BASIL

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BASIL

This production summary provides an overview of basil growing, harvesting, and post harvesting practices. There are some common practices that many large commercial growers use when producing basil, and though there are variations in these practices, having an understanding of the most common methods used will be helpful when carrying out regulatory activities.

By the end of this summary, you will be able to:

1. *Describe the differences between the varieties of commercially produced basil.*
2. *List the top basil producing regions.*
3. *Identify the most common farming practices used in the production of basil.*

INTRODUCTION

Basil is a member of the mint family. Sweet basil is the most common culinary basil. Physically, basils are characterized by square, branching stems, opposite leaves, brown or black seeds, and flower spikes.

Large-leaved basils, such as sweet basil, Italian basil, and lettuce-leaf basil can grow two to three feet in height. Small-leaved basil such as lemon basil, dwarf basil, bush basil, or spicy globe basil will grow 8 to 12 inches in height and width. Reddish-purple variations such as Dark Opal and Purple Ruffles tend to be intermediate in size, bearing purple instead of white flowers. Although these varieties have minor nuances in flavor, they are used for food preparation.

In the United States, basil is grown commercially in western and southern states where the climate is favorable including

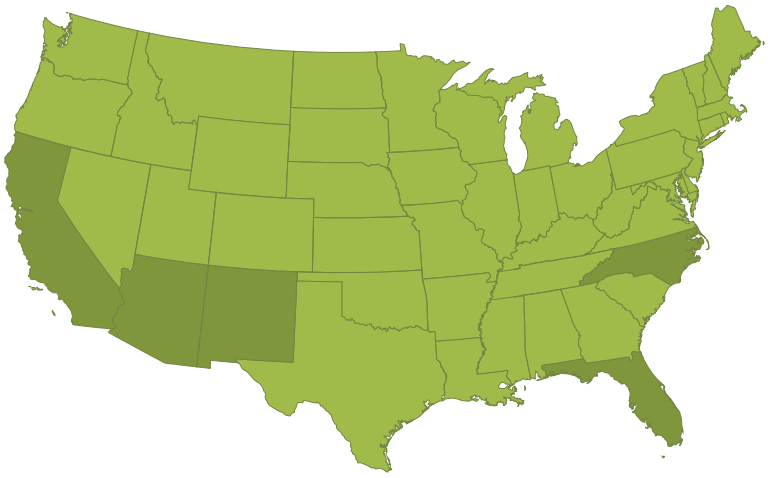

Fig 1 - Top Basil Producing States in the US

Arizona, California, Florida, New Mexico, and North Carolina (Fig 1). Production statistics for basil are not tracked individually, but they are included in the larger 'herb' category. Mexico is a larger exporter of basil to the United States.

GROWING

Basil is cultivated in climates with temperatures ranging from 45° to 80°F. This tender herbaceous annual is susceptible to frost and cold-temperature injury. It develops best during long days in the full sun with well-drained soil.

Basil can be directly seeded or transplanted to the field in late spring once all danger of frost has passed.

Rows are planted 25 to 35 inches apart, with plants spaced every six inches. Basil can also be planted in raised beds in rows of three lines. The distance between rows is


Alice Henneman via flickr.com

determined by a grower's equipment, but generally ranges from 10 to 15 inches.

Soil is kept moist to encourage germination and improve plant establishment. Germination occurs within eight to 14 days after seed planting. Initial growth is slow, but after the first few sets of leaves appear, growth increases dramatically.

Some small growers use transplants to raise basil as an annual crop for the fresh basil market. Transplants normally require approximately 28 to 42 days for growth. Lateral branching and growth may be encouraged by topping when the plants are five inches high. Topping promotes branching and helps to maximize plant growth when three to five sets of true leaves are present. True leaves appear as the second set of leaves after a plant germinates. (The first set of leaves are the plant's food structure and are not leaves at all.)


Charlie Vinz via flickr.com

Basil does not tolerate water stress and needs to be watered regularly. Drip irrigation is preferred since it minimizes damage to foliage caused by moisture contact with the leaves.

The need for fertilizing basil is determined by soil type, previous applications of fertilizer, and previous crop type. In general, a fertilizer that provides nitrogen, phosphorus, and potassium is recommended. Fertilizer can be spread over a field and plowed in or applied by 'side dressing,' which refers to application of a fertilizer between the rows of a growing crop.

Basil is typically grown commercially without the application of herbicides after plant emergence. Growers rely on mechanical cultivation, high plant populations, use of mulch, and manual weed removal for weed control.

Although a variety of different insect, fungal, viral, and nematode pests can affect basil, relatively few pesticides are approved for use on growing basil plants. Novel or organic methods such as biological control using beneficial insects or bacteria, insecticidal soaps, plant extracts, pest traps, manual pest removal, and organic insecticides are used. In some cases, applications of chemical controls can be applied during pre-planting or pre-emergence.

HARVESTING

The part of the plant that is harvested and the timing of the harvest depend on the anticipated use of the herb. For dried basil leaves, the plant is cut just prior to appearance of flowers. To produce essential basil oil, the plant is harvested when the flowers are in full bloom.

In warmer climates, three to five cuttings can be made per year. In cooler climates, the growing season may only allow two cuttings per year; the first usually begins in early summer and the second just before bloom.

Basil leaves are harvested above the bottom two to four sets of true leaves for fresh and dried markets. In larger commercial operations, basil plants are cut four to five inches above the ground to allow for regrowth. Planting and harvesting dates are staggered to allow continuity in the supply of fresh basil leaves.

For the fresh market, the length of the stem may be important, as is the pack or bundle size and weight. Small scale production is labor intensive and requires that workers cut leaves using a sharp sickle type knife and place the loose leaves in a tote or container.

For large scale commercial operations, harvesting is conducted by using a modified sickle bar/jerry mower pulled by a tractor. The height of the cutting blade is adjustable depending the cut required. Some growers harvest the entire plant depending on market demand.

PACKING

If marketed fresh, the leaves are washed and cleaned, removing all weeds and extraneous field material.

Basil is packaged in bulk boxes in the field and transferred to storage rooms below 50°F for short periods of time without inducing chill damage. Shipped to a packinghouse, the herb is hand sorted and placed into small plastic clam shells for retail sales. Whole plants are wrapped in plastic to maintain their integrity.

HOLDING

Postharvest handling greatly impacts aroma, flavor retention, and leaf color. When dried, the leaves are usually not subjected to temperatures over 90°F.

For the dried herb, low temperature drying of the leaves under forced air is used to retain maximum color prior to milling or distillation to extract essential basil oil.

CONCLUSION

Having a basic understanding of the way basil is grown, harvested, and cooled will provide the basic background information that will be helpful to regulators when completing inspections or investigations in the field.

The agricultural practices described in this production summary are common on most large commercial farms like those found in major basil producing regions in the United States. There are undoubtedly variations in these practices depending on the region, operation size, and individual grower preferences. This is especially true of farms outside of the U.S.

REFERENCES

"Basil Production." *Essential Oil Crops*. Department of Agriculture, Forestry, & Fisheries, Republic of South Africa, 2012. Web. 22 June 2015.

Diver, Steve. "Greenhouse and Hydroponic Vegetable Production Resources on the Internet." National Center for Appropriate Technology, 2004. Web. 22 June 2015.

Holmstrom, Kristian E., Gerald M. Ghidiu, Christian A. Wyenandt, and Bradley A. Majek. "Crop Profile for Basil in New Jersey." Rutgers Agricultural Research and Extension Center, 2008. Web. 23 June 2015.

Meyers, Michele. "Basil." *Herb Society of America Guide*. The Herb Society of America, 2003. Web. 22 June 2015.

Mossler, Mark A. "Florida Crop/Pest Management Profile: Herbs (Basil, Cilantro, Dill, Mint, Parsley, Rosemary, Sage, Thyme." Pesticide Information Office, Agronomy Department, University of Florida Extension, Mar. 2014. Web. 22 June 2015.

Savio, Yvonne and Curt Robinson. "Basil." *Rain.org*. University Extension, UC Davis, 21 July 1992. Web. 23 June 2015.

Simon, James E. "Basil." *Crop Fact Sheet*. Purdue University, 1995. Web. 22 June 2015.

Simon, James E. "Sweet Basil: A Production Guide." Purdue University, Cooperative Extension Service, Jan. 1985. Web. 23 June 2015.

Succop, C. Elizabeth. "Hydroponic Greenhouse Production of Fresh Market Basil." Department of Horticulture and Landscape Architecture, Colorado State University, 1998. Web. 22 June 2015.

USDA. "Hawaii Vegetable and Herb Report." National Agricultural Statistics Service, 12 Nov. 2013. Web. 23 June 2015.

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