



Lavender Production, Markets, and Agritourism

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This publication is intended for a beginning lavender grower with some horticultural experience. The publication discusses geographic and climatic considerations for lavender, soil-preparation and cultivation techniques, lavender propagation, and field production. The publication also addresses marketing options for lavender, including essential oils, essential-oil distillation, direct marketing of a variety of lavender products, and information and resources about lavender agritourism and value-added lavender products. It also includes a list of additional resources about lavender production.

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Photo: Florencia Viadana

Introduction

Lavender is a small, aromatic shrub used in the fragrance, specialty-food, and alternative-medicine industries. Although family farmers may find large-scale extraction of lavender’s valuable oil too expensive and laborious, small-scale lavender production is feasible for some farmers using direct-marketing strategies. Agritourism, including lavender u-pick operations, farm tours, and lavender festivals, has been a very successful form of direct marketing for lavender. Additionally, small- and medium-scale lavender farmers now sell lavender bunches, or

various value-added lavender products such as soaps, lotions, essential oils, and more at farmers markets and grocery stores. Many lavender farmers successfully combine multiple marketing channels in order to realize a profit from their lavender crop. Often, a combination of agritourism and direct-market sales of lavender flowers, plants, or essential oils can be the most profitable option for small and medium-scale lavender farms.

Like most herbs, lavender has very few insect pests. A few fungal diseases attack lavender, but because there are no known remedies for them,

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chemical applications are rarely used on the plant. Lavender ranks high as a sustainable crop because it does not rely on pesticides and fertilizers. It does not require much fertilization, although in hot climates irrigation may be necessary. The biggest challenge for lavender farms is finding viable marketing channels for the product.

Suitable Locations for Lavender Production

Lavender originated around the Mediterranean in poor, rocky soils and mild coastal climates. *Lavandula angustifolia* (English lavender) is the most hardy, but high-camphor lavandin (*Lavandula x intermedia*) cultivars like Grosso may be grown successfully in most parts of the United States (to Zone 4) without winterkill, under certain circumstances. Bodies of water can greatly moderate otherwise inhospitable climates. For example, *L. angustifolia* can be successfully grown in the British Isles, due to the influence of the Gulf Stream; Ukraine can produce lavender around the Black Sea; Japan produces several metric tons a year; and Argentina, Brazil, and East Africa have some production. Each location has a climate moderated by a large body of water, which can create microclimates several zones different from those nearby. Some types of lavender have been grown successfully near Lake Champlain in upstate New York and in the “Banana Belt” south of Lake Ontario. Illinois, northern Nevada, Idaho, and even Minnesota produce lavender. Elevation, topography, and the severity of winters are other climatic factors that influence lavender farming. Elevation can significantly influence plant survival, with valleys being less desirable. Heavy mulching of plants is necessary to protect them through severe winters. Continuous snow cover could have much the same effect. Excellent drainage is crucial to the survival of lavender plantings.

Lavender can be compared to grapes in the sense that temperature, days of sunshine, rain and growing season all impact lavender’s scent and bounty. A dry summer might produce stunted plant growth, but very fragrant oil and intense flowers which translate into a spectacular essential oil. Growing altitude also impacts lavender’s fragrance. As a general rule of thumb, the higher the elevation the greater the difficulty in harvesting or wild crafting the lavender, and the more precious and pricey the resulting oil.
—Virginia Gemmell, lavender blog author (2014)

Cultivation

Lavender (*Lavandula*) can be a long-lived perennial, with a typical productive life of about 10 years, although plants have been known to live for 20 years. English lavenders (*L. angustifolia*) have the finest fragrance. However, their oil production (see box) is much lower than the high-camphor lavandin. Oils from lavandin are commonly blended, either with *L. angustifolia* oil or with commercially available essential oils, to create a pleasing fragrance. Whole plants in flower can be used for essential oil production. Buds, flower spikes, and flowering tips—both fresh and dried—have a variety of culinary, fragrance, and decorative uses.

Soil Preparation

Lavender is best established on sandy loam soils of pH 6 to pH 8. Although lavender is a drought-tolerant plant, a regular irrigation schedule is necessary during establishment, as well as supplemental fertilization or adding compost annually in the spring (Sunshine Lavender Farm, 2018).

Lavender cannot survive simply being stuck into clay soil. Beds must be worked down 18 to 24 inches. It is best to raise the bed about six inches above ground level and mix in 1/3 sand, 1/3 loam, and 1/3 clay soil. Too much sand is better than too much clay. A good soil mix like ground cotton seed, mulched leaves, old potting soil, and compost—sweetened with a bit of lime or egg shell—would work for loam soil. The ATTRA publication *Potting Mixes for Certified Organic Production* offers more recipes for organic soil mixes.

Purchase healthy propagation materials (plants or plugs) from a reputable dealer. Make sure the lavender variety is appropriate for your climate zone.

Raised, sandy beds allow the drainage necessary to avoid root rot. Gravel can be added as well. Remember that lavender tolerates too little watering better than too much.

Mulching and landscape fabric can help with weed control. However, if the mulch is too heavily applied, it can increase susceptibility to root rot. A medium application of mulch around the base of the plants in the fall or spring months will help with weed control.

Related ATTRA Publications www.attra.ncat.org

Direct Marketing

Entertainment Farming and Agri-Tourism

Herb Production in Organic Systems

Keys to Success in Value-Added Agriculture

Plug and Transplant Production for Organic Systems

Potting Mixes for Certified Organic Production

Specialty Cut Flower Production and Marketing

Sustainable Small-Scale Nursery Production

Lavender Production Estimates

- An acre of true lavender (*L. angustifolia*) produces from 300 to 1,800 pounds of dried flowers (12 to 15 pounds of essential oil = about two gallons).
- An acre of one of the lavandin cultivars (*L. x intermedia*) yields from 3,500 to 4,500 pounds of dried flowers per acre (53 to 67 pounds of essential oil). In the Pacific Northwest, estimates are only 1,000 to 1,500 pounds of dried buds per acre for L. 'Grosso'—equaling 18 to 35 pounds of essential oil.
- In Massachusetts, flower yields for L. 'Grosso' were as follows (Lopes, 2002):
 - Approximately 150 stems per bundle
 - Four to seven bundles per plant (five to six average)
 - 12 to 15 bundles to yield a pound of dried buds
 - Buds per plant: ¼ to ½ pound dried buds
 - Bundles per acre: 4,000
 - Buds per acre: 1,000 to 1,500 pounds dried buds per acre

Lavender Start-Up Costs of Production

Before getting started with lavender production, it is important to know the average cost of production for a lavender operation. There are several good resources that explain start-up costs and questions to ask before starting a lavender farm. A few of these resources follow:

Projected start-up costs for lavender operation between vineyard rows—small operation, www.foodfarmforum.org/wp-content/uploads/2014/01/Lavender-production-budget-Swift.pdf

Lavender start-up costs and questions for beginning lavender farmers, <https://everything-lavender.com/starting-lavender-farm.html>

The most common species of lavender used in cultivation are the following, according to Stony Hollow Lavender (2018):

- True lavender or fine lavender (*Lavandula angustifolia*)
- Spike lavender (*Lavandula latifolia*)
- Lavandin, a hybrid obtained from cross-pollination of true lavender and spike lavender. Lavandin 'Super' and Lavandin 'Grosso' are grown mostly in Provence, France, with *Lavandin* 'Grosso' accounting for 80% of all lavandin cultivation there.

More complete information and pictures of the cultivars of lavender and lavandin are available from the following sources:

- *Lavender: The Grower's Guide*, by Virginia McNaughton
- Lavender Varieties <https://purplehazelavender.com/lavender/lavender-varieties>

Cultivars and Propagation

Lavender—a small, non-hardy, perennial, ever-green shrub—is best propagated from softwood cuttings of standard types. Seed may not come true to type, and lavandin seeds are sterile. Different cultivars are raised for different purposes. Most growers favor deep blue flowers, lush growth, and hardiness. Other types of lavender—such as 'Spike'—are not commonly grown in the United States, except as specimen plants. White and pink forms of *angustifolia* are curiosities sometimes seen in home gardens. Although some California growers favor 'Irene Doyle' for its fragrance, ability to flower bi-annually in Zone 7, and its "slightly darker lavender blue" flowers, the most commonly grown cultivars in all parts of this country are the lavandins 'Provence' and 'Grosso'. 'Grosso' attracts attention in tourist areas, creating a striking effect of large fields of "purple haze." It is very hardy and grows to three feet in height. Products of acceptable quality can be made by judiciously blending 'Grosso' distillate with imported sweet oils.

The English lavender (*L. angustifolia*) cultivar 'Munstead' is commonly grown in New England, as is the lavandin (*L. x intermedia*) cultivar 'Grosso'. 'Munstead' is reportedly the only English lavender that does well at high altitudes and was recently reported doing well in Nevada. Nurseries may market cultivars of *L. angustifolia* and *L. x intermedia* (lavandin) under deceptively similar names. For example, 'Hidcote' is *L. angustifolia*, while 'Giant Hidcote' is *L. x intermedia*.

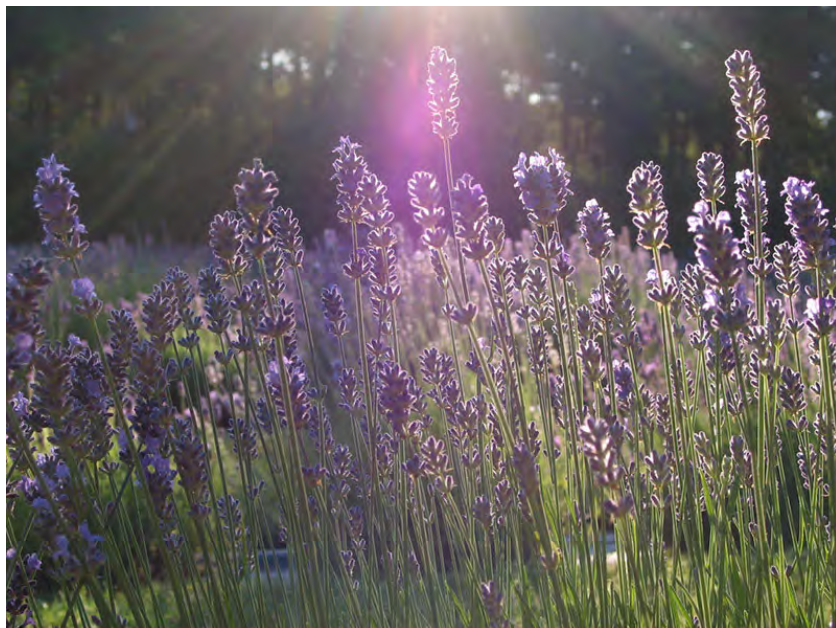


Photo: www.happyvalleylavender.com

The different cultivars of lavender vary slightly in specific gravity (s.g.) and have distinct chemical profiles. Because lavender oils are lighter than water (s.g. of less than 1.0), they rise to the top. The lower the s.g., the more easily the oil is volatilized. More information on distillation parameters may be found in E. Guenther's *The Essential Oils*, four volumes (1948-52); Brian Lawrence's *The Essential Oils*, three volumes (1976-78); the *Journal of Essential Oils*; and the *Journal of Agricultural Food Chemistry*. Chemical profile affects the olfactory properties of an essential oil and, hence, the quality.

Essential Oils

Essential oils are used as flavors and fragrances in manufacturing, as well as in aromatherapy, an alternative health discipline. Now that alternative therapies receive such broad public support, and the food and fragrance industries are growing, the main question is, "Can the limited-resource farmer in the United States find a profitable niche growing and selling lavender?"

Consumers both in developed and developing countries are spending more on organic essential oil products including lavender oil owing to their health benefits. Lavender oil is considered to have unique properties that are beneficial for the skin, hence, used in various skincare products. Over the years, application of lavender extract, oil and essence in food and beverage products has also increased to a substantial level. According to PMR's report, the global lavender oil market is expected to reach US \$124.2 million between 2016 and 2024. In 2016,

lavender concentrates accounted for a staggering 49.0% revenue share of the market. —*PR Newswire, 2017*

Some of the key players in the global lavender oil market include doTERRA International, LLC; Young Living Essential Oils; Takasago International Corporation; International Flavours & Fragrances Inc.; Aromaland Inc.; Symrise AG; Givaudan SA; Firmenich SA; Rocky Mountain Soap Co.; and China Flavors and Fragrances Company Limited. To strengthen their market position, many of these companies are going into strategic alliances and also concentrating on further technological advancements to improve product line.

The Essential Oils Industry

Most essential oil production continues to take place outside the United States, due to infrastructure, transportation, and labor considerations (cost and availability). The majority of the essential oil produced in the United States is orange oil, which can be cheaply produced as a by-product of the citrus-juice industry. The next-largest volume produced is cedar oil, a by-product of the forestry industry. Worldwide, most essential oils (including most aromatherapy oils) are distilled from tropical plants not widely grown in the United States. The three main plants utilized for essential oil production in this country are mint, orange, and cedar. The U.S. mint industry is centered in the Pacific Northwest. Washington farmers produce the most spearmint oil and the second-most peppermint oil, with about 17,000 acres of spearmint and 16,000 acres of peppermint. Together, those produce about 3.5 million pounds of mint oil annually, valued at about \$80 million (Pihl, 2012).

Australia and New Zealand have developed a lavender oil industry. Some of the smaller operations there received initial government support. However, similar support for essential oils distillation does not exist in this country for farmers, with the exception of the USDA Value Added Producer Grant (www.rd.usda.gov/programs-services/value-added-producer-grants).

Oil Extraction Options

There are four methods to derive essential oils from plants:

- **Hydro distillation** (also known as water distillation) is a process in which water and plant material are boiled together in a tub.

The Estimated Value of Lavender

Note: These values are estimates only, of yield from one acre in the second production year.
(Source: Swift, 2014)

Wholesale Value of Oil

Lavandin oil sells for \$10.50/pound

Lavender oil sells for \$22.50/pound

Product	Yield	Value
Lavandin oil	35-180 pounds per acre	\$367.50-\$1,890.00
Lavender oil	5-25 pounds per acre	\$112.50-\$562.50

Retail Value of Lavender Oil

Lavender/lavandin oil sells for \$12+ per 5-ml bottle

1 gallon = 756 bottles of 5 ml = \$9,072.00

5-ml bottles empty cost ~ \$0.55 = \$415.80

Product	Yield	Value
Lavandin oil	4-21 gallons per acre	\$36,288-\$190,512
Lavender oil	.75-3 gallons per acre	\$6,804-\$27,216

Value of Buds

Buds sell for \$6-\$10 per pound

Flower bundles sell for \$6-\$10 per bundle

Product	Yield	Value
Buds	1,000-1,500 pounds per acre	\$6,000-\$15,000
Flower Bundles	15,000-25,000 per acre	\$90,000-\$250,000

Value of Hydrosol

(This is the distillate produced when distilling for essential oil)

16 ounces = \$9

4-ounce spray bottle = \$12

Product	Yield	Value
Hydrosol	25 gallons per acre	\$9,600

The result is a “hydrosol,” rather than a pure essential oil. Hydrosols are the basis of a variety of retail products.

- **Steam distillation** is used in large-scale production of essential oils for commercial purposes. Steam distillation uses dry steam to vaporize and extract the oil. It is the method of choice for leafy crops like lavender that have specific gravity of less than 1.0 (lighter than water). Small-scale steam distillation can be accomplished with a pressure cooker on top of a kitchen stove, but only a few drops of oil are produced per batch. For more information and detailed instructions on small- to medium-scale steam distillation, visit www.bbfamilyfarm.com/distillation.
- **Solvent extraction** uses organic solvents to extract both essential oils and oleoresins, which are then separated. (Oleoresins complete the flavor profile of food-grade essential oils.) Use of many of the organic solvents would not be compatible with certified organic production.
- **Supercritical extraction** uses carbon dioxide under extremely high pressure to extract both essential oils and oleoresins. Essential oil produced as a by-product of the citrus industry requires a four-story fractionating tower. Oleoresins separated

out at the beginning of the process are added back at the end. To produce essential oils or hydrosols, plants typically are steamed. As the steam passes up through the plant material—bark, stems, roots, or fresh or dried flowers (as in the case of lavender)—it carries both the oil and other plant essences into a receiving container. As the distillate cools, essential oil floats to the top and is siphoned away. The liquid left behind is hydrosol.

A video of the steam-distillation process is available from Tazeka Aromatherapy at www.youtube.com/watch?v=OVQC-6qIq-Y. As noted above, commercial-scale production of lavender essential oils relies on steam distillation. (A modest steam distillation unit costs \$8,000 to \$11,000.) Table-top units that sell for \$2,000 to \$2,500 online will usually produce only hydrosols; they cannot achieve and maintain the temperatures necessary to extract a high percentage of essential oils.

Floragenics Distillation Systems (www.floragenics.com), in Pescadero, California, offers several sizes of stills, including the large 50-gallon still. This is a turnkey system with all necessary parts, hoses, and fittings.

For those interested in a cottage fragrance industry, there is an older method of small-batch production called *enfleurage*. Fats, oils, or alcohol

are used to extract the plant essence for scented soaps, bath oil, lotions, homemade paper, etc. Once made, scented oils must be used quickly or stored in a tightly sealed bottle. Making perfumes at home requires a recipe, additional undenatured ethyl alcohol, and an appropriate fixative (such as storax oil, sandalwood oil, or orris root). More information on these methods and products, some of which may have potential as value-added farm enterprises, is provided in *Rodale's Illustrated Encyclopedia of Herbs*. There are examples of businesses dedicated entirely to this method of essential-oil extraction.

Direct Marketing

Many farms are adding lavender into their cut-flower operations, bringing bunches of lavender to farmers markets to sell, or selling lavender products such as lotions, soaps, and tinctures. At the farmers market, lavender can sell for between \$3 and \$6 per bunch, depending on the area. There are also other lavender products farmers can sell at the market, including dried lavender bunches, lavender plants, lavender sachets, lavender soap, and other value-added lavender products. Dried lavender bunches can also be sold to florists, grocery stores, or other businesses. Methods for direct marketing of horticultural products are discussed in the ATTRA publication *Direct Marketing*. For more information about producing potted lavender plants (also direct-marketed), see the ATTRA publications *Sustainable Small-Scale Nursery Production* and *Plug and Transplant Production for Organic Systems*.

It is essential to have a marketing plan for a lavender farm first, before any plants are put in the ground. The market is competitive and it takes a marketing niche to grow a lavender farm into a

profitable and sustainable business. ATTRA has great business-planning resources, such as the *Getting Started in Farming* online tutorial (<https://northcarolina.ncat.org>) and marketing tipsheets (<https://attra.ncat.org/attra-pub/summaries/summary.php?pub=440>) to help you get started.

Lavender and Agritourism

It is common for lavender farms to incorporate agritourism into the farm operation as a direct-marketing opportunity and to diversify revenue sources. Examples of agritourism include tours, u-pick operations, and lavender festivals. Some farms create event centers on the farm for weddings and other events, or build vacation rentals

Sequim Lavender Festival

www.lavenderfestival.com

Sequim (pronounced skwim), in Washington's Dungeness Valley, has been proclaimed the "lavender capital" of the United States. Sequim has a favorable geographic location for lavender, with warm summers and cool, dry winters. Sequim (population 6,606) is in the "rain shadow" of the Olympic Mountains—protected by the mountains from rain sweeping in from both east and west. Its annual mid-July "Celebrate Lavender" festival draws thousands of visitors to view the purple haze of harvest-ready lavender fields. Sequim also has a thriving bedding-plants industry and sponsors an herb festival each May. In fact, Sequim is a growing tourist and retirement center, with festivals scheduled for almost every month in the year.

The lavender farms around Sequim provide a significant boost to the local economy and are an established part of the local tourist industry, promoted by both local and state governments. Tours of lavender farms and a Lavender Street Faire showcase lavender products and services from the Sequim-Dungeness Valley, as well as regional garden products and natural crafts. Other attractions include an open air market, lavender-crafting demonstrations, food, aromatherapy, dance, music, clowns, and face painting.

There are other regions of the United States where lavender agritourism is growing.

It is essential to have a marketing plan for a lavender farm first, before any plants are put in the ground.

Value-Added Products Made from Lavender

- Lavender splashes
- Bath soak
- Dried bundles
- Body lotion
- Sachets
- Lavender honey
- Lavender dijon mustard

on the farm to attract tourists. If you are interested in an agritourism operation, it is important to consider the location of the farm and its accessibility to cities, or whether it is near other lavender farms or tourist destinations. It is worthwhile to note that land prices will be significantly higher in areas that are already popular for tourists.

For more information about agritourism, see the ATTRA publication *Entertainment Farming and Agri-Tourism*.

Requirements for Success in Lavender Production

Successful lavender producers invest considerable time (at least a year) just doing research, traveling to conferences, and talking with established farmers before setting up operations. Because there are many methods to market lavender and lavender products, research is important to determine which is the best fit for your farm. Before starting a lavender farm, it is important to have a good sense of the costs of production, as well as familiarity with agritourism and essential-oils production, and ready access to capital. The

United States Lavender Growers Association (www.uslavender.org) has a conference every two years, information about local events and workshops, and a virtual-farm-tour Web page.

Before starting a lavender farm, it is important to conduct research and talk to as many farms in different regions as possible, in order to understand the details of this particular crop and the demand for it in different areas. If agritourism is part of the business plan, doing careful research on land opportunities, location, and proximity to tourism destinations, as well as zoning regulations/policies for agritourism-related events, will be very important before purchasing or leasing property for a lavender operation.

In summary, lavender production can be a rewarding and economically profitable farm enterprise, but this type of operation requires careful research and a solid understanding of the market for lavender products. There are still many opportunities to start a lavender farm, and there are many resources available to help new and beginning farmers become successful lavender farmers.

Note: Mention of specific brand names or companies is for educational purposes only and does not constitute endorsement by NCAT, ATTRA, or USDA.

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Sunshine Lavender Farm <http://sunshinelavenderfarm.com/planting-care/#plant>

Further Resources

Online Resources

Fifty States of Lavandula
<http://everything-lavender.com/lavender-farms.html>
State-by-state listing of lavender farms compiled by Susan L. Harrington.

Strictly Medicinal Seeds
www.strictlymedicalseeds.com
Bulk herbs, distillation equipment, and essential oils.

Lavender. By Douglas Green. <https://dougsgreengarden.com/book/lavender-grow-sensual-herb-garden/>
E-book for sale online.

Lavender Guide: Lavender: Choosing a Distiller
<https://www.youtube.com/watch?v=C9SbwFzMAG0>
A YouTube video on lavender distillation equipment, with California lavender farmer Lila Avery-Fuson.

Lavender listserv
Lavandula@yahoogroups.com
Listserv for lavender growers and others interested in learning more about events, publications, and agritourism events. Also useful for those starting lavender farms because it is an easy way to communicate and ask questions of others in the field.

Richters Herb
www.richters.com
Q&A section has large amount of material on lavender.

Celebrate Lavender Festival
www.lavenderfestival.com
The website for the annual festival in Sequim, Washington.

Organizations

The Australian Lavender Growers Association
www.talga.com.au

New Zealand Lavender Growers Association
www.lavender.org.nz

United States Lavender Growers Association
317-678-7542
www.uslavender.org

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