Sweet Gale (Myrica Gale)

Features - *Myrica gale* is a species of flowering plant in the genus *Myrica*, native to northern and western Europe and parts of northern North America. Common names include bog-myrtle[1] and sweetgale.[2] It is a deciduous shrub growing to 1–2 m tall. The leaves are spirally arranged, simple, 2–5 cm long, oblanceolate with a tapered base and broader tip, and a crinkled or finely toothed margin. The flowers are catkins, with male and female catkins on separate plants (dioecious). The fruit is a small drupe.

It typically grows in acidic peat bogs, and to cope with these difficult nitrogen-poor growing conditions, the roots have nitrogen-fixing actinobacteria which enable the plants to grow.

North American First Nation Ethnobotany - In some native cultures in Eastern Canada, the plant has been used as a traditional remedy for stomach aches, fever, bronchial ailments and liver problems. Native Americans used it to preserve food, to prepare dye and in fumigations to keep mosquitoes away. They also prepared a diuretic decoction with branches.

Global Uses - Traditionally used as a flavoring for beer, fish and vegetables. Boiled branches were used as a diuretic and to treat gonorrhea. Seeds were boiled to make a yellow dye. The female flowers were used to make fishing lure. In north-western Europe (Germany, Belgium and Great Britain), it was much used in a mixture called gruit as a flavouring for beer from the Middle Ages to the 16th century, but it fell into disuse after hopssupplanted gruit herbs for political and economic reasons.[3] In modern times, some brewers have revisited this historic technique and in Denmark and Sweden the plant is commonly used to prepare home-flavoured schnaps. The plant has been used, and still is, as a mosquito repellent. The essential oil is now recognized as an effective agent against insects (especially mosquitoes). In a Scottish study, volunteers allowed mosquitos free access to their arms. Only one arm was covered with a gel with bog myrtle essential oil. After 10 minutes the protected arm had average of 1.6 stings, while the unprotected arm had 9.4 average stings.

Bog myrtle is astringent and antiseptic herb with styptic, wound-healing and diuretic properties.

Traditionally it was used as a medicinal herb to treat wounds, acne and digestion problems. In Sweden, the dried bark was used to treat intestinal worms and to relieve itching.

In the past, the plant was used to dye wool yellow. It has a spicy scent, reminiscent of camphor, and a bitter strong flavor.

The fresh or dried leaves can be used to make tea. Both leaves and fruits can be, in small amounts, used to add flavor to soups, stews and some meat dishes.

The plant is one of the traditional components for Scottish wedding bouquets and is used as an ingredient in many perfume products and also as a condiment.

Medicinal Potential – Chemical Constituents: Plant was extracted by hydrodistillation and the oil collected after 30 and 60 min. Chemical composition determined using GC-MC analysis. 53 components identified with myrcene (23.18–12.14%), limonene (11.20–6.75%), *α*-phellandrene (9.90–6.49%) and *β*-caryophyllene (9.31–10.97%) the major components in the 30- and 60-min fractions, respectively. Higher caryophyllene oxide content was detected in the 60-min fraction (9.94%) than in the 30-min fraction (3.47%).

The anticancer activities of the extracts discussed above were assessed against human lung carcinoma cell line A-549 and human colon adenocarcinoma cell line, DLD-1. The 60-min fraction showed higher anticancer activity against both tumor cell lines with an IC_{50} value of 88±1 μg/ml. The 30-min fraction had an IC_{50} value of 184±4 μg/ml for A-549 and 160±3 μg/ml for DLD-1. The higher cell growth inhibition induced by the 60-min fraction, as compared to the 30-min fraction, could be due to sesquiterpene enrichment.

Research Potential - Myrica Gale has also been used in research to advance knowledge of nitrogen fixing in plants as discussed in the following abstract:

Plant secondary metabolites, and specifically phenolics, play important roles when plants interact with their environment and can act as weapons or positive signals during biotic interactions. One such interaction, the establishment of mutualistic nitrogen-fixing symbioses, typically involves phenolic-based recognition mechanisms between host plants and bacterial symbionts during the early stages of interaction. While these mechanisms are well studied in the rhizobia-legume symbiosis, little is known about the role of plant phenolics in the symbiosis between actinorhizal plants and *Frankia* genus strains. In this study, the responsiveness of *Frankia* strains to plant phenolics was correlated with their symbiotic compatibility. We used *Myrica gale*, a host species with narrow symbiont specificity, and a set of compatible and noncompatible *Frankia* strains. *M. gale*fruit exudate phenolics were extracted, and 8 dominant molecules were purified and identified as flavonoids by high-resolution spectroscopic techniques. Total fruit exudates, along with two purified dihydrochalcone molecules, induced modifications of bacterial growth and nitrogen fixation according to the symbiotic specificity of strains, enhancing compatible strains and inhibiting incompatible ones. Candidate genes involved in these

effects were identified by a global transcriptomic approach using ACN14a strain whole-genome microarrays. Fruit exudates induced differential expression of 22 genes involved mostly in oxidative stress response and drug resistance, along with the overexpression of a *whiB*transcriptional regulator. This work provides evidence for the involvement of plant secondary metabolites in determining symbiotic specificity and expands our understanding of the mechanisms, leading to the establishment of actinorhizal symbioses.

This research as well as medical research and research on myrica gale as a food additive or cosmetics could be advanced.

Its effects as abortifacient should be studied and better understood.

Food and Drink Uses - The essential oil and the volatile compounds of Myrica gale fruits were analysed by gas chromatography (GC) and GC-mass spectrometry (GC-MS). The volatile compounds were detected using two different fibres for headspace-solid phase microextraction (HS-SPME), Carboxen/PDMS and PDMS. Sixty two compounds were identified, which represented more than 90% of the total extracts. Major components of fruit essential oil are alpha-pinene (22.6%), 1,8-cineole (18.9%) and germacrone (14.2%), whereas they are germacrone (25.1%), alpha-pinene (12.2%), limonene (8.1%) and alpha-phellandrene (8.0%) for the leaf essential oil. Major volatile fruit compounds detected in HS-SPME were alpha-pinene, 1,8-cineole, p-cymene and eth-cadinene. As M. gale fruits are traditionally used in brewery for flavouring beer or as a spice in soups or stews, the antifungal properties of these essential oils were investigated on a panel of foodborne fungi, namely Aspergillus flavus, Cladosporium cladosporioides and Penicillium expansum. A complete antifungal activity was observed at 1000 ppm against C. cladosporioides. Both essential oil and entire fruits could thus be used as an additive in food or cosmetic preparations for their flavour, odour and their conservative properties.

Its use as in a spice blend is being tested in Northern Saskatchewan.

Commercial Potential – There could be potential in its use as a flavouring, preservative and other uses of essential oils.

Potential Quantities in Northern Saskatchewan – Grows on wet shorelines – common in northern Saskatchewan. Supply of up to 250 kg (dried) is possible at this point. Given development time, this supply could be increased exponentially.

Harvest Window – Harvest is best in the mid and late summer months of July and August.

References: https://en.wikipedia.org/wiki/Myrica_gale; http://aem.asm.org/content/76/8/2451.full; http://www.sciencedirect.com/science/article/pii/S0944711304001370; https://www.ncbi.nlm.nih.gov/pubmed/18780242; https://www.herbal-supplement-resource.com/bog-myrtle-benefits.html; http://www.miseagrant.umich.edu/explore/native-and-invasive-species/species/plants/sweet-gale/