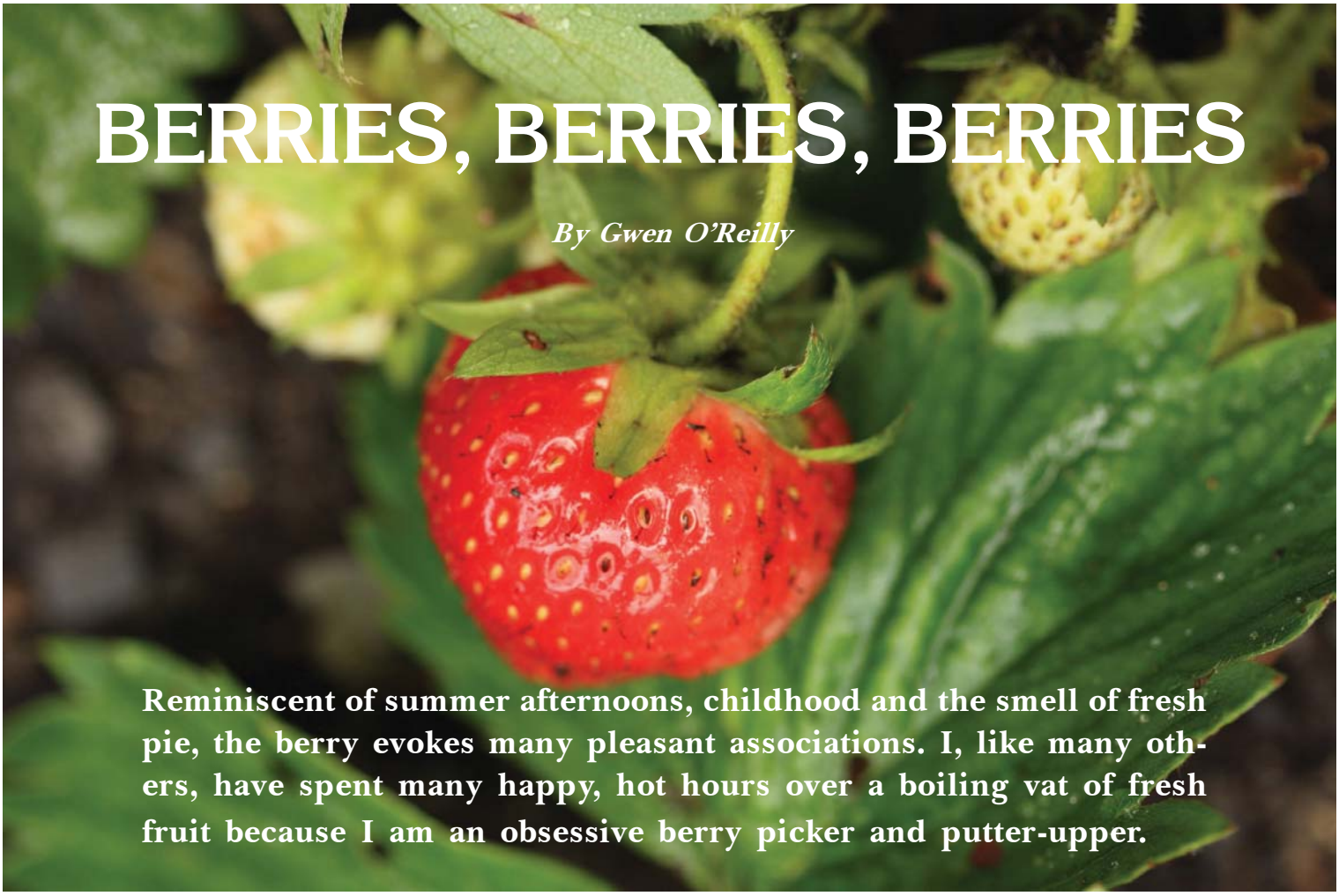

BERRIES, BERRIES, BERRIES

By Gwen O'Reilly

Reminiscent of summer afternoons, childhood and the smell of fresh pie, the berry evokes many pleasant associations. I, like many others, have spent many happy, hot hours over a boiling vat of fresh fruit because I am an obsessive berry picker and putter-upper.

I am not a large-scale organic fruit grower, but if I was, all those happy memories might be overshadowed by an aching back or high labour costs. Fortunately, Organic Science Cluster (OSC) researchers are looking for solutions.

Berry basics

Berry patches need good sun, good drainage and protection from prevailing winds. Adding amendments to a perennial crop after establishment is tricky for many reasons, so it is wise to start with a fertile site with a pH of 6–7 (except for blueberries, which prefer a pH of 4.5–5). If you have less than ideal circumstances, you can improve the conditions by using mulch, raised beds, windbreaks and/or high tunnels.

Most important is adequate spacing and row width that allows for sun penetration and air circulation. Ample spacing helps prevent disease, encourages ripening, and allows for easier weed control and harvesting. When deciding on spacing, think about the width of machinery you will be using for weed control and other practices. Select disease-resistant varieties adapted to your growing and market conditions, and prune, thin or trellis as required.

Weed control can be the biggest headache for organic growers, so it is recommended that you start with a clean site, and use rotation, cultivation and mulching to control weeds. For some crops, such as strawberries, several years of cover crops may be needed to clean out persistent weeds and build a microbially active, fertile soil.

Adequate spacing and row width allows for sun penetration and air circulation.

Cover crops can be grown in alleyways or paths between rows of fruit. The choice of cover crop is critical. Growers must balance nitrogen availability with competition for water and nutrients, and the risk that cover crops will harbour pests and diseases. Dutch white clover, for example, is a low-growing legume that can handle traffic well. It can, however, harbour nematodes and compete with the crop if not well-managed.

Many growers use hoophouses to extend the growing season.

The cover crop can be tilled in to provide organic matter and nutrients to the soil. Or, in the "mow and blow" approach, the cover crop is cut and plant material blown over the root zone in the rows of fruit. With highbush blueberries, researchers found that cover crops improved soil health, but they also reduced crop growth and yield.[1]

High tunnels, hoophouses and other temporary greenhouse structures can be installed over brambles and other berries. They shelter plants from wind, rain and hail, and provide moderate protection from cold temperatures. Hoophouses or tunnels are often covered with a single layer of plastic; side and end walls can be opened to regulate temperature. Tunnels generally require an irrigation system and, in areas with a lot of snow, the plastic needs to be removed for the winter.

The mixed blessings of mulch

Organic fruit growers often rely on mulching for weed control and sometimes fertilization, however mulching can have both positive and negative effects. Mulch can:

- control weeds, but can also contain weed seeds and nourish their growth;
- add (or tie up) nutrients;
- alter pH and nutrient exchange;
- moderate soil temperatures;
- increase (or reduce) microbial activity;
- reduce (or increase) disease and pest problems; and
- maintain moisture levels.

Researchers found that composted ruminant manure improved the growth and yield of highbush blueberries and strawberries to the same degree as chemical fertilizer.[3]

Brambles

Raspberries are red;
others are black;
handpicking either
might break your back.

Bramble fruit, such as raspberries and blackberries, are usually biennial, with each shoot taking two years to produce fruit. The bushes grow from a perennial crown that can live 10–20 years. The first year, raspberry crowns produce vegetative shoots, called primocanes. In the second year, these same shoots produce fruit and are called floricanes which die off at the end of the year. The same crown produces new primocanes each year.

Everbearing varieties produce fruit at the tips of the primocanes late in the first year, then produce fruit on lower parts of the same cane the second year. Floricanes are usually removed at the end of the second season to prevent disease, though some growers suggest leaving them over winter to trap snow and protect the primocanes. Some producers mow alternate rows each year when the canes are dormant, so that rows of smaller primocanes are interspersed with producing floricanes. This allows for more sunlight and air circulation into the orchard.[2]

Raspberries can be established from nursery 'handles' (canes with root), or tissue culture plugs. Plugs are more expensive, but provide uniform growth without the risk of disease. You can also propagate your own raspberries, but you risk spreading disease or pest problems. Sites that have grown other fruits may harbour crown gall infections; those with a history of tomatoes or potatoes might carry Verticillium wilt. Try to keep the patch 300–500 feet away from wild

brambles, as they can harbour pests and disease.

Remove perennial weeds before planting—raspberries do not compete well, particularly in their first year. The second year, growers may establish less-aggressive cover crops, such as white clover, between rows. Narrow rows (1.5-ft. wide) allow for light and air circulation, and easier harvesting. A mulch of woodchips or compost is often used around the base of the canes. Many brambles require trellising, but it is optional with raspberries.

Highbush blueberries.

Remove perennial weeds before planting raspberries.

High tunnels can greatly extend the harvest season at either end for raspberries. OSC researchers found that tunnels increased the length of the growing season by 40 days.[4] Tunnels increase fruit yield and size dramatically compared to field-grown crops, and produce fruit of higher quality and therefore longer shelf life.[5] There is evidence that pest and disease problems are also reduced.[5]

A combination of floricane and primocane bearing varieties can be used in high tunnels, creating a much longer harvest period compared to field-grown crops. Floricanes fruit earlier, and primocanes can provide a late fall crop if growing tips were pinched early in the season. Blackberries, which often do not fruit at all in fields, provide reliable and bountiful crops in high tunnels.[5]

Wild blueberry fields with lupins in the foreground.

Blueberries

Blueberries: You take the highbush and I'll take the lowbush, and I'll be antioxidated before ye.

Blueberries come in two main forms—highbush and lowbush (wild). Canada is the second largest producer of blueberries and cranberries in the world, and the leader in wild blueberries.[6] The growing interest in the nutritional and medicinal benefits of antioxidants in wild blueberries has developed into a significant export market, and demand for organic blueberries is on the rise.

Both types of blueberries need acidic soil with a pH of 4.5–5.0. Cultivation methods are very different, mostly because lowbush blueberries are naturally established stands.

Highbush blueberries

Highbush blueberries are suited to organic production because they

Black currant weed control trial at NSAC.

have low fertility needs; have high yields per plant; and resist many pests. The large berries on erect branches make them easy to harvest and therefore a good candidate for U-Pick operations. However, the cost of establishment is high, and bushes do not reach full production for 4–7 years.[7]

Highbush blueberry plants are often mulched with softwood sawdust, which preserves moisture and creates the acidic conditions they need, but also ties up nitrogen. Composted manure is often too high in pH and salts for blueberries. Canadian researchers experimented with different mulches in highbush blueberries and found the following:

- Composted yard waste seemed to provide an adequate alternative to fertilizer.[8]
- Pine needles suppressed weeds very well, but did not stimulate plant growth.[9]
- Two composts (manure/sawdust and seafood waste) increased crop yield, but led to excessive weed growth.[9]
- The berries' sugar content was higher in the plants mulched with seafood waste compared to those mulched with needles or composted manure.[9]
- Populations of beneficial organisms were higher under organic mulch versus bare soil or plastic, and damaging nematodes were more numerous under plastic mulch.[10]

Lowbush blueberries

Commercial lowbush blueberry production occurs predominantly in the Maritimes. However, in boreal forest regions across the country, the roadside sale of wild blueberries is a subsistence activity for many, including First Nations people. Lowbush species grow closer to the ground, and are comprised of several native species that grow in forest clearings or old fields. They are not planted, but are encouraged through pruning, weed control and fertilization.

To maximize berry harvest, plants are forced into a biennial production cycle by drastic pruning every second year.[11] Commercial-scale pruning is accomplished by flail mowing or burning. Mowing is the cheapest and most common form of weed control. Burning kills competing vegetation, pests and diseases, but can be dangerous and reduce levels of soil organic matter.

Growers must also use a combination of strategies to control weeds, including choosing sites where annual rather than perennial weeds predominate, and inhibiting weed seed production. OSC researchers are currently testing viable weed management systems for organic lowbush blueberries [see page 15].

Strawberries

Strawberries: No shortcuts to shortcake

Organic strawberries are a coveted crop, due in large part to the high levels of pesticide residues commonly found in conventional strawberries. Weeds and disease are the most significant considerations for organic strawberry production, so many organic producers use a much shorter rotation (2–3 years) than conventional growers (5+ years). Incorporating cover crops into crop rotations can:

1) control weeds;
2) enhance fertility; and
3) reduce insect and disease pressure.

Some cover crops, such as marigold, sorghum and brassicas, may also control soilborne diseases and nematodes.[12] [See details on pages 34–35.]

Planting occurs in the spring after the field is well weeded. Some growers dip plant roots in compost tea to protect them against root rot. In the first year, weed con-

Lowbush blueberries.

trol is critical, and blooms are removed to encourage crown development.[12]

Harvest occurs in the second and third year, which means that production occurs for two out of four to five years. Growers usually have at least three sites for strawberry rotation to ensure fruit production each year.[13]

In the traditional matted row system, runners from the original plant establish themselves. In plasticulture, plastic mulch is used over raised beds with open rows between.

Strawberries can be day-neutral (everbearing) or short-day (Junebearing). Short-day varieties develop flower buds the autumn before the production year, and bear fruit over 4–8 weeks. Day-neutral types produce flower buds all season long in their production year, allowing them a much longer harvest.

OSC researchers are developing high tunnel production systems for day-neutral strawberries. Other researchers have found that tunnels protected strawberry crowns in raised beds from winter kill and hastened fruit production by five weeks, compared to field production.[14] Also, plants in the high tunnels had:

- higher yields,
- sweeter fruit, and
- more leaves and branch-crown development than those out of doors, but
- less runner development.

OSC researchers found that plants in high tunnels grow best when provided with the fertilization regimes used in fields compared to greenhouse fertilization rates.[15]

Black currants

Black currants: Fruit or farmaceutical?

Farmers in PEI are attempting to grow organic black currants to supply Japanese and local markets. The high vitamin C and anthocyanin content (a potent antioxidant) of black currants and other fruits have been suggested to ward off cancer and cardiovascular disease, among other ailments.[16, 17] The seeds are also rich in gamma-linoleic acid (GLA), vitamins and minerals, and are purported to have antifungal and antibacterial properties.[17]

Black currants grow 1–2 metres in height, and begin fruiting heavily after four years. They are extremely cold hardy (I can attest to this—they have outlived many apple trees in my zone 2b garden). In fact, it seems that a ***lack*** of winter chilling can result in poor bud development for the next season. They are an alternate host for white pine blister rust, and should not be planted near white pines. The bushes live 15–30 years and most varieties are self-pollinating. Cultivars vary in their concentrations of anthocyanins and resistance to diseases. The type of site, cultivar and timing of harvest can all impact the quality of berries.[18]

Currants are heavy feeders; use a cover crop and incorporate composted manure in the soil before planting.

A cool, moist soil like a clay loam, with a pH of 6–7.5 is ideal. Currants are heavy feeders; growers recommend using a cover crop and incorporating composted manure in the soil before planting. After plants are established, OSC researchers recommend spring and fall nutrient treatments. They used composted poultry manure and crabmeal which produced greater yields than one annual treatment, but the effects varied between sites.[19]

To maintain productivity, prune about a third of the oldest stems every year.

Weed management in black currant plantations is similar to that for highbush blueberries. Some researchers found that landscape fabric controls weeds in black currants, while others suggest that living mulches may be problematic due to competition for nutrients with the crop.[20]

There you have it—a brief overview of the best of organic berry culture. Baskets of these natural confections should be coming soon to an organic market near you, thanks to the hard work of farmers and OSC researchers. For some reason, I am craving toast and jam. I better go check the pantry.

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Photo credits: Laura Telford (pg. 62), Justin Renkema (pg. 64 upper), Janet Wallace (pgs. 63 and 64 lower), Karen Nelson (pg. 65), Scott White (pg. 66)

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