

SESBANIA



In Yuma, Sesbania is grown as a cover crop or green manure during the summer months. In the process of growing cover crops involves the soil incorporation of Sesbania while green or soon after flowering, for the purpose of soil improvement.

Sesbania also known as the hummingbird tree in some areas is a small tree believed to have originated either in India or Southeast Asia and grows primarily in hot and humid tropical areas of the world. When mature the tree grows between 6 and 15 feet in height. The leaves are regular and rounded and the flowers white and large, very characteristic.

A major benefit obtained from growing Sesbania is the addition of organic matter to our desert soils. During the breakdown of organic matter by microorganisms, compounds are formed that are resistant to decomposition—such as gums, waxes, and resins. These compounds help bind together soil particles as granules, or aggregates. A well-aggregated soil tills easily, is well aerated, and has a high water infiltration rate.

Arizona desert vegetable growers can achieve increased yields, pest suppression, and reduced soil erosion and nutrient leaching by growing summer cover crops prior to planting winter crops.

Cover crops suppress pests and fix the nitrogen in legumes which enhances plant development especially in organic crop production where synthetic pesticides and nitrogen fertilizers are not permitted. Cover crops can offer similar benefits in conventionally-grown winter vegetables.

Unlike other legumes, Sesbania does not need herbicide applications to be established in weedy fields and is considered an excellent cover crop in our hot Yuma climate. When planted in late spring, this crop can cover the ground in less than 4 weeks, and in 50 days Sesbania can grow over 6 feet tall and produced over 2 tons per acre of dry biomass. The nitrogen that Sesbania captures from the atmosphere is estimated to be about 100 pounds per acre.

Typically, Sesbania starts to flower in early September in the low deserts and needs to be cut or incorporated into the soil before the end of September.

The flowers of Sesbania are eaten as a vegetable in Southeast Asia, particularly in Laos. The young pods are also eaten, along with the leaves.

Family: Leguminosae

Genus: Sesbania

Species: various, *S. grandiflora* (Agati), *S. sesban* (Common Sesban)

(i) General background on the plant

A native to Asian countries such as India, Malaysia, Indonesia and the Philippines where it is commonly seen growing on the dikes between rice paddies, along roadsides and in backyard vegetable gardens. Most *Sesbania* spp can be described as soft, semi or slightly woody, 1-4 m tall perennial nitrogen fixing trees. *Sesbania grandiflora* has large red or white flowers, up to 10 cm in diameter. The plant's first outstanding feature is its extremely fast growth rate, especially during the first 3 or 4 years after planting. In Australia and in India, plantations have attained heights of 8m in under 3 years.

(ii) Details of quality characters

The tree provides forage, firewood, pulp and paper, food, green manure and landscape decoration. It also has potential for reforesting eroded land and grassy wastelands through the tropics. The wood is of low quality.

A new saponin was isolated from the seeds of *Sesbania sesban* by Kohli et al.

Reclamation of problem soils by *Sesbania bispinosa*.

It is also possible to make a protein concentrate (Leaf Protein Concentrate, LPC) from the leaves of *Sesbania grandiflora*: fresh leaf protein content is about 8.4 % protein.

Chemical composition of 100 g LPC:

Total N 10.3 g

Fibre 1.8 g

Mineral matter 3.3 g

Iron 76.7 mg

Calcium 517 mg

beta Carotene 66350 mu.g

Essential amino acid contents of LPC: (g/16 g N)

Arginine 6.1 g

Histidine 2.5 g

Isoleucine 5.8 g

Leucine 10.0 g

Lysine 6.2 g

Methionine 2.9 g

Phenylalanine 6.5 g

Threonine 4.7 g

Valine 6.3 g

LPC is a rich source of lysine and threonine which are deficient in cereals and millet.

(iii) Current production and yield

Of 35 accessions of *Sesbania* assessed for potential uses as pulp fibre, animal fodder or green manure, 25 were considered high yielding varieties (HYV), producing 8-17 t/ha dry matter containing 150-245 kg/ha N when sown at 125,000 plants/ha and harvested 98 days after planting. Most HYVs similar to *S. canabina* and *S. bispinosa* are grown as green manures in Asian lowland rice systems. A perennial *S. sesbania* accession was evaluated for fodder production, and in the one year after planting produced 20 t/ha dry matter in 5-6 cuts during the year.

54 days after sowing green matter production was 26 t/ha (India). Average woody biomass at maturity, 200 days after sowing was high (19 t/ha) (India) showing potential for short term fire wood production. There is a linear relationship between *Sesbania* plant size and woody and leafy biomass produced.

Coppice stands of *Sesbania sesban* exhibited better sprouting, greater height increment and canopy spread and greater diameter of mainstem at 25,000 plants/ha than at 50,000 or 75,000 plants/ha.

In India it is recommended that *Sesbania sesban* plantations for fuel or pulpwood production should be harvested in the second year after planting and coppiced annually for 2-3 years.

(iv) Constraints on production

The tree is a native of the tropics, therefore conditions which support its growth are only likely to be found in the southern, hotter areas of southern Europe. The tree is frost sensitive, it is not wind resistant, its brittle branches easily break. It is also very susceptible to nematodes. It is best adapted to the moist tropics with annual rainfall in excess of 1000mm rainfall and no more than a few months of dry season. It does however grow abundantly on the arid island of Timor.

(v) Markets and market potential

Agati (*Sesbania grandiflora*) leaves could be used as herbage for growing goats.

Cold soda pulps were prepared from *Sesbania aculeata* and *S. aegyptiaca* (bark) from chips of the plants. Softened chips were refined twice at 50°C. The cold soda pulps can be admixed with long fibre chemical pulps to make news print and several industrial papers.

Medicinal uses:

Cancer inhibitor found in seed (Sesbanimide: isolated from *Sesbania drummondii*).

Ethanol seed extracts of *Sesbania vesicaria*, *S. punicea*, and *S. drummondii* showed antitumor activity.

Sesbania grandiflora has many medicinal uses, e.g. for treating catarrh, headache and epilepsy. Aqueous extracts of the flowers produce a loss of haemoglobin from red blood cells of humans and sheep. The primary compound responsible was the methyl ester of oleanolic acid.

(vi) Other information

A nodulated nitrogen-fixing plant, the average concentrations of N, P, K, S, Ca and Mg in the shoots are enough for *Sesbania* species to be useful as an integrated biofertiliser source. In N. Africa Rhizobium-containing nodules of root and stems of *Sesbania rostrata* are responsible for fixing nitrogen, at a rate of up to 200 kg N ha⁻¹.

Sesbania exaltata is susceptible to *Colletotrichum truncatum* causing losses in biomass of seedlings.

Sesbania Mosaic Virus (SMV) decreased net respiration rate, gross production/unit leaf area and chlorophyll and carbohydrate content, but increased respiratory loss in *Sesbania sesban*. Gross production increased for 60 days after inoculation with SMV.

See the following pages in the NF-2000 Database

Biology Experts Ltd

(vii) Contacts

(viii) References

Tropical Legumes: Resources for the Future. National Academy of Sciences.

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