

Last updated: 15th January 2003

MILKWEED

Family: *Asclepiadaceae*

Genus: *Asclepias*

Species: *syriaca*



Source of photo see *



Source of photo see**

*<http://www3.pei.sympatico.ca/~david.fraser/jsyriac.jpg> Photo courtesy of Monarch Watch

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General Background

Native to eastern parts of North America, it is naturalised in cultivated ground and dry grassland in various parts of Europe.

Milkweed is a perennial upright herb with many straight stems growing up to 150cm. Leaves are glaucous, 15 - 23 x 5 - 9cm, ovate-oblong, rounded at the base and white with short fine hairs beneath. The umbels are many-flowered and not quite globe-shaped on 5-10cm stalks. Flowers are pink on 3-6cm stalks. Fruits are formed of one carpel and dehisce along one side (follicle), they are white with short soft hairs and spines. Seeds are brown flat and oval shaped, 6mm long and 5mm wide, with a tuft of silky white hairs apically.

Details of Quality Characteristics

Milkweed was formerly cultivated for fibre and as a food-plant for bees. Currently it is being evaluated for fibre production by Natural Fibres Organisation Ltd and Silsoe Research Institute.

The seeds contain up to 20% of an edible semi-drying oil, which is made up of 4% palmitic-, 1% stearic-, 15% oleic-, 15% 11-octadecanoic-, 53% linoleic-, 1% linolenic; 10% 9-hexadecenic-, and 2% 9,12-hexadecadienic-acids. (List and Horhammer, 1969–1979)

According to Hager's Handbuch (List and Horhammer, 1969–1979), the latex contains 0.1–1.5% caoutchouc, 16–17% dry matter and 1.23% ash. Also they report the digitalis-like mixture of α - and β -asclepiadin, the antitumor β -sitosterol, and α - and β -amyirin and its acetate, dextrose and wax.

Condurangin has also been reported from the seed, with at least 9 active cardenolids, among them uzarigenin, desgiucouzarin, syriogenin, syriobioside; also xysmalogenin. (List and Horhammer, 1969–1979)

The sprouts, eaten like asparagus, contain asclepiadin, nicotine, β -sitosterol, α - and β -amyirin and tannin. (List and Horhammer, 1969–1979)

Current Production and Yields

Although not yet grown on a commercial scale the unimproved ‘wild’ type of milkweed produces a yield of 12.33 t/ha based on a plant density of 107,635 /ha. In comparison the developed ‘new’ crop produces a yield of 22.42 t/ha assuming two cuttings per season and a planting density of 107,635 /ha. (see Table 1)

Table 1. Comparisons of the products of ‘wild’ type and developed milkweed with relation to yields, and identification of potential uses.

| | ‘Wild’ type* | ‘Wild’ type* | Developed** | Developed** | |
|---------------------------|-----------------------|----------------------|-----------------------|----------------------|-------------------------------|
| Product | % of dry plant | Yield (kg/ha) | % of dry plant | Yield (kg/ha) | Potential uses |
| Natural rubber | 1.6 | 197 | 4.0 | 897 | Rubber goods manufacture |
| Whole-plant (latex)oil | 4.1 | 505 | 6.0 | 1345 | Chemical intermediates |
| Polyphenol fraction | 7.2 | 888 | 10.0 | 2242 | Chemical intermediate |
| Seed-triglycerol oil | 1.9 | 234 | 0 | 0 | Edible oil |
| Seed-Extracted meal | 7.2 | 887 | 0 | 0 | Foods and feeds (51% protein) |
| Leaf-Extracted meal | 16.0 | 1973 | 33.0 | 7397 | Feeds (20% protein) |
| Floss | 11.1 | 1368 | 0 | 0 | Insulating/stuffing material |
| Bast fibre | 11.0 | 1356 | 3.0 | 1345 | Premium paper making, cordage |
| Woody fibre – pod | 12.3 | 1517 | 0 | 0 | Paper and board making, fuel |
| Woody fibre – stem shives | 27.6 | 3404 | 41 | 9190 | Fuel |
| Total | 100 | 12329 | 100 | 22416 | |

*Based on dry weight and composition of a typical wild plant assuming a plant density of 107.635 /ha

**Assumes 2 cuttings per season with the plant not allowed to seed, combined generic and agronomic improvement.

Source: Buchanan and Duke (1981)

Constraints upon Production

For floss production only 1-3% of the flowers produce mature pods. The seeds contain up to 20% of an edible, semi-drying oil. However, the seed is very light resulting in large quantities of plants needing to be grown in order to obtain a reasonable quantity of oil.

Markets and Market Potential

Milkweed has a variety of uses (see also Table 1). Potential markets include paper and boards, cloth, insulating materials, rubber goods, animal feeds and others which are explained in detail below.

Fibres:

Milkweeds produce tough fibres in their stems. Two types of fibre are obtainable; the long, quite strong but brittle bast fibre and the seed hairs. These fibres can be used to make cloth or twine and may be suitable for use as a substitute for wood in pressed panels. The fibre pulp yields a good paper.

Fibres were traditionally harvested from dead stems in autumn and winter. Dry summers are known to produce the strongest fibres.

Latex:

The plants contain latex which can be extracted and made into a good quality rubber. This latex is largely found in the leaves and is produced mainly in hot weather when grown on drier soil, if exposed to frost it is often destroyed. Concentrations vary but are generally considered to be too low for commercial exploitation. The latex has also been used as chewing gum.

Oil:

The edible semi-drying oil found in milkweed seeds can be used in cosmetics and soap manufacture.

Floss:

Mature seed pods contain large quantities of floss which has a number of applications. It can be used as a kapok substitute for stuffing toys etc, and being very water repellent it has been used in life preservers. Although the floss is difficult to spin on its own it can be mixed with other fibres to make cloth and it has also been used to make candle wicks.

Unfortunately only 1-3% of the flowers produce mature pods.

Energy:

The stems of milkweed can be used as a fuel. The annual productivity ranges to ca 13MT/ha according to the estimates of Buchanan and Duke (1981), assuming a plant density of 107,635 kg/ha.

Dyes:

An extract of the leaves can be used as a dye.

Food Stuffs:

The extracted seed meal contains 51% protein and the leaf meal contains 20% protein. Both seed and leaf meal can be used as fodder.

Virtually all parts of the plants are edible when cooked although there are reports that large quantities can cause stomach upsets. Young shoots, gathered in April/May can be used as an asparagus substitute. Young flower buds have a pea-like flavour as do the very young seed pods (prior to floss production). Flowers are used as a flavouring and a thickener in soups and stews.

Medicinal qualities:

Regular applications of the latex are said to be a cure for warts.

Other Information

Since milkweed is usually harvested from the wild, there is little data currently available relating to its cultivation. Campbell (1983) spaced his rows at 0.7 m apart, planting his seed at the rate of 100/1.5 m, 2 cm deep on an Aquic Hapludult with pH 6.2 (2.0% organic matter). Seed dormancy is broken by removal of the seed coat or with gibberellic acid or kinetin which appear to counteract an inhibitor located in the seed coat. Nondormant seeds can germinate at 14–35°C and apparently emerge best when planted 1–2 cm deep. (Duke, 1993)

Young plants are attractive to slugs and snails which can destroy the whole crop. However, established and strong growing plants seem to be little affected. According to Campbell (1983), there is no evidence of major losses due to insects or disease; however, aphid infestations and viral infections appear common (http://www.hort.purdue.edu/newcrop/duke_energy/Asclepias_syriaca.html)

Research

Currently the SRI (Silsoe Research Institute) is evaluating milkweed as part of a link funded project called Fibrelin, to establish whether its fibres can be removed and to assess its qualities and potential industrial uses (See <http://www.nf-2000.org/secure/Other/F14.htm>).

Useful Websites

http://www.hort.purdue.edu/newcrop/duke_energy/Asclepias_syriaca.html - General information on production and uses of milkweed

<http://www.scs.leeds.ac.uk/pfaf/milkweed.html> - General information on the milkweeds

http://plants.usda.gov/cgi_bin/plant_profile.cgi?symbol=ASSY - Pictures and details of distribution of milkweed

<http://www3.pei.sympatico.ca/~david.fraser/jsyriac.jpg> - Pictures of milkweed

BioMat Net

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