

The History of *Mentha piperita* and Its Economic Importance in Indiana

C. L. PORTER, Purdue University

The genus *Mentha* is included in the dicotyledonous family Labiatae. According to legend, a nymph named "Minthe" was changed by Prosperine into a mint plant. Theophrastus gave the name "Mintha" to the plants of this group, thus honoring the legend. Mintha has been modified to *Mentha* in modern terminology.

According to the eighth edition (1950) of Gray's Manual of Botany (3) eleven species of *Mentha* are listed as occurring in the Northern United States. All of these with the possible exception of some varieties of *M. arvensis* have been introduced from Europe. In a foot note in this edition of the manual the authors state "The Old World species have crossed and recrossed until hundreds of the vegetatively propagating progeny have been described and very unsatisfactorily defined. Many of these have been introduced into this country and have found their way to waste places, roadsides, etc. Only the strongest-marked and definitely naturalized plants, without hypothetical guesses as to their derivation are here recorded."

Mint is mentioned in the Bible (Matthew 23:23), by Theophrastus, Hippocrates and Pliny. Mint is included in monastary records which recommends the herb both for culinary and medicinal use. Henslow in "Medical works of the Fourteenth century" quotes from old monastary records an ancient cure for ulcers. "For an ulcer, take eggs that be rotyne undre an henne whane she sittes to bryng forth byrddes, and breke them and ley them on the sore and it schale sleye the worme for the stynche; and whoso hathe none egg is take thereof the Jus of mynte and it will do the same".

Until the time of the Renaissance the various mints were undifferentiated. The origin of *Mentha piperita* is obscure and there are conflicting opinions as to the origin. According to Gray's Manual of Botany Europeans consider the species to be a cross between *M. spicata*, spearmint and *M. aquatica*, water mint. Miss Kamm (9) in her book entitled "Old Time Herbs" suggests that *M. piperita* may have originated about 1696 as a sport from the English hairy mint, *M. hirsuta*. Pickering (11) in his "Chronological History of Plants" is authority for the statement that peppermint originated in India. The plant was observed in the gardens of Egypt. "Linnaeus states that the species is well known in gardens throughout Middle Europe. It became naturalized in England before the days of Persoon."

Mentha piperita has a high degree of sterility and for this reason it has been a difficult plant to analyze genetically. According to Nelson (10) the sterility "is an evidence of its hybrid constitution." Schurhoff and Schultz believe that *Mentha piperita* is a hybrid with *M. aquatica* and *M. viridis* as the probable parents. But Schurhoff thinks that *M.*

viridis is a hybrid with *M. sylvestris* and *M. rotundifolia* as the parents. If these conclusions are correct it would make *M. piperita* a triple hybrid.

The mints contain essential oils that are valuable in medicine and flavoring. Peppermint oil is used to flavor tooth paste, candy and chewing gum. Fifty percent of the extracted oil of peppermint is used by the chewing gum industries. Menthol, sometimes termed "peppermint camphor", is a derivative of the oil and is valuable for its antiseptic qualities and in the treatment of colds.

The essential oil characteristic of the various mints is derived chiefly from the foliage where it is produced in small glands located most abundantly on the tips, margins, and undersides of the leaves. The oils of different mints have different qualities and hence, impart different flavors. For example, *Mentha spicata*, spearmint, as is well known, has a pleasant flavor, but one quite distinctive from that characteristic of *Mentha piperita*. The Japanese mint, *Mentha arvensis* var. *piperascens* has a bitter taste that is objectionable. Nevertheless, the Japanese mint is the principal source of menthol. Many of the wild mints produce oils with disagreeable flavors. It is unfortunate when such "weed" mints appear in fields of peppermint. Their oils contaminate the peppermint oil and serve to lower the quality of the latter oil. The chewing gum industry is extremely wary of any flavoring in their product which varies to any degree from that to which the trade is accustomed. For this reason the oil extracted from disease-resistant hybrids or synthetic peppermint oil prepared by the chemist has never found favor with chewing gum manufacturers.

The industrial history of *Mentha piperita* in the United States begins with the importation of planting stock from England in 1812. The first plantings were made in the vicinity of Ashfield, Mass. The first plantings of this species made in Michigan occurred in St. Joseph county in 1835. There is an area of muck soil in Southern Michigan which is more or less contiguous with similar muck land in Northern Indiana. These muck soils are so well adapted to the culture of mint that this Michigan-Indiana area has become the center of peppermint culture in the United States.

The first plantings of peppermint on the west coast were made in Washington and Oregon about 1919. This western mint is grown chiefly on lava soils. The area there has expanded rapidly until at this date it is somewhat greater than the Michigan-Indiana area. The climate and soil of the northwest produces more rapidly growing plants; larger and coarser than the peppermint grown in Indiana. However, the quality of Indiana mint oil is superior and is preferred by the manufacturers.

The principal mint producing areas in Indiana which include both peppermint and spearmint, quoting from Ellis and Stevenson (2), are "near South Bend, North Judson, Rennselear, Bremen, Nappanee and Columbia City." Acreage in Indiana for 1949 according to Bureau of Agricultural Economics of the U. S. Dept. of Agr. was expected to be 16,000 acres for peppermint and 10,400 acres for spearmint. The yield

per acre in pounds of oil was estimated for peppermint as 29; for spearmint, 27. The total production of peppermint oil for Indiana in 1949 was calculated at 464,000 pounds. Yield of spearmint oil was 281,000 pounds. The price of mint oil has varied from a low of 75 cents a pound to a high of \$30.00 per pound. The current price is \$7.00. The mint crop therefore on a comparatively limited acreage in Indiana amounts annually to more than a million dollars. The individual farmer in years of high yield and good prices gets his maximum return with a mint crop on muck soil. William Gehring owner of the Gehring Farms is among the largest growers of mint in this state. He began production on an area of previously uncultivated muck soil. He was forced to borrow money to initiate his enterprise. At present he has 5000 acres of soil under cultivation using the most modern equipment and the latest agricultural technics. His experience demonstrates the possibilities, when mint oil is mixed with intelligence, resourcefulness, and energy.

Mentha piperita is susceptible to a number of diseases. Wilt caused by *Verticillium albo-atrum* R & B is by far the most serious disease of *Mentha piperita*. The attack of this fungus is by way of the vascular system of the host so that conduction is affected disastrously. However, the plant does not become flaccid as is observed with most of the wilts. The leaves near the terminal portion of affected plants are dwarfed and exhibit a characteristic bronze color. Affected plants may not die, but they become seriously dwarfed. This dwarfing may curtail the crop sufficiently so that returns measured in pounds of oil is reduced below the margin of profit. Peppermint, it must be remembered is an expensive crop to raise and process. Nelson (10) reported this *Verticillium hadromycosis* as occurring in Michigan in 1924. Baines was the first to report the disease in Indiana in 1940. It is most probable that the disease antedated its discovery in both states by several years. The disease spread with great rapidity in Michigan until at the present time there are but few fields in that state in which the hadromycosis is not present. History has repeated the Michigan experience in Indiana. The elapsed time in Indiana has not been sufficiently great for our growers to feel the full devastating effects recorded in Michigan mint history. The peppermint acreage in Clinton County, Michigan dropped from 5,815 in 1935 to 1,873 in 1948. Production in pounds of oil for that county dropped from 228,465 pounds in 1935 to 28,941 pounds in 1948. The yield per acre in Clinton County dropped from 39.4 lbs. in 1935 to 15.4 lbs in 1948. *Verticillium hadromycosis* is almost one hundred percent responsible for the decreases recorded. The story of failing mint production in Clinton County has been repeated in every other mint producing county in Michigan; and is being repeated in the muck areas of Northern Indiana. The mint acreage in Indiana has not actually been decreased to date, as we still have new and uninfected areas being brought into cultivation. The actual presence of *Verticillium* wilt was not proved in the Northwest until this year, 1951. Nelson indicated a number of years ago that he had found the wilt in certain areas of the Northwest but he based his observations on symptoms which is inconclusive.

Dr. Johnson of my staff was sent to Washington and Oregon in 1949 to search for the causal organism. He visited all parts of the two states where mint is grown and cultured reported and suspected plants. The culture method is the only exact method of determining the presence of the organism. His cultures were all negative and he concluded that in 1949 the disease was not present in the northwest. However, this summer the organism was cultured from diseased plants and the fungus was identified as *Verticillium albo-atrum* in my laboratory. There is now no doubt of its presence in the Pacific coast states. It is possible that climatic or soil conditions there may prevent its rapid spread.

Users of peppermint oil, particularly the manufacturers of chewing gum are confronted with the gloomy prospect of having to carry on without their most satisfactory flavoring product. This will mean a huge financial loss to such companies until they can educate the public to buy their gum with new, and possibly inferior flavors. The loss to the farmers in these areas is obvious. The loss of an industry to this state can not pass without unpleasant repercussions.

Control of *Verticillium* hadromycosis is difficult. Resistant varieties so useful in circumventing many diseases is not possible because of the high degree of sterility in *Mentha piperita*. My laboratory has been heavily subsidized by The Beechnut Packing Co. for the purpose of finding a basis for control of the disease. I have assigned a research team of nine members to the project. Our lines of attack have included the production, by heat, of disease resistant planting stocks. This *Verticillium* produces sclerotia and these bodies may be the means both of the spread and of maintaining the continuity of the fungus from season to season. To date, little is known concerning the circumstances under which the sclerotia are formed, or how, or when, they germinate. We don't know how resistant they are to drying, cold, chemicals, etc. We are making an intensive study of these sclerotia. We are investigating how the fungus responds as a whole to various soil nutrients; we are interested particularly in the response to the so-called minor elements, to pH in the soil, and to soil moisture conditions. We are making a study of the possible inhibition of *Verticillium* by other soil organisms. We have studied the host range of *Verticillium albo-atrum* and have found that the strain which attacks peppermint is quite specific. We are investigating the mode of entrance of the fungus into the host, and the rate, and manner of spread within the mint plant. We are hoping that the answers to these questions will give us clues as to control, and will contribute to saving *Mentha piperita* and its valuable essential oil as an agricultural industry for the state of Indiana.

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