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Growing and Marketing Elderberries in Missouri

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The American elderberry (*Sambucus canadensis*, also known as *Sambucus nigra* subsp. *canadensis*) is native to much of eastern and midwestern North America. The plant is a medium to large multiple-stemmed shrub, bush or small tree (Fig. 1). Elderberry

Figure 1: The American Elderberry plant

is commonly found growing in a range of habitats throughout Missouri, but it prefers moist, well-drained, sunny sites and is often found along roadside ditches and streams. Elderberry is a beautiful plant with showy flat cymes of white flowers in June followed by bright purple to black berries in late summer (Figures 2 and 3). Ornamental forms are important landscape plants, and elderberry has been grown for generations as a backyard fruit. Based on identified market size and demand, opportunities exist to increase both the production and processing of elderberry across the value chain. At present, usage of both fruit and flowers for wine, juice, jelly, colorant and dietary supplement

Figure 2: The blossoms of the American elderberry

products is on the rise. European elderberry (*Sambucus nigra*) is grown as a commercial fruit crop in Europe and elsewhere. The American elderberry, however, appears to be a better candidate for commercial production in Missouri. This guide outlines production practices and market information for American elderberry based on research and growers' experiences in Missouri.

Figure 3: The fruit of the American elderberry

It is important to note that elderberry remains significantly underdeveloped as a commercial crop. Not very much is known about several aspects of elderberry production, including managing elderberry pests and diseases, yield and economic potential, soil fertility management, and productive longevity of elderberry plantings. While elderberry has excellent potential as a viable commercial crop for Missouri, producers must understand that there are inherent risks to growing a novel crop for which all the answers are not known.

Site Selection and Preparation

As might be expected from a species with wide distribution, elderberry thrives on a range of soils. However, soils that are moderately fertile and with adequate surface and internal water drainage are best for commercial production. To increase success when planting on soils with drainage issues, it is recommended that planting rows be formed into "berms" (raised ridges) prior to planting (Fig. 4). Pre-plant soil testing is recommended to evaluate the soil pH and nutrient levels. Adjust pH level to 5.5-6.5, phosphorus level to 50 lbs/acre, and potassium level to 200-300 lbs/acre. Although elderberry tolerates cold temperatures following bud break, it is best to select sites that are elevated relative to surrounding land to reduce the risk of damage from spring frost. Elderberry requires full sun for optimum production. Control problem perennial weeds such as bermuda grass, johnson grass, blackberry and poison ivy before planting elderberry. Establish a non-competitive ground cover in the alleys between rows to facilitate operations in the planting. Elderberry is a freestanding bush and does not need trellising.

Figure 4: A bermed elderberry planting

Cultivar Selection

Several cultivars of American elderberry are commercially available. Most are selections developed in New York and Nova Scotia many decades ago, and virtually all of these cultivars were derived from the same very narrow genetic pool. In general, these northeastern cultivars have not performed as well in Missouri trials compared with more recent selections from the Midwest. Elderberry seedlings are available from the Missouri Department of Conservation State Nursery; these are excellent for wildlife and ecological restoration plantings but are not recommended for commercial fruit production where consistent, high-quality fruit is desired. Wild locally-growing plants that consistently produce abundant fruit may also be worth propagating and evaluating. A portion of the commercial fruit crop, especially in the Midwest, is harvested from wild plants; however, fruit quality is variable.

Elderberry cultivars tested in Missouri

Missouri cultivars (University of Missouri/Missouri State University)

'Bob Gordon' (*2011). Selected from the wild near Osceola, MO. Produces large clusters of berries on first year shoots, as well as smaller clusters on older shoots. Medium to large berries. Ripens with Adams 2. Tends to have pendulous cymes that resist bird predation. This cultivar has performed well for Missouri producers.

'Wyldewood' (*2010). Selected from the wild near Eufaula, OK. Produces large clusters of berries on first year shoots, as well as smaller clusters on older shoots. This is a large, vigorous, upright shrub. Medium to large berries. Ripens 7-10 days later than Adams 2. Wyldewood is a productive cultivar for the Midwest.

New York cultivars (New York Agriculture Experiment Station)

'Adams 1' and 'Adams 2' (*1926). Selected from the wild in New York. Medium berries, with Adams 2 berries slightly smaller but more productive than Adams 1.

'York' (*1964). Cross of Adams 2 and Ezyoff. Produces the largest berries among American cultivars. Ripens earlier than Adams 2 in Missouri.

Nova Scotia cultivars (Kentville Research Station, Nova Scotia)

'Johns' (*1954). Long grown in northeastern US. Medium to large berries, several days earlier than Adams.

'Kent' (*1957). Seedling of Adams 1. Medium to large berries. Ripens 7-10 days earlier than Adams 2.

'Nova' (*1959). Seedling of Adams 2. Medium to large berries. Berries sweeter than Kent or Victoria. Ripens earlier than Adams 2.

'Scotia' (*1959). Seedling of Adams 2. Medium to large berries. Berries sweeter than Kent or Victoria.

'Victoria' (*1957). Seedling of Adams 2. Medium to large berries. Ripens 3-6 days earlier than Adams 2.

**year cultivar released*

In addition to cultivars derived from the American elderberry, the European elderberry may also offer potential for production. However, trials in Missouri have indicated that European elderberry may not be as well-adapted to midwestern environmental conditions as American elderberry.

Propagation

Elderberries may be propagated by several means. Rooting dormant hardwood cuttings is a relatively easy and cost-efficient method for propagating large numbers of plants (Fig. 5). Collect vigorous, 2-4 node cuttings from the previous season's growth before budbreak, which typically occurs by early February. Be sure that the cuttings are not cold-damaged and are free of defects. Cuttings may be rooted immediately or stored under refrigeration for 4-6 weeks for later rooting. A dip of the basal end of the cutting in a commercial rooting powder (0.1% IBA) may increase rooting. Place the basal node(s) below the surface of a well-drained soil or sterilized commercial potting medium. Keep cuttings warm and moist but not wet. The cuttings will usually break bud and begin growing several weeks before rooting, but they should be well-rooted within six weeks.

Figure 5: Hardwood cuttings in individual containers

Sprouted hardwood cuttings and softwood cuttings are easily rooted, provided high humidity is maintained around the cuttings until rooted. An intermittent mist system works well. A rooting hormone dip may be beneficial. Cuttings of 2-3 nodes root well. Remove a portion of the foliage to keep cuttings from wilting; leaving only the 2 basal leaflets of each compound leaf usually works well. Softwood cuttings typically root well until about July 1; rooting percentage drops as the summer progresses.

Root cuttings (pencil diameter or slightly smaller, 4-6 inches long) may be dug in late February before growth begins (Fig. 6). The root cuttings are placed horizontally in a flat or pot, covered with ¾ to 1 inch of a light soil or soilless medium and kept warm and moist. Often, a single root cutting will produce 2-3 plants.

Figure 6: Elderberry root cuttings

Elderberry may also be propagated from seed. Caution: seedling plants will exhibit variability in yield, fruit quality and plant performance. Seeds should be cleaned upon harvest and require stratification (winter treatment) before they will germinate. Planting the seeds directly outside in fall, either in pots or in a nursery bed, works well. Keep evenly moist over winter, and they should germinate in late spring.

Establishment

Elderberry plantings are commonly established using either dormant, bare root one-year plants dug from a nursery or recently propagated container-grown plants. Dormant plants may be planted in early spring. Actively growing greenhouse plants should not be planted in the field until late April or early May, after the risk of frost has passed. Plantings are best established before temperatures warm in late May. Elderberry plantings may also be established by placing unrooted dormant hardwood cuttings directly in the field in early spring; however, rooting and survival can be erratic and this method of establishment is generally not recommended.

Planting rows are typically spaced 10-12 feet apart, with plants spaced 4 feet apart in the planting row. Within two to three years, the rows will be completely filled in as shoots develop from the rapidly-spreading elderberry root systems. Remove all flowers during the establishment year to prevent fruit development and to encourage development of roots and structure. A partial crop can be expected the year after planting if plants are vigorous and healthy, with a full crop expected in three years. Elderberry plants will likely remain productive for at least five years, but the full productive life of an elderberry planting is not known.

Fertility Management

Research is underway to investigate elderberry fertility management. Proper pre-plant site preparation should eliminate the need for all nutrients except nitrogen the first year. Do not apply nitrogen at planting time; a light application (no more than 10 lbs per acre) of nitrogen may be made 4-8 weeks after planting. Mature bearing elderberry plantings benefit from 60-80 pounds of nitrogen per acre annually, applied as growth begins in late March to early April. Additional nutrients, such as phosphorus and potassium, are applied in later years as indicated by soil test results.

Pruning

American elderberries produce fruit on stems that are one year old and older, and many cultivars also produce fruit on new shoots that develop from the crown or root system that same summer. A number of pruning options are available for elderberry depending on the producer's goals and resources. A systematic pruning management program can provide flexibility and precision in managing an elderberry fruit crop and can have a significant impact on factors such as harvest timing and labor. In Missouri, pruning should be done in January or early February, well before bud-break.

Elderberries are not absolutely dependent on pruning (as are many fruit crops) and can be left un-pruned occasionally with the expectation of an acceptable fruit crop for backyard producers. However, for commercial production, it is recommended to prune elderberry bushes each winter to keep them healthy, vigorous and productive. A standard horticultural pruning involves removal of all dead, diseased or damaged stems, removal of most 3-year-old and older wood, and tipping back weak canes to strong wood. This method works well for elderberry in most situations.

Many American elderberry cultivars also perform well if pruned completely to the ground in winter. This task can be accomplished quickly and efficiently using mechanized equipment such as a sickle-bar cutter rather than pruning one plant at a time by hand. This pruning strategy forces all flowers and fruit to be produced on similarly aged and similarly sized stems rather than on both old and new stems at various times and positions on the bush. Further, pruning to the ground usually results in the production of fewer but larger fruiting cymes, a more uniform fruit ripening, and a narrowing of the harvest window; all of these factors may lead to greater efficiencies in the orchard and processing facilities. Pruning all stems to the ground in winter may also have the added benefit of removing over-wintering insect eggs, pests, and disease inoculum from the orchard if the pruned stems are collected and destroyed. It must be noted that most European elderberry and some American elderberry cultivars may not be amenable to this pruning method because they are not consistently fruitful on new wood. Research has shown that this pruning strategy may slightly reduce overall fruit yield compared with the general horticultural pruning method described above; however, most commercial producers are willing to accept a reduced yield in exchange for significantly improved pruning and harvest efficiency.[16] Other producers, however, may prefer a slightly larger potential yield paired with a longer, more gradual harvest period based on the availability of labor and storage/processing resources, choosing instead the more traditional horticultural pruning method.

Irrigation

Elderberries are not drought tolerant and require 1-2 inches of water per week for optimum growth and fruit development. The fruit ripens in the heat of summer, and adequate water must be available at that time to produce high quality, marketable fruit. Drip or trickle irrigation is commonly used to irrigate elderberry. Irrigation systems using 0.5 inch plastic lines with inline emitters spaced at 18-24 inches are typical. Mulching helps conserve soil moisture and reduces weed competition. Mulches, however, must allow for the annual growth of new shoots from the roots and crown.

Pollination

The pollination of elderberries is not well-understood. They are believed to be primarily wind pollinated with some assistance from insects. Honey bees are rarely seen foraging among elder flowers. Elderberries are thought to be partially self-fruitful; however, research in New York suggests that cross-pollination is required.[7] Therefore, more than one cultivar will likely result in better pollination in commercial plantings. Designing plantings to take advantage of prevailing winds to assist pollination may be considered.

Pest Management

While elderberries are relatively pest resistant, several potential problems are present in Missouri that may impact commercial production. Pest management strategies should emphasize sanitation, weed control, removal and destruction of prunings, and elimination of wild elderberry plants in the vicinity of production fields. If indicated by pest monitoring, a preventative spray program for elderberry pests should be considered. While a limited number of pesticides are labeled for elderberry, little research has been conducted to determine these products' efficacy in managing elderberry pests. Consult labels for up-to-date information on legal insecticide, fungicide, and herbicide use on elderberry. Cornell University maintains a website listing pesticides labeled for

elderberry; see the reference list at the end of this guide for more information. American elderberry may be a good candidate for organic production provided very diligent pest and disease monitoring and control measures are employed.

Eriophyid mites are microscopic pests that cause cupping and crinkling of the foliage (Fig. 7) and can destroy florets and young fruit in severe infestations. Little is currently know about this pest, including its species, life cycle, and how best to control or manage it. Eriophyid mites are believed to overwinter under buds and bud scales on above-ground portions of the plant and are therefore easily and unknowingly spread by transporting dormant cuttings for propagation.

Figure 7: Foliar injury from eriophyid mite

Japanese beetles (*Popillia japonica*) feed on foliage, blossoms and developing fruit in mid-summer and can cause severe economic damage if large populations are allowed to develop (Fig. 8). Fortunately, elderberry is not their favorite food, although they will readily eat it. Therefore, if the beetles are controlled at the first sign of infestations, subsequent groups of beetles will likely move to more preferred crops.

Figure 8: Japanese beetle adults and feeding injury

The larvae of the elderberry sawfly (*Tenthrado grandis*) can quickly defoliate elderberry plants in late spring (Fig. 9). While they tend to leave developing flowers undisturbed, they can also damage flowers in severe cases. Producers must understand that this pest is not a true caterpillar; therefore, certain common control measures for moth and butterfly caterpillars are ineffective against it.

Figure 9: The larva of the elderberry sawfly

Elderberry longhorn beetles, also known as elder borers (*Desmocerus palliatus*), feed on foliage and flowers as adults (Fig. 10) and bore into the stems and roots as larvae. This boring may cause weakness, breakage or death of stems. These beetles are often present in elderberry orchards in early summer, but not usually in economically significant numbers. Hand removal of the adults may be an effective control measure in small plantings. Economic threshold numbers are unknown for elder borer; however, commercial producers should carefully monitor populations and be prepared to control them if damage is significant.

Figure 10: Elderberry longhorn beetle adult

Other insect pests in elderberry include the larvae of fall webworms (*Hyphantria cunea*) and cecropia moth (*Hyalophora cecropia*), both of which may defoliate plants, and aphids. The currant borer, a clearwing moth (*Ramosia tipuliformis* or *Synanthedon tipuliformis*), and elder shoot borer (*Achatodes zeae*) have also been documented as damaging elderberries but have not been associated with severe economic damage in Missouri.

A bacterial leaf spot disease tentatively identified as *Pseudomonas viridiflava* (Fig. 11) has caused economic damage to elderberry in Missouri. Little is known about this disease or how to manage it.

Figure 11: Bacterial spot on elderberry foliage

An elderberry rust disease identified as *Puccinia bolleyana* can cause economic damage (Fig. 12). In minor infections, galls should be pruned out and destroyed; more aggressive control measures may be necessary in severe cases. Sedges are the alternate host of this fungus; however, it is unknown if destroying sedges in the vicinity of elderberry plantings may be helpful.

Figure 12: Elderberry rust on leaf blade (l) and petiole

Several viruses have been identified in elderberry. The tomato ring spot virus has been associated with severe decline of plants in New York, but the impact of this and other viruses in Missouri is unknown. Research is underway to better understand viruses associated with elderberries.

Birds of several species will feed on elderberry fruit and can cause significant crop losses; those selections with pendulous (down-hanging) cymes appear to be less attractive to birds. Netting or scare tactics can help protect the elderberry crop from bird depredation.

Weed Management

Elderberries present challenges relative to weed control. The plants are multi-stemmed, and new shoots arise annually from the crown and roots, leading to problems related to herbicide use. In particular, non-selective post-emergent herbicides must be used with caution. Annual weeds may be managed with a combination of mulching, hand weeding and herbicides. Perennial weeds can become a persistent challenge with elderberry, and growers must practice regular removal of weeds at an early stage of development. Several herbicides are presently labeled for elderberry; consult labels for up-to-date information on herbicide use on elderberry.

Harvest and Postharvest Handling

Elderberry blossoming takes place in June in Missouri, and flowering cymes harvested for fresh use or drying are clipped when all flowers are open (Fig. 13). Individual flowers are easily removed from the cyme by rubbing over screens. The flowers may then be dried or frozen for future use.

Figure 13: Harvest elderberry blossoms when all flowers are open

Elderberry fruit harvest takes place in late July, August and early September. At present, the Missouri elderberry crop is harvested by hand. Entire cymes are clipped and harvested when all berries are fully colored (Fig. 14). The cymes on the current season's shoots ripen several days later than cymes on older wood. Plants that were pruned to the ground the previous winter will usually ripen fruit over 2 to 3 weeks, whereas plants with shoots

Figure 14: Elderberry fruit are harvested when all berries in the cyme are fully colored

of mixed age will ripen over a 3 to 4 week period. Harvest plants at weekly intervals. Harvest early in the day for best fruit quality. CAUTION: Be careful when picking elderberries from the wild, as the railroad and road crews often spray just before they are ready for harvest. Yields may range from 2 to 4 tons per acre for mature bearing plantings, though higher yields have been recorded. Harvested fruit is highly perishable; refrigerate at 32-40°F as soon as possible after harvest. Fresh individual berries are difficult to separate from the cyme without tearing and loss of juice. Whole cymes may be frozen, and individual berries separated from the stems by hand shattering or by placing the frozen cymes in a fruit de-stemmer. Berries may be stored frozen for a few months before processing; however, research has shown that the health-giving anthocyanins (purple pigments) in elderberry are fragile and easily destroyed by long-term storage, repeated freezing and thawing cycles, and over-processing, resulting in brown fruit (and brown products) with reduced health benefits.

The harvest of fruit for specific purposes, such as winemaking or for dietary supplements, may be scheduled based on fruit quality parameters; however, little research has been conducted to determine ideal juice characteristics for specific products. Typical elderberry juice characteristics include total soluble solids levels of 11-12°Brix, juice pH of 4.5-5.0, and juice titratable acidity in terms of malic acid of 0.60-0.70 g/100 ml.

Marketing

In contrast to Europe, elderberry is neither well known nor widely utilized in the U.S. To date, there have been few studies published on the U.S. elderberry market, and this is especially true for the specialty food and wine market.[5, 13] Recent market reports suggest that elderberry sales are subject to wide swings based on current issues.[1] Market research at the University of Missouri demonstrates that the elderberry industry has high growth potential and is presently dominated by small scale producers, with the exception of a few large-scale entrepreneurs and innovators.[5]

Existing elderberry producers have focused their efforts on introducing elderberry and its uses to consumers, creating awareness about the products and the industry. The industry is vertically integrated. Most players participate in multiple stages of the value chain (Fig. 15): propagate their own plants, grow elderberry, and produce some value-added products (wine, juice or jelly).

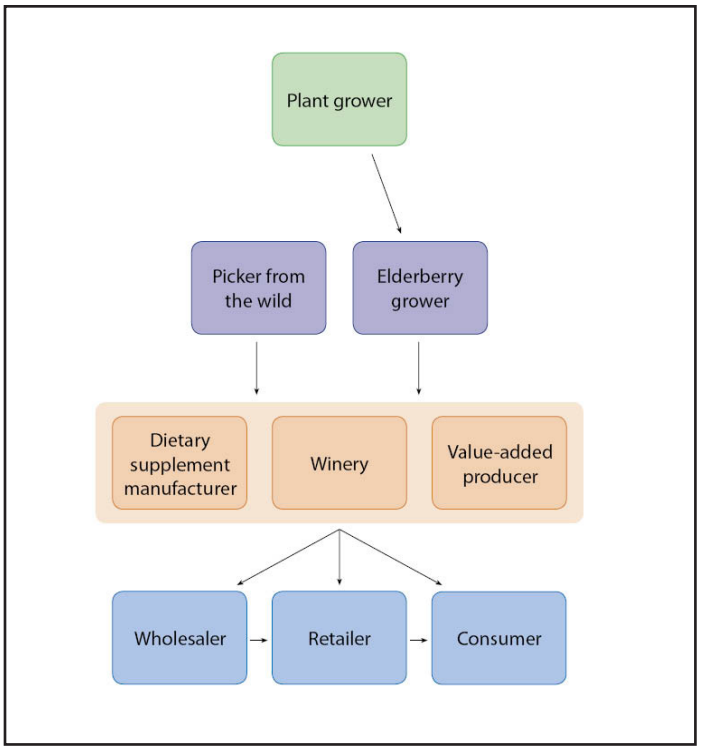

Figure 15: The elderberry value chain

A lack of mechanized harvest equipment results in a labor intensive process. Limited industry-wide quality standards create challenges for both growers and value-added producers. The supply of American elderberry is limited, and processors have faced supply shortages, although this is changing rapidly with a large increase in acreage over the past 3 years and additional acreage coming on line. Some value-added producers produce their own fruit; others rely on imported concentrate and/or pay a higher price to obtain a local supply.

Import prices have increased over the past few years, and imported concentrate is becoming harder to obtain. Following national trends, locally produced elderberries are preferred over imports. Additional plant and fruit supply is needed for the existing industry players to operate at full capacity and grow.

Products Sold

A variety of elderberry products are created and sold in the U.S.: seeds, cuttings, plants in pots, fresh and frozen elderberries, dried flowers, wine, juice, concentrate, extract, syrup, jelly, jam, food colorants, vinegar, fudge, barbeque sauces, salad dressing, carbonated beverages, cordials, juice blends, yogurt and pie.

Fresh or frozen elderberries are sold through different outlets for various uses: to wineries for winemaking, in farmers markets or online to individuals, and to dietary supplement manufacturers. Wine is sold primarily at wineries and retail outlets. Because the wine industry is tightly regulated, most elderberry wine is sold inside the state borders. Demand for elderberry wine is increasing, driven by increased consumer interest in personal health. The Internet is helping increase sales. Elderberry value-added products are sold directly to consumers and to wholesale outlets and health food stores. Sales are primarily local. Dietary supplements are mostly sold nationwide, direct to health food stores and to health food store distributors.

Some examples of prices received by survey respondents are provided in Figure 16.[5]

Product	Sale Price
Cuttings	$1-2.50 each
Plants	$5.00 ea., 6 for $25.00
Fresh Berries	$0.50/lb (with stems) to winery
	$1.25/lb pick your own
	$3.00/lb de-stemmed for pie-making
	$5.00/lb to winery (de-stemmed)
	$11.00/lb to dietary supplement manufacturers
Wine	$10-14 per bottle
Juice	$12-17 per 11 oz. bottle retail
Concentrate	$25 per 375 ml bottle retail

Figure 16: Elderberry products and sale prices

Demand Trends

While elderberry is a new product on the market, it has a long history and tradition. It has been used for centuries as a natural remedy and to improve the taste of grape wine. Memories of grandpa's elderberry wine or grandma's elderberry pie are unique to elderberry. Current demand trends are favorable (Fig. 17).[5] Wineries are seeking more local supply. Chefs are increasingly interested in elderberries. The health properties of elderberries attract customers. Organic and locally grown foods are perceived by consumers as healthier and safer for both people and the environment. There are many substitutes for elderberry and elderberry products. However, elderberry has distinctive properties that put it in a class by itself.[5] Even without FDA-approved medical claims, people perceive elderberry's unique health benefits. Flavor and taste also differentiate elderberry from similar products. Respondents describe the flavor of elderberry wine as complex and rich with a finish that provides a unique flavor.

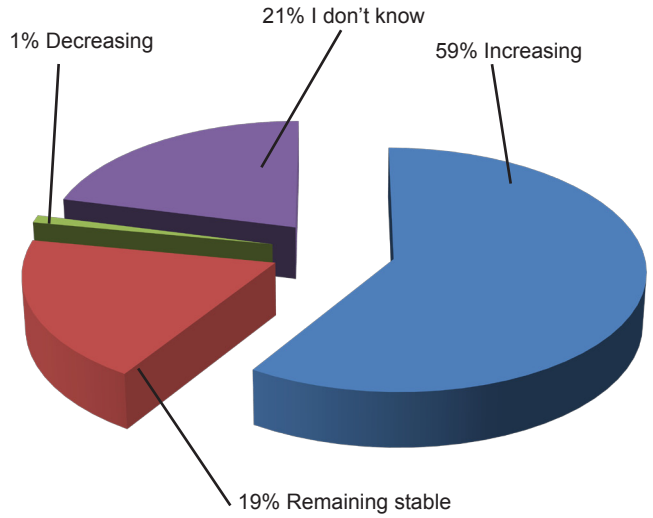

Figure 17: Estimated demand for elderberry over the next five years (survey results from 74 respondents)

Consumer Research

In a 2011 study of elderberry juice and jelly products, 1,043 households were surveyed throughout the United States.[13] Results show one-third of respondents to be familiar with elderberry. The most commonly purchased elderberry products were juice, jelly, and wine products. These products were most often purchased in grocery stores, farmers markets and health food stores. Based on study results, marketing strategies were identified that may be applied by elderberry firms to stimulate growth in sales and gain competitive advantage, as follows:

Marketing and Consumer Strategies

Sell Your Products Locally	Selling products locally can be a huge advantage for elderberry producers. Juice and jelly products with labels indicating the product had been produced locally were over three times more likely to be purchased than products that had been imported.
Advertise the Health Benefits of the Product	Promoting the health benefits of elderberry products will draw in new customers. Juice and jelly products that advertised health claims on their labels were twice as likely to be purchased as products without health claims.
Give Out Free Samples	Have prospective customers taste your products. Findings suggest that 80% of consumers who sampled an elderberry product also made a purchase. Consumers who sampled or purchased elderberry products were shown to be willing to pay more for elderberry juice and jelly products and less likely to purchase traditional or competing fruit products when an elderberry product option was available.
Approach Existing and Potential Consumers Differently	**Existing consumers:** Findings indicate that people who have purchased elderberry products are younger, more educated, and less price sensitive compared to individuals who have never purchased elderberry. They strongly prefer locally produced juices. For these customers, position elderberry juice as a healthy specialty product. Focus on the product origin in advertising elderberry juice to take advantage of consumer preferences for "local" items. Emphasize that unlike other products (e.g., açaí juice), elderberry juice is produced in the U.S. **Potential consumers:** Consumers who have not tried elderberry are characterized by higher price sensitivity but also an appreciation for local products. In this case, introduce elderberry juice products as value healthy products (similar to cranberry), emphasizing local origin while maintaining a lower price. Another option is to blend locally produced elderberry juice with cranberry, which is already known and preferred by consumers in these segments, to ease consumer acceptability.

FDA Statement

Remember that any label claims related to the health benefits of elderberry are subject to approval by the U.S. Food and Drug Administration.[10] Consult an attorney and/or the FDA prior to making health claims related to elderberry products.

Elderberry Economics

The costs and returns for elderberry production are extremely variable. Since elderberry is a wild native plant that grows in abundance throughout much of the U.S., it is often harvested from fence lines and road sides without an accounting of cost. However, in order for elderberry to become a viable economic crop, it must be commercially produced through dedicated plantings. The economic considerations for commercially produced elderberry have been modeled using the Elderberry Financial Decision Support Tool (EFDST).[12] This model is based on the costs of establishment, management, marketing and harvesting on an existing commercial elderberry production farm. The model allows users to modify different elements of the production process and determine how these changes affect the estimated financial returns. Based on the EFDST, establishing a commercially viable elderberry plantation could cost between $2,500 and $4,500 per acre. However, the model also indicates that the rate of return on that investment can be as high as 15 percent, and the landowner can recover that establishment cost as early as the third year after establishment.

Elderberry Grower's Calendar

Time of Year	Action
January - early February	Prune all plants. Collect cuttings and refrigerate for later propagation or place in heated greenhouse now for propagation.
Late February - early March	Spray dormant oil to control overwintering mites and insects. Plant dormant bare-root plants in the field. Propagate cuttings that have been in storage.
Late March - early April	Fertilize.
May 1 (frost-free)	Plant newly propagated plants in the field.
Mid-spring - mid-summer	Monitor insects, mites and diseases at least weekly; be prepared to use control measures if needed. Mulch plants once new shoots have emerged from soil. Irrigate as needed.
June	Harvest flowers if that is the primary product being produced.
Mid-July	Apply bird netting or prepare to deter birds from ripening fruit.
Late July - early September	Harvest fruit.
Mid-September - Fall	Continue to irrigate as needed. Continue to monitor pests and take control measures if needed so plants go into winter in good condition. Remove any stems that appear to be harboring insect eggs or pupae (especially borers).

Elderberry Orchard Costs*

Establishment Costs:			Cost/acre	Cost/plant
Site Preparation	Herbicide with Discing		$150.00	$0.17
Initial # of Stems Per Acre	908 stems at 4′ x 12′ spacing			
Planting Stock	Cuttings (Selected Varieties - 908 x $1.65 each)		$1,498.20	$1.65
Bed Preparation	Plastic Mulch/Irrigation		$350.00	$0.39
Planting Cost	Hand		$226.88	$0.25
Fertilization	100 lbs N Organic		$75.00	$0.08
Permanent Cover	Grass Mix		$250.00	$0.28
		Subtotal:	**$2,550.08**	**$2.81**
Management Costs:				
Fertilization	Compost (premade)		$280.00	$0.31
Pruning	Manual		$100.00	$1.00
Weed Control	Mowing		$50.00	$0.06
Deer Control	User Defined		$68.36	$0.08
		Subtotal:	**$498.36**	
Harvesting Costs:				Cost/lb
Harvesting Method	Hand Harvest		$964.25	$0.20

**This is one example of potential orchard establishment, management and harvesting costs. Expenses vary depending on user decisions. For more information, visit http://www.centerforagroforestry.org/profit/elderberryfinance.php*

Elderberry Resources

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