Berry Best Practices

Berry crop culture from fields to greenhouses.

by **SUSAN PARENT**

North American berry growers who produce mainly strawberries, blueberries and raspberries in field soil have been confronted with a lot of changes in the past few years. The reduction of registered fungicides and other chemicals are making it more difficult to grow in field soil. In addition, limited land for expansion, limited worker availability and climatic stresses have growers seeking opportunities to use new technologies for above-ground production of berries in greenhouses or high tunnel structures.

In European countries like the Netherlands, Belgium and France, growers have been converting berry production acreage from field to greenhouse for many years. For example, in the past 12 years, the Netherlands has increased its above-ground production of strawberries in greenhouse by 100%. As of 2018, 30% of all strawberries produced in the Netherlands were grown above-ground in greenhouses. In Japan, berries have been grown in greenhouses for many years to supply the off-season market when field-grown berry plants are no longer in production.

In Québec, Canada, greenhouse strawberry yield per square foot has increased 124% over field-grown, hilled strawberry crops. In 2020, 40% of the raspberry production in Québec will be grown above-ground, in high tunnel or in greenhouse structures.

GROWING MEDIA

Berry crops grown in greenhouse structures or high tunnels are produced in soilless media, which need to have good air porosity, good drainage and moderate water retention. The growing medium must not compact over time, causing root asphyxia, and it needs to be compatible with drippers or drip tapes. Equipment is needed for continuous monitoring of the EC and pH of the fertigation solution applied to the crop.

No matter what berry species is grown, there are generally two steps in the plant production: the young plant propagation step, which consists of rooting and initial growth, and the growth of the crop bearing fruit.

Strawberry runners rooted and ready for planting.
Source: Premier Tech.

STRAWBERRY

Strawberries fall into two main genetic groups: June-bearing are long-day dependent for fruit production and are the most popular for field production. Day neutral, or ever-bearing strawberries, aren't daylength dependent for fruit production. They're the main type used for above-ground growing in high tunnels and greenhouses.

Ever-bearing strawberries are grown for one production season and then discarded along with the growing medium. In North America, ever-bearing strawberries are becoming more common in the grocery stores after the June-bearing strawberries are no longer producing.

Propagation: Strawberries produce runners that are harvested in the fall and stored during the winter in refrigerated chambers. In the spring, the runners are then rooted and grown in trays or plugs. In some cases, the summer runners are grown in trays to use the following year.

Production: In northern environments, rooted plugs are planted above-ground after the risk of frost and harvest occurs from July to October. In the south, rooted plugs are planted in the fall after the hot summer, and strawberries are harvested in the fall and winter months.

Growing media: Growing media requirements are similar for both propagation and production of strawberries, however, the growing medium needs to be coarser (with the addition of bark or coarse coir) when growing in the larger containers to encourage faster drydown and reduce root diseases. The growing medium pH should be 6.0 to 6.5 during the crop cycle and EC must be no higher than 1.5 mmhos/cm. Generally, plants and the growing medium are used only for a single harvest season.

RASPBERRY OR CANEBERRY

Traditionally, raspberry plants have a two-phase cycle—the first year they produce vegetative canes (called primocanes) and the second year these canes produce fruit (called floricanes). Years ago, raspberries were grown in outdoor soil and fruit was harvested the second year after planting. Recent developments in plant genetics have generated plant varieties that produce long canes. Long-cane raspberries will produce fruit on the tips of first-year primocanes in summer/early fall. Long-cane raspberry plants are well adapted for above-ground production because fruit is produced higher in the plant for easier picking.

Propagation: Propagation of long-cane raspberries starts in smaller containers, like in a nursery. They're rooted and grown for vegetative growth for the first year, but aren't pruned before they're placed in cold storage over winter. The following spring, the meter-tall (3-ft.)

plants are transplanted in bigger containers to be grown vertically so berries are easily harvested. These plants can be reused for a second vegetative and fruit-bearing cycle.

Growing media: Growing media for raspberries must have good air porosity and support plants through the overwintering process. Coir-based growing media are often used, but 100% coir growing media are losing favor because coir blocks need to be decompressed, the coir must be washed to remove salts and must provide up to a 30% leaching (by container volume) at each irrigation to reduce salt buildup. Growers have concerns about all the leachate produced, and the loss of water and fertilizers. As a result, sphagnum peat-coir growing media are gaining interest in North America since they don't require preparation before use and there's less need for leaching.

Like strawberries, raspberries prefer a pH range of 6.0 to 6.5 and they aren't tolerant of high EC, so EC should stay at or below 1.5 mmhos/cm.

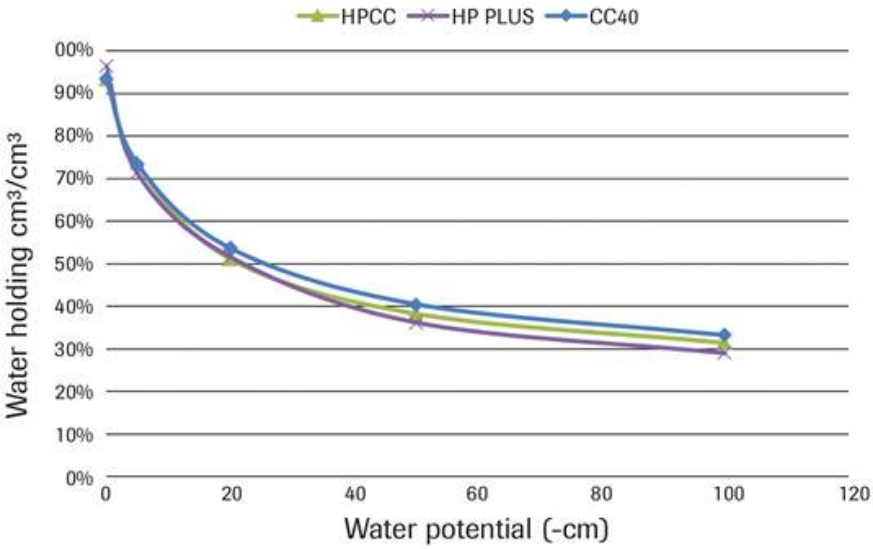
BLUEBERRY

Traditionally, blueberries were grown in their native acidic heathlands in northern North America. For several decades, these wild varieties (low-bush varieties) have been gradually replaced by high-bush blueberry varieties. Like with the other berries, blueberry production is dependent on weather and land availability. In recent years, there's been significant interest in producing above-ground blueberries in high tunnels in certain southern U.S. states and in Mexico.

Propagation: Propagation of the high-bush blueberries can start with tissue-cultured plants or cuttings taken from mother plants. Cuttings and tissue-cultured plants are rooted and grown in small containers for a year. The following year they're transplanted into larger containers and are then used for fruit production. Most of this above-ground production is occurring in southern North America, but few high tunnel structures are being used.

Growing media: The growing medium used for blueberries must have a low pH of 4.5 to 5.0. Sphagnum peat moss naturally has a low pH of 3.8 to 4.2, so when mixed with coir or bark it provides the ideal pH. In fact, sphagnum peat-coir growing media are used successfully in Mexico. Because blueberries are grown for many years in the same container, the growing medium must be able to maintain its structure for good air porosity and water retention for the duration of the crop cycle.

In conclusion, growing media selected for above-ground culture of strawberries, raspberries and blueberries in a high tunnel or greenhouse can have similar physical characteristics. Growing media should provide good air porosity for drainage and adequate water retention, as illustrated in Table 1.



This figure illustrates the typical water desorption curve for Albion strawberries grown in 2 peat-coir media, PRO-MIX HPCC and PRO-MIX CC40, compared to a peat-perlite growing medium, PRO-MIX HP PLUS (MYCORRHIZAE + BIOFUNGICIDE). This figure illustrates the rapid drainage of these media due to the steep drop in water holding from saturation (0 water potential), but the curves begin to stabilize at -20 water potential, which means the growing media retained enough water.

Fruit-bearing strawberries in above-ground containers in a high tunnel.

However, these crops do have different pH requirements: 6.0 to 6.5 for strawberries and raspberries, and 4.5 to 5.0 for blueberries.

Not all berry farmers are interested in changing their practices to above-ground growing. However certain parts of North America are more inclined to make this investment where climatic stresses are prevalent, excess heat or unexpected frosts occur, and less land is available for field production.

References: www.cbs.nl/en-gb/news/2017/31/fewer-growers-produce-more-strawberries; Jacques Painchaud, Aboveground strawberry production, is it for you? Presented at the conference on diversification in horticulture. Ministry Agriculture, Fisheries & Food Quebec (MAPAQ) February 17, 2016; Guy Pouliot, Raspberry above-ground statistics, Presented at the information day on berries in Levis Québec, Feb 28, 2019.

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