



Taxonomic Characterisation and Economic importance of Lesser known Green manure Crop *Sesbania cannabina* Poir

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Abstract

Now-a-days, the use of organic manures has been overlooked in favour of chemical fertilizers. Interest in green manures has also been revived because of the continuously increasing concern for maintaining long-term soil productivity and ecological sustainability. This interest has led to the identification of lesser known legume plants that have green manuring potential, e.g. *Sesbania cannabina*. *Sesbania* has vigorous growth and is adapted to various adverse climatic conditions. *Sesbania* species fix nitrogen, and produce large no of root nodules for this purpose. Thus, it provides low-cost nitrogen inputs incrop production system. *Sesbania cannabina* is a multipurpose annual plant which can serve as a green manure, green leaf manure, a biofertilizer and is a good companion crop for wetland rice cultivation. It grows well under water logged or unirrigated conditions, tolerant to high temperatures (36-44°C), high soil alkalinity (pH 10) and establishes during rainy season in a wide variety of soils such as loamy, clayey, black and sandy soils. *Sesbania* species can play an important role in long-term maintenance of soil fertility and productivity.

Keywords: Biofertilizer, green manuring, legume, productivity, *Sesbania cannabina*.

Introduction

Sesbania cannabina is a multipurpose leguminous crop and is widely adaptable to various adverse climatic conditions. It belongs to family Fabaceae and is commonly used as a green manure crop. *S. cannabina* is an annual shrub and can fix atmospheric nitrogen due to presence of root nodules.

Table-1
Classification

Kingdom	Plantae- Plants
Subkingdom	Tracheobionta-Vascular plants
Superdivision <i>Spermatophyta</i>	<i>Spermatophyta</i> - Seed
Division	<i>Magnoliophyta</i> - Flowering plants
Class	<i>Magnoliopsida</i> -Dicotyledons
Subclass	<i>Rosidae</i>
Order	<i>Fabales</i>
Family	<i>Fabaceae</i> - Pea family
Genus	<i>Sesbania</i> Scop. – riverhemp
Species	<i>Sesbania cannabina</i> Poir.

Common Names: *Sesbania cannabina* (figure 1) is commonly called canicha, danchi, dunchi fibre, prickly sesban, prickysisham, sesbania pea (English); sesbane (French); canicha, danchi, dhaincha (Hindi); sanô (Tibetan); mrindazia, msalia-Nyuma (Swahili); sano-khangkhok (Thai)¹.

Distribution: The native distribution of *Sesbania cannabina* remains unclear since it has been introduced and naturalised in a wide area and has been reported from India, Iraq, Myanmar, Malaysia, New Caledonia, Phillipines, Mauritius, Ghana, Indo-

China and the South Pacific Islands. It is thought to be native to Australia in all inland states except for Victoria, and also in the Northern Territory, and extending its native range in the islands to the north into Papua New Guinea and Indonesia².

Season, Sowing, Soil and Growth: The optimum time of sowing New Dhaincha for seed production is the middle of March until the end of May. For use as a green manure it is incorporated into the soil one week before transplanting the main season paddy (at 50-60 days old). It can also be intercropped with maize after the first intercultural operation or relayed with wheat. It grows well in all soil conditions as well as can tolerate waterlogging, drought, high temperatures (36-44°C), high soil alkalinity (pH 10) and grows during rainy season in a wide variety of soils such as loamy, clayey, black and sandy soils³. Irrigation is required only once in 10-15 days. The seed rate for the purpose of greenmanuring is 50 Kg/ha and for the seed purpose it is lesser as 20 Kg/ha. Which yield about 25t/ha biomass and 500-600 Kg/ha, respectively. *Sesbania cannabina* is normally spreading shrub, but in dense stands they are less branched. They grow very rapidly and may reach a height of over 3.5 m in 6 months, making them very competitive with weeds. Under waterlogged conditions, it develops aerenchyma and adventitious roots and hypertrophied stem and successfully survived in waterlogged condition. It can produce a green manure in 2-3 months and a fuelwood in 5-6 months. The flowers are mainly pollinated by bees. Ripe pods normally do not shatter and harvesting of seed can be delayed for several months, although pods will shatter eventually and may be damaged by insects⁴.



Figure-1
Sesbania cannabina

Morphological Descriptions

Annual slender subshrub, up to 4m tall. Stem terete, slightly striate, glabrescent. Leaves with 10-45 pairs of leaflets; stipules linear-lanceolate, up to 6 mm long, ciliate; petiole 3-15 mm long; rachis sparsely hairy; stipelssubulate with gland-like tips; leaflets oblong-obtuse or truncate-apiculate or mucronate, 8-25 mm x 3-4 mm, glabrous or sparsely sericeous especially on prominent midrib on lower surface. Raceme about 6 cm long, 4-12 flowered; peduncle about 1 cm long; pedicel slender, shorter or a little longer than the calyx; calyx 3-5 mm long; corolla yellow or orange-yellow; standard transversely oblong-orbicular, 13 mm x 15 mm, conspicuously streaked on back, pale within, claw flat and short, not thickened; wings about as long as the standard; keel slightly shorter than the wings; pistil glabrous. Pod very slender, 12-23 cm x 2.5-4 mm, slightly curved or straight, hardly so when mature, olive-green to brown, with darker, transverse markings corresponding to the septa. Seed cylindrical, about 3 mm x 1.7 mm, dark brown, shiny.

Nutritional value: *Sesbania* species have considerable potential as sources of animal feed. *Sesbania* seeds have been considered as feeds. It is unlikely that *Sesbania* seeds will become feed sources of any significance without their large scale development as gum sources, whereby large amounts of byproduct seed husk and kernel would become available.

Sesbania leaves are generally considered to be excellent sources

of protein to supplement protein-poor roughages in ruminant diets. Studies on nutritional values of *Sesbania* fodder have been conducted with small ruminants.

The proximate composition of Dhaincha seed⁵ is presented in table-2:

Table-2
Proximate composition and energy value of seeds of *Sesbania cannabina* and samples (g 100 g-1DM)

Dry matter	93.13
Crude protein	29.2
Crude lipid	5.68
Ash	3.77
Crude fibre	13.0
NFE (Nitrogen free Extract)	48.4
Gross energy (kJ g ⁻¹)	19.7

The crude protein contents in *Sesbania* seeds are much higher than those reported for conventional legumes, such as chickpea (*Cicera rietinum*), mungbean (*Vigna radiate*) and cowpea (*Vigna unguiculata*)⁶. The crude fibre content of dhaincha is much higher than those reported for commonly cultivated pulses, such as chick pea, horse gram, red gram and black gram⁷ and the high crude protein content is considered as a good indication of nutritive value of the feed material⁸.

Diseases and pests: Damage caused by diseases is generally of

limited and local importance only. A number of insect pests affect the leaves and stems, but damage is mostly minor. References to seed pests are very few, although large amounts of seeds are produced and stored in India⁴.

Economic importance: i. **As green manure crop:** Sesbanias are grown and ploughed under in the same field in rotation with the crop to be benefited. They may also be used as '**green leaf manure**': green matter cut and brought from elsewhere to the field for burial. Green leaf manure may be partitioned from the top growth of nearby green manure crops, or it may be from plants deliberately grown for green leaf manure production on field borders, paddy bunds, and miscellaneous areas. ii. **Use for Soil Reclamation:** Plants which are able to colonize problem soil sites caused by excess or deficiency of soil elements are important in stabilizing and reclaiming such lands. The ability of *Sesbania* species to grow in a wide range of soil conditions has resulted in an expanded range of adaptability and utility as compared to many other legumes. iii. **Sources of Gums:** Seeds of *Sesbania cannabina* contain a water-soluble gum, like guar gum, that produces a smooth, light coloured, coherent, and elastic film useful for sizing textiles and paper products and for thickening and stabilizing solutions. *Sesbania* gums have potential value for industrial purposes. Examples of food products containing gums include ice cream, candy, soft drinks, beer, pastries, and heat-and-serve convenience foods. Gums are also used in manufacture of paper, textiles, and paints, in well drilling, and in mineral assay. iv. **Pulp Fiber Resources:** A number of *Sesbania* species are considered for pulpwood production by CSIRO, Australia. Results of research at the Division of Chemical Technology in Melbourne were reported for seven species including *S. cannabina*, *S. sesban*, *S. tetraptera*, *S. simpliciuscula*, *S. pachycarpa*, and *S. marginata*. Stem core and bark fractions were analyzed separately, but pulping of whole, unseparated stems was recommended. The *S. sesban* and *S. cannabina* accessions tested were designated as having potential as pulpwood crops based on their agronomic characteristics and their physical and chemical pulping properties⁹. v. **Use as Firewood:** The stems have a low density (specific gravity, 0.3), but can be produced in high yield in about 6 months. It is used as firewood crop in northern Pakistan and in Vietnam. In the Cameroons, villagers plant a similar *Sesbania* species for firewood. vi. **Fibre:** The stem can be processed to provide a cordage fibre with jute-like qualities, useful for items such as a fishing net, gunnysacks, and sails. vii. **Used as food:** The flowers of *Sesbania cannabina* is a popular vegetable of Chhattisgarh and natives used it as a vegetable due to its good taste and medicinal properties¹⁰. viii. **Fodder:** The leaves reportedly make a good cattle fodder with high protein and high fibre content. ix. **Medicinal uses:** The leaves of *Sesbania cannabina* have aperient, diuretic, emetic, emmenagogue, febrifuge, laxative, and tonic properties and can be used to cure dysentery, eyes, fevers, headaches, small pox, sores, sore throat, and stomatitis¹¹. The astringent bark was used in treating small pox and other eruptive fevers. The juice of *Sesbania cannabina* flowers is also effective for treatment of

headache, head congestion, or stuffy nose. Leaves are chewed to disinfect the mouth and throat¹². Leaves are also considered good for eyes and it is a common belief that regular use of it as a vegetable improves eyesight and prevent eye diseases. The natives also use it for anaemic patients. According to the healers, as medicine, this vegetable is good for patients suffering from dysmenorrhoea. The vegetable eaten in large quantities upto long time is considered good for treatment of dysmenorrhoea. The use of flowers during flowering season is recommended and its off-season use is not considered good. In Bastar region of Chhattisgarh, the juice of fresh flowers is applied inside the eyes as eye tonic. The natives of this region collect the flowers in the early morning and dry it in shade. They use dried flowers in treatment of skin diseases. After converting the dried flower into powder, the natives prepare a decoction and advise the patients to wash the parts having skin troubles with this decoction. In another method powder is boiled in milk and Makkhan is prepared¹⁰.

Conclusion

On the basis of above mentioned facts it can be concluded that *Sesbania cannabina* Poir. is a multipurpose leguminous crop with wide range of economic uses and there are possibilities for wide utilisation and exploration of more areas of utilisation of this highly resistant green manure crop.

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