

Part One

Peppermint in the United States

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I. Cultivation and Oil Production

The person or persons who brought peppermint from England to the United States are unknown; however, by 1812 it was being raised commercially around Ashfield in western Massachusetts. In 1821 there were five stills operating around Ashfield producing peppermint essence (as the oil was called at that time). By 1830 this had grown to nine distilleries; however, in addition to the peppermint oil, spearmint, tansy, wintergreen, spruce and hemlock oils were also produced in these same stills (Landing, 1969).

During the late 1830s the cultivation of peppermint and, to a lesser extent, spearmint for oil production had begun to move westward. For example, both mints were introduced in New York State near the town of Vienna in Wayne County. From 1830–1840, peppermint had spread to northeastern Ohio in the counties of Lake, Ashtabula, Cuyahoga, Lorain and Huron. Over this period of time oil production had grown to around 1,400 kg. During the same decade, peppermint had spread into Southern Michigan and Northern Indiana. In Michigan, oil production centered around Ionia and Lyons in Central South Michigan and in Kalamazoo St. Joseph, Branch and Hillsdale counties in the south (Landing, 1969).

Peppermint is considered to be a long-day-length plant. It needs a minimum midsummer day length of 15 hours and a diurnal temperature fluctuation to produce a satisfactory oil yield, that possesses an acceptable aroma and oil quality. This day length can be achieved north of the 40th parallel. It is worth noting that the latitude of the origin of peppermint in Hertfordshire in England is ca. 50°N. All peppermint-growing areas in the United States meet this photoperiodic requirement. As the cultural practices used to raise peppermint are well documented (Lacy et al., 1981), discussion on this subject will be directed towards rootstock only.

Peppermint is propagated clonally by planting stolons. As wilt (*Verticillium dahliae* syn. *V. albo-atrum*) is the most devastating disease of peppermint, *Verticillium*-free, *Verticillium*-resistant rootstock is the most desirable peppermint to grow.

Although most farmers use good cultural practices and timely crop rotation, it is still not possible to keep wilt out of a growing area unless nuclear stock is used.

A few years ago, mutation breeding of peppermint by the late M. J. (Bill) Murray produced wilt-resistant strains (Murray, 1969). From this monumental work, selections were made based on vigor, stability, wilt-resistance and the ability to produce high quality peppermint oil in good yield. In 1971, the first selection (N°52) was registered and released as Todd Mitcham (Murray and Todd, 1972). A few years later, a second selection (N°3202) was also registered and released as Murray Mitcham (Todd et al., 1977). In addition, a third selection (N°92) escaped without official release. These three selections have become the nuclear stock from which all peppermint plants have been reproduced.

Different grade names are given to disease-free mint stolons. Initially, the disease-free stock, which is greenhouse raised, is referred to as nuclear stock. When it is propagated in a disease-free environment in the spring and inspected in the summer—assuming the stock is still a clean, disease-free strain—it becomes foundation stock. The second year the disease-free stock becomes registered stock. Subsequent years in the same location become Certified I (third year) and Certified II (fourth year) stocks. Most growers try to get their hands on foundation or registered stock because of the lower potential of disease incidence than with certified stock.

Examination of the areas where peppermint is grown in the United States for oil production is best done regionally. The oils are produced over a large geographic area: the Midwest, Eastern Oregon, La Grande, Western Idaho, Madras and Willamette Valleys in Oregon, Washington, Montana, and, more recently, northern California and Nevada.

Midwest

Traditionally, mint oils were produced on muck soils in the Midwest. This is still true for many of the mint farms in Michigan, Wisconsin and Indiana. In Michigan, production is centered around the community of St. John's, although some farms are scattered throughout the state.

Many of the small mint farms in Michigan are not very productive and barely make a profit. The climate experienced in Michigan and other Midwest states is influenced by the Great Lakes. For example, both humidity levels and temperature can be moderate to high throughout the summer with frequent rainfall throughout the year. This rainfall can often interfere with the mint harvest.

Ample water resources are available for sprinkler irrigation, which is the normal method of water application. Michigan is the third-largest producer of both peppermint and spearmint oils in the Midwest, after Indiana and Wisconsin.

Scotch spearmint and peppermint oils are the two major mint oils produced in Wisconsin. Most of the mint oils are produced in a region extending from Lake Geneva northwards through the central sand belt region of the state. This region contains a few large farms and a limited number of small growers. The climate and soil types of Wisconsin are similar to Michigan except that a larger proportion of Wisconsin farms raise mint on soil types with an increasingly sandy character.

Indiana is the leading mint oil-producing state in the Midwest. Its major mint growing area is in the north central part of the state; however, growers are producing oil as far south as Lafayette. Certain farms in Indiana are very large and are thought to influence the overall quality of Midwestern mint oils.

The climate of Indiana is somewhat different from Michigan and Wisconsin—slightly hotter and dryer—because it is less influenced by the Great Lakes. Indiana rarely receives any rainfall during the harvesting time. Currently, the Midwest region accounts for less than 10% of the mint oil produced in the United States (Sheldon, 2007).

Oregon

Peppermint plants were first introduced in the Willamette Valley of Oregon in 1909. Currently, peppermint is produced in the Willamette Valley, northern Oregon, the Madras region and eastern Oregon. Scotch peppermint is produced in all of these same areas except the Willamette Valley. Little or no native spearmint is grown in northern or eastern Oregon and none grown in the Madras region or in the Willamette Valley.

Willamette Valley

Peppermint cultivation can be found in the central core of the Willamette Valley from just north of Salem to as far south as Eugene. The borders of the valley are the Cascade Mountains to the east and coastal mountain range to the west. Its location gives the area a very protective coastal maritime climate with an average growing season of ca. 200 days. The valley receives ample rainfall of around 35–40 inches (89–101 cm) per year with only 6–8 inches (15–20 cm) occurring during the summer growing season. The heavy rainfall months are between November and March. The winters are relatively mild although high rainfall can often cause the quite high humidity. Summer temperatures are moderately warm, exceeding 90°F (32°C) only six to eight days per year. The primary source of water in the valley is the Willamette River and its tributaries. Because of a readily accessible water table, well water can be used for irrigation purposes.

According to Sheldon (2007), peppermint oil production in the Willamette Valley has reduced from more than 20% of the US production in 1994 to ca. 9% in 2004.

Madras Region

Peppermint cultivation in the Madras region of North Central Oregon is quite restricted. It extends from ca. 15 miles (ca. 25 km) north of Madras southward for about 25 miles (ca. 40 km) to just south of Redmond in an area about eight to 10 miles (13–16 km) wide. As this area is part of the Madras plateau, it is not unexpected that the average elevation for the entire region is greater than 2,000 ft (610 m). In fact, in some of the mint growing areas the elevation is above 3,000 ft (915 m).

The summers are dry with warm days and cool nights. The average growing season is quite short—only about 105 days. Nevertheless, as this is a dry area (average rainfall < 10 inches (25 cm) per year), it enjoys considerable direct sunlight with relatively few cloudy days. Several days with temperatures of 100°F (38°C) are not uncommon.

The main source of water for irrigation purposes is the Deschutes River, which originates in the Cascade Mountains. Water is somewhat scarce throughout the region, hence, rill or furrow irrigation is the common practice rather than sprinkler irrigation.

Peppermint is the major mint crop raised in the Madras region of Oregon. The majority of it is grown in Jefferson and Crook counties. Limited quantities of peppermint oil are also produced in the vicinity of Christmas Valley and Agency Lake to the southeastern side of the state, Twickenham and Dayville to the east of Madras and Rufus to the north of the state. It should be noted that the production of peppermint oil in the Madras region has been steadily declining over the years to a point today where the production is less than 1.5% of the oil produced in North America (Sheldon, 2007).

La Grande (Oregon)

Although the soil ranges from heavy clay to sandy loam in the La Grande region, the climate is that of the desert plains with hot days in the summer coupled with cool nights—an ideal environment for monoterpene biosynthesis. The winter months, which are not terribly extreme, generally produce enough snowfall to protect the peppermint plants from freezing (Sheldon, 2007). The production of peppermint oil has been steadily growing from 3.4% of the US production in 1994 to 7.2% in 2004 (Sheldon, 2007).

Eastern Oregon/Western Idaho

Although the production area for peppermint oil straddles the border between Eastern Oregon and Western Idaho, oil produced in this area is referred to as Idaho oil or even Ontario oil (a city in Oregon—not to be confused with Ontario, Canada). It encompasses an area of about 1,000 miles (ca. 1,610 km) in length by 20–40 miles (32–40 km) in width covering the southwestern section of Idaho and southeastern Interstate 84. The peppermint growing area stretches from southeast