

## Poorly Known Economic Plants of Canada - 5. Hop, *Humulus lupulus* L.

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**Common names:** hop, common hop, English hop, European hop ("hop" refers to a hop plant; "hops" refers to the hops of commerce, i.e. the female cones). French: houblon.

*Humulus* has three species, indigenous in north-temperate areas. Only the perennial *H. lupulus* is native to North America. It frequently occurs in moist thickets, slopes, river banks, alluvial woods, or along fences and hedges, often in sandy soils. The Asian annual *H. japonicus* Sieb. & Zucc. is a naturalized weed of eastern North America, including southern Ontario and southwestern Quebec.

There are five varieties of *H. lupulus*: var. *lupulus* of Eurasia; var. *cordifolius* (Miquel) Maximowicz of Japan; var. *neomexicanus* Nelson & Cockerell, the predominant wild hop in the western Cordillera of North America, found from Mexico to British Columbia; var. *pubescens* E. Small, of the midwestern U.S.; and var. *lupuloides* E. Small, of eastern North America, which includes most wild hops from the Prairie Provinces to the maritime provinces. The distribution of the two indigenous Canadian varieties is shown on the map. In much of Canada and the U.S. the European var. *lupulus*, is found as an escaped plant from past use in brewing, or as a persisting ornamental around abandoned homesteads.

Hop is a high-climbing, wind-pollinated, perennial vine, sometimes extending more than 10 m. The vines climb by twining, and are assisted in holding onto surfaces by two-hooked hairs that resemble miniature grappling hooks. Charles Darwin entertained himself while sick in bed in 1882 by studying a hop plant growing on his window-sill. He noted that the tip of the stem completed a revolution in 2 hours. The annual, above-ground stem is killed by frost each year, re-growth occurring each season from perennial underground rhizomes and from buds on the rootstock (crown). The rootstocks can live for half a century. The perennial crown becomes woody with age, with heavy, rough, dark brown bark. The hop plant is propagated primarily vegetatively rather than by seeds. More than one hundred cultivars have been named, each essentially a clone. Many of these are of hybrid origin, and have been reproduced asexually for centuries.

Some plants have male flowers, others have female flowers; occasionally plants bear both kinds. In most natural populations of hop, female plants are about twice as numerous as males. Because the female plants produce the commercially valuable hops (the cones or fruit-clusters), and also are of greater ornamental value than the males, the latter are generally discarded as soon as they can be recognized. However, a few males are usually planted deliberately in



England because they increase yield and it is not economical to grow most English cultivars seedless. Male flowers are not organized into "cones," but are in loose inflorescences (panicles). In most hop plantations, males are regarded as a nuisance, since their pollen fertilizes the females, and prevents the formation of the valuable "seedless hops" that are predominantly preferred in commerce. A resin with the valuable brewing constituents is produced in yellow glands on the bracteoles of the cone, as well as on the seeds.

Hop has been used through recorded history for culinary, medicinal, and household purposes, although it is chiefly known as a brewing ingredient. The cultivation of hop was not introduced into England until the close of the 15th century. The hop was brought to North America and grown in the early 17th century. The first commercial brewery in Canada was founded in Quebec about 1668 by the Intendant

Jean Talon, to control the intemperate use of stronger drink. By the middle of the 19th century, New England and New York produced the bulk of the hops of the New World. However, by the early 20th century, the Pacific Coast became the leading hop-producing area in North America. In the 1920's hop growing in New York was practically wiped out by downy mildew and by Prohibition. Similarly, in eastern Canada commercial hop growing was phased out by the end of the Second World War, but became established in British Columbia.

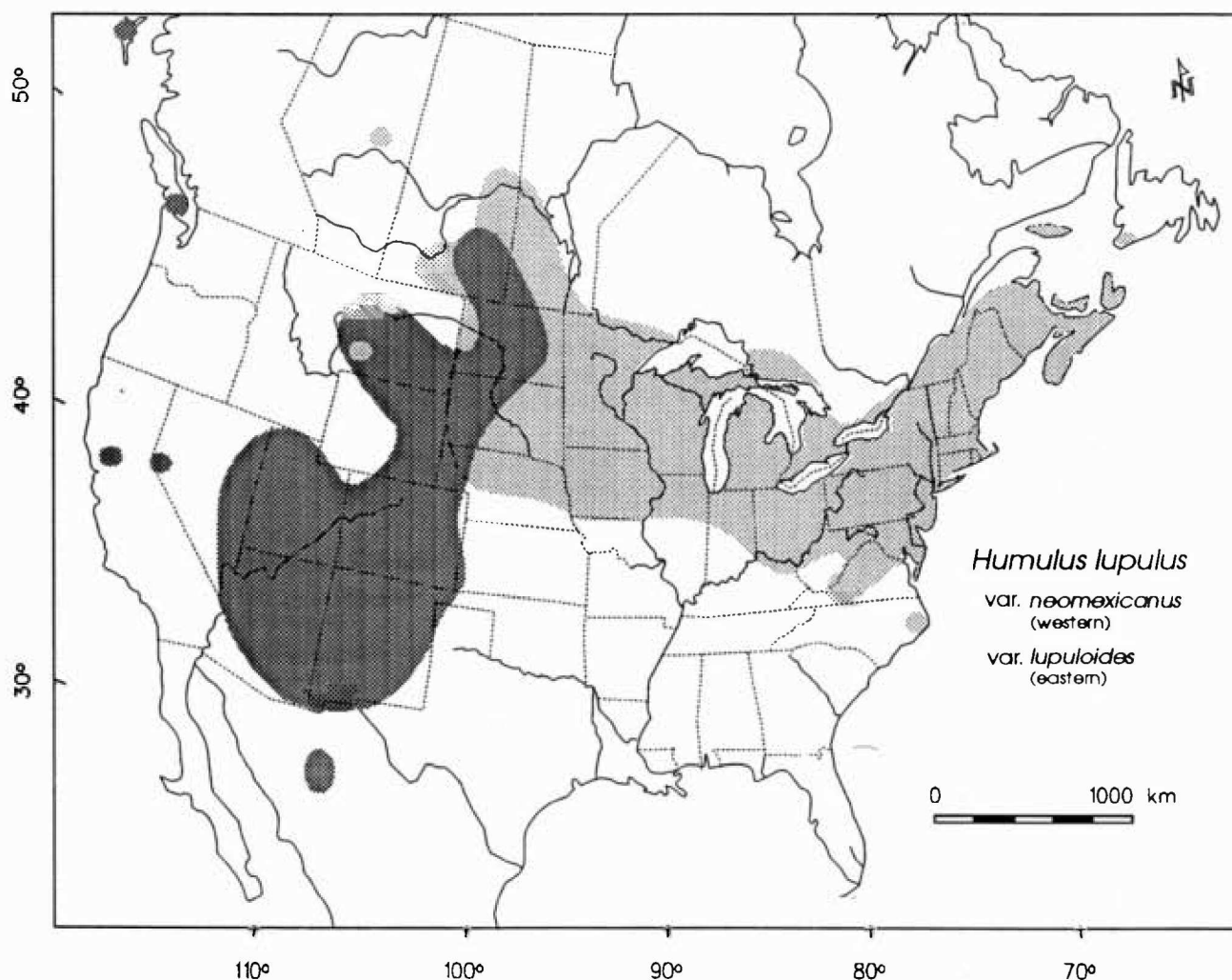
About two dozen countries, including Canada, raise substantial commercial crops of hops. Germany is the largest producer, followed by the U.S. Other centers of hop production include Russia, China, England, the former Czechoslovakia, and the former Yugoslavia. About 114,000 t are produced worldwide annually, on more than 90,000 ha.

The wild European variety, var. *lupulus*, is the ancestor of most brewing cultivars used today. However, both in Japan and in North America, the local wild hops hybridized with the imported European hop, to produce unique cultivars. Brewers have long recognized that North American cultivars have a higher content of the important brewing

constituents, the alpha acids, and produce beer of stronger aroma. Bitter hops are very important commercially, and nearly all owe a great deal to American germplasm. Hop is a good example of a crop that has been substantially improved recently through incorporation of wild germplasm. A wild hop from Manitoba contributed to the improvement of many standard brewing varieties. Indeed, the improved cultivars account for an ever-increasing proportion of production. The contribution of wild hop germplasm was recently valued at almost \$90,000,000 annually in North America.

Hop extracts and oil have been used to flavor tobacco, yeast, beverages other than beers, frozen dairy desserts, candy, gelatins, puddings, baked goods, various confections, chewing gums, and condiments. In the past, yeast for bread-making was prepared by culturing wild yeast in a decoction of hops and water. The hops added flavor and apparently prevented the yeast from spoiling by virtue of their antiseptic properties.

The high oil and resin content of hops contributed to a reputation, greatly exaggerated, for valuable medicinal properties, and hops have a long history of use in folk



medicine. Hop resin is bacteriostatic (against gram-positive organisms) and this factor may lend some credibility to use of hop in former times for treatment of certain types of epidermal sores and irritations, and bacterial infections such as tuberculosis. The hop plant is related to the hemp (marihuana) plant, tempting some to try to smoke the leaves. However, hops are devoid of the mood-altering chemicals found in marihuana. Hop plants are not considered toxic, although they have caused dermatitis in as many as one in 30 hop workers. Today, hop extract is used as an aromatic bitter principle in pharmaceutical preparations and in shampoos. Extracts are used in skin creams and lotions in Europe for their alleged skin-softening properties.

There is a long Eurasian tradition of using hops to induce sleep, including putting the cones in pillows, and planting hop beside bedrooms. Remarkably, American Indians independently adopted the soporific use of the plant. The tranquillizing effect commonly alleged in folklore for hops may have a logical basis in a sedative volatile alcohol, dimethylvinyl carbinol, which comprises up to 0.15% of the dried leaves.

The pharmaceutical use of hop is limited at present, but the use of hop shoots as a vegetable is an interesting possibility. Young shoots (6-10 cm long) are often consumed as a pot-herb, like asparagus. These spears can be boiled for 2-3 minutes, and then boiled in a change of water until tender. When steamed for 5 minutes and served with melted butter or cheese sauce, the shoots taste much like asparagus. In hop-producing areas of Europe, blanched hop spears are often served in fine restaurants. Hop farmers generally have surplus rhizomes from which the spears can be harvested, but because of their desire to maintain possession of unique hop strains, they may not be willing to sell them. In any event, there is a need to select strains that produce tasty shoots rather than good brews.



## BOOK REVIEW

### A Cultural Perspective on a Widespread Plant Genus

When I first offered to review "The Birch: Bright Tree of Life and Legend" by John L. Peyton (McDonald & Woodward, Blacksburg, Virginia, 1994, US\$9.95), I expected it to be a new technical treatise, an update to the "Birch Symposium Proceedings" (U.S. Forest Service, NE Forest Experiment Station, 1969) sitting on my shelf. I was somewhat dismayed to receive a thin (73 pp.) paperback written for the lay public, laced with flowery prose, snippets of poetry, and pen and ink sketches by the author. However, upon completing this delightful book (a comfortable half-day read suitable for a snowbound log cabin, or wishing you were in one), I must say that our familiarity with all organisms would benefit from this sort of treatment. It revitalizes almost-forgotten information with the help of peoples whose lives were entwined with this tree for millennia.

Peyton briefly describes the taxonomy of Betulaceae, and the range, habitat, and autecology of the major species of *Betula*, including their role in colonising disturbed forest land, stabilizing soils, shading trout streams, and the value of *Alnus* species in fixing nitrogen. But he is really a folklorist who has primarily compiled a number of North American and Eurasian tales involving birch trees. He especially emphasizes legends of the Anishnaabeg (Ojibway) and Same (Lapp) peoples. *Betula papyrifera* was as important to the material culture of the Anishnaabeg as *Thuja plicata* was to many Northwest Coast peoples, or as important as *Bison bison* was to the Plains Indians. Its value stemmed largely from its famously strong, flexible, and long-lasting bark. We are all familiar with its use in constructing canoes, lodges, and baskets, but I did not realize that the bark is easily molded upon soaking in hot water, and then holds its shape upon drying and cooling. Hence it has been used to make shoes, leg splints, and burial shrouds as well. Are there some modern applications for this traditional and renewable resource? It is suggested that the Anishnaabeg also practiced individual-tree selection harvesting of paper birch from self-sustaining, sacred birch groves ... perhaps a lesson for modern silviculturalists.

Similarly, *Betula pubescens* figures prominently as a raw material, a player in origin myths, and a symbol of spring and rebirth to many northern European peoples. Birch wood is valued for making furniture, bowls and spoons, now as in the past. The beginning of the growing season in northern cultures has been traditionally marked by the annual breaking of birch buds, and birch or alder sap is symbolically (even linguistically) equated with bear's blood and menstrual blood. Birch as a symbol of new life and vitality seems to reflect its phenological role in flushing earlier than many associated species, its pioneering role in ecological succession, and its ability to produce vigorous stump sprouts after apparently being killed. Peyton also describes how the birch has also played a prominent role as an element (and subsequently a symbol) of discipline ("the birch switch"), and of populism (the "fasces", a bundle of birch rods tied around an axe). Curiously, the perception that a birch tree offers safe shelter from a thunderstorm is found in both Eurasian and American folklore.

In closing his book, John Peyton says, "The birch tree still stands, a living presence, to remind us of times and places in which respect for nature was more important than the immediate pleasure and profit of the individual." For more examples of some the practical uses of the birch, I further refer the reader to George Matz's recent article, "The Worth of a Birch", published in the *International Journal of Ecoforestry* 10(3):141-145, 1994.

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This book may be obtained directly from: The McDonald & Woodward Publishing Co., P.O. Box 10308, Blacksburg, VA 24062-0308.

