e-GRO Edible Alert

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Is containerized blackberry production ready for prime time?

Blackberries and other small fruits are increasingly being grown in soilless substrate and containers versus field soil. Growing small fruit crops in containers requires additional capital and effort compared to field production, but has some potential benefits. Potential benefits can include earlier and more consistent yields as well as greater nutrient and water use efficiency. In some scenarios, growers can use soilless and containerized production to extend the growing season and increase labor efficiency during harvest. However, blackberries differ in growth habit and physiology compared to small fruit crops such as blueberry, raspberry, and strawberry, which must be taken into account when considering containerized production.

This e-GRO Edible Alert explains the unique growth habit and physiology of blackberries and why this matters for containerized production. We also describe new research at the University of Arkansas in developing techniques for containerized blackberry production.

Blackberry has a unique growth habit and life cycle

Blackberry is a perennial crop that develops a long-lasting rhizome root system and crown. However, the above-ground cane growth follows a biennial life cycle. In other words, vegetative growth occurs the first year whereas flowering and fruiting occurs the second year. In field conditions, vegetative canes called primocanes (meaning first-year canes) arise from the crown and rhizomes in summer and grow until dormancy is initiated during fall.

The following spring, these same canes are now called floricanes (meaning second-year canes), and develop lateral branches that subsequently flower and fruit. Floricanes senesce after fruit development in late spring and are replaced by new emerging primocanes in summer, and the cycle continues year after year.

The first primocane-fruiting, thornless, and shipping quality blackberry varieties were released by the University of Arkansas Fruit Breeding Program in 2004. These varieties develop fruit on primocanes and therefore do not require the typical dormancy period and winter chilling needed by traditional varieties. However, the primocanes still over-winter after developing fruit during fall, and fruit again on the floricanes the following spring.

Floricane-fruiting varieties tend to be higher yielding. However, primocane-fruiting varieties offer growers the potential to receive a "double crop"—where fruit is harvested each spring on floricanes and each fall on primocanes—which can have market benefits in some locations. Primocane-fruiting varieties can be grown more like an annual in mild climates, such as California, where primocanes are mowed to the ground after fruiting, after which new primocanes emerge to continue fruiting.

Possibilities for containerized blackberries

We can easily look at raspberry, the cool-weather cousin of blackberry, when considering containerized production.

Figure 1. Blackberry fruit from the variety 'Apache', developed by the University of Arkansas fruit breeding program.

Figure 2. Container-grown blackberry plants grown with drip-irrigation. The trough underneath the containers catches leached water and nutrients for recycling.

Figure 3. Root system of a containerized blackberry plant. Square containers are often used to aid in horizontally stacking containers during cold storage.

Figure 4. Raspberry, the cool weather relative of blackberry, grown in containers at a California nursery.

Figure 5. Containerized blackberries grown under high tunnels (plastic removed in this photo) for season extension and for protecting berries from ultra-violet light.

Raspberry production in Europe has switched primarily to soilless substrate and containers, and you would be hard-pressed to find raspberry grown in field soil. This trend is increasing for blackberry as well, and is expanding to North America.

Growers of containerized blackberries use soilless substrates similar to those in floriculture, where common substrate components include sphagnum peat, perlite, coconut coir, and bark. Most crops are watered and fertilized via drip irrigation, with root zone fertility being managed similarly to greenhouse and nursery crops. Crops are typically grown in container sizes up to 30 gallons. Trellising and pruning practices can be similar to those used for field-grown plants, however some growers are experimenting with novel techniques to increase harvesting efficiency.

Our research team at the University of Arkansas is also exploring the potential of blackberry production using “long-cane” techniques in the U.S., which have already been adopted for off-season and high-yield raspberry production in Europe. This technique involves production of canes with flower buds in one season, followed by cold storage and the forcing of canes for berry production the following season. Forcing can be done in a greenhouse, high tunnel, or outdoors, depending on the time of year and geographical location. By varying the time of cold storage, and therefore the time of forcing, the market window can be greatly increased. Canes are trained vertically in relatively small containers to allow for high density cold storage and subsequent forcing, helping maximize space use efficiency and yield.

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We summarized some of the potential benefits as well as considerations of growing blackberry in containers based on our research, evaluation of other small fruit crops grown in containers, and recent discussions with growers and breeders.

Potential benefits:

- Novel trellising and pruning practices for container-grown crops makes for easier harvesting and increased labor efficiency.
- Faster plant growth and establishment in soilless culture results in reduced time between transplant of young plants and high-yielding mature plants.
- Container production makes it easier to capture and recycle leached water and nutrients for improved water/nutrient use efficiency. This is especially important for California and areas where environmental policies heavily influence grower practices.
- Eliminate variability in crop growth caused by non-uniform soil conditions, as well as reduce soilborne disease issues. There is also flexibility to grow plants regardless of soil type and on non-agricultural spaces, such as parking lots.
- Production in protected environments, such as high tunnels or greenhouses, and using “long-cane” techniques can allow growers to produce fruit off-season.

Potential considerations:

- Production costs are greater compared to growing in field soil. Growers must invest in containers, substrate, fertigation equipment, etc. Additional labor or automation may be needed to move and manage containers. For long-cane production, growers may need to invest in cold storage facilities if over-wintering cannot be achieved outdoors.
- It helps if growers have experience in both container production and growing blackberry for harvest. Our experience has been there are several aspects of blackberry production that differ from floriculture and nursery ornamentals.
- Blackberry root systems are more aggressive compared to blueberry, strawberry, and raspberry. Therefore, blackberry may need repotted more frequently to prevent root restriction and stunted growth. However, this has not yet been tested.
- There is little information on best production practices for containerized blackberry production. Also, few varieties have been developed specifically for container production.

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