, and it should be added only once or twice a year. No fertilizer should be applied after mid-August to insure that the plants properly harden off in the fall. As with the fungicide drenches, leaf injury can be avoided by washing the leaves with clear water after fertilization.

Storage of rooted cuttings over winter—Cuttings need to be gradually exposed to the natural environment. After they have rooted in propagation boxes, the sash should be raised slightly each day for 1 to 2 weeks until the cover is totally removed. The shading material should be left on until September to avoid burning and scorching of the leaves, but it must be removed in September to facilitate hardening off. Greenhouse temperatures should also be allowed to drop gradually. This can be accomplished in permanent houses by opening vents; in polyethylene houses by removing the plastic as it begins to deteriorate in August.

Rooted cuttings can be overwintered in the propagation boxes and greenhouses, or they can be placed in cold storage after they have hardened off (late October to early November). Bare-rooted cuttings should be stored in plastic bags or in boxes lined with sphagnum moss at 32 to 40°F. When the plants are left in the boxes or greenhouses, they must not be allowed to dry out. Soil should be banked on the sides of propagation boxes to prevent bottom ventilation and excessive freezing.

Planting and care in a nursery—Rooted cuttings are generally planted in the nursery in mid-April or just before bud break. They should be set in rows at least 18 inches apart, depending on the method of cultivation and individual equipment sizes. Within-row spacings should be 6 to 10 inches.

The cuttings should be side dressed with fertilizer 2 to 3 weeks after planting. A 1-1-1 or 2-1-1 ratio fertilizer is generally used at a rate of about 1 to 1½ ounces actual nitrogen per 100 square feet. A second application at a similar rate is sometimes made in July if it appears needed. The fertilizer must not be applied when the leaves are wet or they can be burned.

Clean cultivation is suggested, with a cover crop of oats planted in early fall. Irrigation is recommended during drought periods, since blueberries require an adequate supply of water for normal development.

Propagation stock—Cuttings are usually taken from producing fields. This procedure is adequate, but it does result in a loss of fruit production. A "Mother block system" can also be employed where plants are spaced 12 inches apart both within and between rows. The plants should be allowed to grow for 3 years, and then all new growth can be removed for propagation each subsequent year. Diseases are more effectively controlled in this system, but higher rates of nitrogen may be needed. This system has worked well in other states on an experimental basis, but it has not been employed commercially in Michigan. It is recommended for trial here on a limited scale.

S OFTWOOD CUTTINGS

Softwood cuttings should be taken during the growing season before flower buds form. Actively growing shoots are generally used that are 6 to 8 inches long. Longer shoots can be used, but their bases are generally too old to root well. The upper, soft portion of the lateral should be removed so that a 5-inch cutting remains. Two or three

basal leaves should be stripped off, and the cutting should be inserted upright into the propagation medium to about half its length. The same propagation frames and rooting media can be used as for hardwood cuttings, but ventilation is even more critical; air flow should be great enough to keep water from condensing on plants but not too great to cause wilting. Shading is also critical, as serious problems can occur on partly cloudy days when the sun suddenly emerges and rapidly heats up the plants. If this happens, increase ventilation and shading. Outside of these procedures, the same directions apply for both softwood and hardwood cuttings.

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