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DHAINCHA (*SESBANIA ACULEATA*): A POTENTIAL MULTIPURPOSE CROP – AN OVERVIEW

RAJESH KUMAR ARYA[1], PANKAJ KUMAR[2], M. K. SINGH[3], PRAKHAR SINGLA[1], RAVISH PANCHTA[1], VIPAN KUMAR*[,1], VINAY KUMAR[1], KANIKA[1] AND SATYENDER SINGH[4]

[1]Department of Genetics and Plant breeding,
CCS Haryana Agricultural University, Hisar-125 004 (Haryana), India
[2]Department of Microbiology, Kurukshetra University, Kurukshetra (Haryana), India
[3]KVK, Kurukshetra, CCS Haryana Agricultural University, Hisar-125 004 (Haryana), India
[4]Department of Genetics and Plant breeding, FASC, SGT University, Gurugram (Haryana), India
**(e-mail: vanynagpal@gmail.com)*

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SUMMARY

Dhaincha (*Sesbania aculeata*) is a leguminous multipurpose plant found widely dispersed in sub-tropical and tropical regions over the world; and it is mostly sown by the farmers of India for green manuring due to its huge potential to fix nitrogen in the soil. In addition to this, it is also grown for green fodder purposes. The present review was written to highlight the several other important uses of dhaincha for all-inclusive information's for researchers and academicians who wants to read this potential plant in more detail about its medicinal properties. Different plant parts of dhaincha are used for different purposes such as phytoremediation, antioxidant effect and, anti-inflammation antifertility and abortion agent, anti-microbial effects, fire-wood, animal feed and pastures development, weed control, green manuring, mosquitos repellent, live support to vines/creepers and *Schistosoma* control. Its fresh flowers also used as vegetable. Having so many medicinal uses and other uses of different plant parts in daily life of common people, it has an immense potential to contribute in ecological livelihood by managing nutritional food for households and health safety.

Key words: Dhaincha, *Sesbania aculeata*, green manure, nitrogen fixation, medicinal and nutritional value

Sesbania (*Sesbania aculeata*) is called as Dhaincha in Hindi and have a prominent place to the family Leguminosae and found widely dispersed in the tropics and sub-tropics and is primarily used as green manure crop to enhance soil fertility. Sah (2021) reported that combination of *Sesbania aculeata* and fertilizer facilitated in yield enhancement as well as improvement in soil health status. It can be utilized as a cost effective and feasible alternate option through partial replacement of inorganic fertilizers to increase the soil health and productivity of rice-wheat cropping system. As we know that the natural resources are depleting with alarming speed, and creating energy crisis, and ecological disturbances, due to excessive use of fertilizers and dread of price increase of the fertilizers, therefore, *Sesbania* is considered as a green manure plant to sustain the soils fertility and productivity (Arya and Kumar, 2021).

Dhaincha has deep tap-root system and found suitable for water-logged as well as soils effected by salinity (Tomar and Tomar 2023). It is fast growing and an ideal crop for green manure, due to succulent, easily decomposable nature with limited requirement of moisture and add extreme volume of organic substance and nitrogen. It is also cultivated as green fodder for animals. *Sesbania rostrele* is also grown for soil reclamation purposes of saline, saline-sodic soils. Dhaincha can be grown on desertification and marginal lands and has the capacity to reclame them. It requires about 750-800 mm rainfall and temperature 22-35 degree for high production. It can be cultivated on all kind of soils and even give good results in saline soil salinity (Tomar and Tomar 2023).

By incorporation of succulent *Sesbania* plant of 55-60 days in the soil add about 61 quintal of N and also works as buffering agent in the soil, as it holds a huge volume of organic substance having low C:N ratio. This condition of soil helps in quick release of atmospheric N in the available form for plant roots in the soil (Singh and Arya, 2016). Along with the enhance of soil fertility, it also improves the physical structure of soil, therefore, prevents leaching of nutrients as well as conserves the moisture of the field into deeper layers of soil and also prevents weeds. Utilization of

such type of natural resources in the development of sustainable elucidations to elementary crop limitations has been proposed by several researchers but these resources are not exploited entirely because of their inherent problems of large size and absence of adequate evaluation (Yadav and Singh, 2014).

In India, the farmer of low income group cannot purchase chemical fertilizers and quality feeds for animals (Wakjira et al., 2011). Therefore, villagers depends on the natural means to improve the soil fertility such as green manuring, and for feeding animals depends on agroforestry system (Singh *et al*., 2026). In recent past, diverse exotic/native multi-purpose fodder utility tree species i.e. *Moringa oleifera* and *Sesbania aculeata* are encouraged by different institutes to maintain soil fertility and also to solve the feed shortage problems, as well as to check the soil depletion.

Sesbania aculeata is a quick growing and N-fixing shrub with deep root system accompanied with high leaf foliage makes this as one of the greatest gifted species for cover cropping in a short-duration (Desaeger and Rao, 2001) and also utilized as a protein complement to grasses for saleable crude protein complements (Mekoya *et al*., 2009). Moreover, it has remarkable ability to resist against soil erosion and maintains fertility of soil under agro-forestry system (Degefu et al., 2011). The products made from *Sesbania* are not restricted to this, it have medicinal value to relieve us from sorrows. Even today, more than 80% villagers are directly dependent on local herbs and shrubs for their basic health treatments (Wondimu *et al*., 2007). In addition to this, its fresh flowers also used as vegetable. In view of above points, the research findings on Sesbania were compiled from different sources on the various attributes and its utility in agriculture, health and other sectors.

BOTANICAL DESCRIPTION

The species, *Sesbania aculeata* (L.) falls to the sub-family Papilionoideae, family Fabaceae or Leguminosae (Dinendra and Azad-ud-doula, 2001; Gupta *et al*., 2011; Pandhare *et al*., 2011) belongs to tribe Robinieae (Forni-Martins & Guerra, 1999) with 2n = 12 chromosome (Gillett, 1963; Heering, 1995) and n = 6, 7, 8, 12 and 14 haploid chromosome (Heering, 1995; Nigussie and Alemayehu , 2013).

The genus *Sesbania* Scop. (Fabaceae) have nearly 50 diverse species, which found extensively disseminated in the tropics and subtropics. Chiefly the *Sesbania* species are annual types, some have comparatively short lifespan, and woody perennial also. The extreme diversity among the species was noticed in Africa (widely distributed in northern, central, southern and eastern Africa) with 33 species reported by different researchers (Gillett, 1963; Yang et al., 2003; Degefu *et al*., 2011; Gupta *et al*., 2011; Vadivel *et al*., 2012). Five varieties of *S. sesban* are botanically documented (Mani *et al*., 2011; Gutteridge, 1993) viz., *S. sesban* var. *bicolor S. sesban* var. *sesban, , S. sesban* var. *nubica, S. sesban* subsp. *punctata* and *S. sesban* var. *zambesiaca*. The first three varieties are almost similar in nature and known for their fast and vigorous growth habit accompanied with high herbage yields, while the last two varieties are not popularly known (Gutteridge, 1993). Other known species of Sesbanaia are : *S. hiristyla, S. afraspera, S. sericea, S. greenwayi, S. coerulescens, S. cinerascens, S. macrantha, S. speciosa, S. quadrata, S. keniensis, S. goetzei, S. formosa, S. rostrata, S. pachycarpa, S. grandiflora, S. cannabina, S. microphylla, S. lectocarpa, S. emerus, S. exasperata, S. simpliaiuscula, S. virgata, S. tetraptera, S. exaltata, S. erubescens, S. formosa, S. campylocarpa, S. nilotica,* and *S. bispinosa* (Sardana *et al*., 2003).

S. aculeata is having deep rooted system and single/multiple stem, with narrow-crown, and able achieve height up to 8 m (Mani *et al*., 2011) with stem diameter upto 20cm. This plant is rapid growing type (Makatiani and Odee, 2007) and it can grow with speed 4.5 - 6.0 m / year (Siddiqi *et al*., 1985); and usually flowering, pod development and ripening of pods takes place within a year after sowing (Heering, 1995). If it is space planted, it generally produces profuse side branches. The numerous branches provide the tree a shrubby outlook (Orwa *et al*., 2009). Its leaves are 12 to 18 cm long but narrow, and compound paripinnate type; the leaflets bear in pair (about 6 - 27 pairs of leaflets per leaf) (Mani *et al*., 2011), oblong or rounded, typically asymmetric at the base, often glaucous and stipules are either absent or miniature (Fig. 1).

It generally bears yellow flowers with brown or purple lines on corolla. Flower is beautiful, yellow, purplish, red, splashed or variegated, rarely white, large or small on lean pedicel, paired or solitary in short axillary racemes; all petals are long clawed, standard orbicular or ob-ovate. Pods are linear in shape and pale yellow in colour (Pandhare *et al*., 2011) or somewhat curved with 10-20 cm long and 0.5 cm wide containing up to 30-50 seeds. Seeds colour is brown or dark green mottled with black and seed shape is sub-quadrate or oblong (Orwa *et al*., 2009; Pravin *et al*., 2012).



Fig. 1. *Sesbania aculeata* single plant, seed production field, root nodules, leaves & flowers, pods and seeds.

Origin and distribution

Sesbania seems to be originated in east Africa. But, the exact place of origin of *Sesbania aculeata* is undecided, however, it is extensively disseminated and found everywhere in tropical regions of Africa and Asia including India. It was introduced in the tropical region of America (Heering *et al*., 1996) and in Ethiopia also (Mekoya *et al*., 2009; Orwa *et al*., 2009).

Local names *Sesbania*

Sesbania is well-known by diverse local names for example dhaincha (India), jainti or jayant (Bengali); sesbania / sesban (English); janti/jayanti/puri (Indonesian); dien-dien (Vietnamese); rivierboontjie (Afrikaans); sesaban (Arabic); girangire (Amharic); Egyptian-sesban (Dande *et al*., 2010), common-sesban, river bean, frother, Egyptian rattle pod, umsokosoko (Zulu); muzimbandeya or mubimba (Luganda) and Añil francés / tamarindillo (Spanish) (Pravin *et al*., 2012).

Improved variety development

The Network Project on "Genetic Evaluation & Improvement of Sesbania and Crotolaria for Green Manuring" was during 2000, under this project, through exploration about 109 germplasm lines of Sesbania spp. were collected from the various locations in India (Punjab, Rajasthan, Bihar, UP, Utrakhund, Meghalaya and Karnataka) and 86 accessions were introduced from Ethiopia, Australia, Brazil, Australia and Philippines belonging to 31 species during 2002-03 through Exchange Division of NBPGR, New Delhi. The promising germplasm accessions of *Sesbanis spp*. were identified for green manuring in AVT-I & AVT-II during 2002-03 at seven location in Inida, viz., Modipuram, Pantnagar, New Delhi, Hisar, Faizabad, Ludhiana and Samastipur. Based on two years

performance on diffrent manuring traits, Ses H-1 was found superior to other accessions, at 45 DAS and Ses-Pant-1 at 60DAS (Sardana *et al.*, 2003). Keeping in view, the performance of Ses H-1 was released and notified as DH-1 (Dhaincha Haryana No. 1) and Ses-Pant-1 as Pant Dhaindha-1. Other officially released varieties of dhaincha are: ND-1 (Narendra Dhaincha-1), Punjab Dhaincha-1, CSD-137 and CSD-123. According to ICAR-NBPGR, New Delhi, DH-1 (Dhaincha Haryana No. 1) is the best variety of *S. aculeata* for green manuring the agriculture fields to improve the fertility status of soils (Sardana *et al.*, 2003).

Seed production

Dhaincha (*sesbania aculeata* L.) is grown generally a green manure crop in India it can also be grown for seed purpose, be in very less amount. It has nodules and absorbed atmospheric nitrogen and fixed in the soil. Therefore, it is known as double purpose crop. Dhaincha is Very economic crop and requires very less amount of fertilizers and even, it can be grow without fertilizers. According to experts, Dhaincha is having 5 types Spp. and among them *Sesbania rostrata* and *Sesbania aculeata* are very popular for green manure & seed purposes: Dhaincha yield about 400 q /ha dry matter, which is used for green manure purpose and if, it is grown for Seed purpose, it fields uplo 15 q seeds/ ha and average yield of Seed is 8-12 q/ha 259 Soils (Tomar and Tomar 2023).

As *Sesbania aculeata* is an indeterminate crop species and continuously reflects vegetative growth. Therefore, for early and high seed production, nipping of main shoot at 45-55 days after sowing stimulates the early development of flower bearing lateral branches. As nipping respond to early flowering in legumes (Majoka *et al.*, 2021; Kumar *et al.*, 2024) which ultimately leads to early maturing crop with high seed yield in comparison to without nipping and early vacation of field is possible for timely sowing of *rabi* season crops (personal communication Dr. Rajbir Garg, 2026).

Nutritional profile

The seeds of *Sesbania* have 30 - 40% crude protein (Hossain and Becker, 2001), 5 - 6% of lipids and only 2.70 - 3.30% ash content (Hossain & Becker, 2002). According to Debela *et al.* (2011), crude protein matter in *S. sesban* fractions differe from 194 g/kg (in twigs) to 297 g/kg (in leaves) on dry matter basis. Moreover, Akkasaeng *et al.* (1989) worked on *in vitro* dry matter digestibility (IVDMD) of *S. sesban* by using latest techniques and reported 75% IVDMD. According to Katiyar and Ranjhan dhaincha (*Sesbania aculeata* / *Sesbania bispinosa*) is revealed a good quality green forage free from toxicity and also rich in to supplement feed for sheep.

Biochemical properties

The saponins, are found in seeds of sesbania, and get released upon hydrolysis of a neutral sapogenin and oleanolic acid (Sharma *et al.*, 2014). The fatty acids found in seed oil are: stearic acid, palmitic acid, linoleic acid and oleic acid. The seed protein made up of different types of amino acids: lysine, valine, isoleucine, phenylalanine, leucine, methionine, and threonine (Kapoor *et al.*, 1992). Dhaincha fibre and seeds are composed of cellulose, lignin and galactomannans (Salpekar and Khan, 1997). Thiolignins of wood are made of p-hydroxy-phenyl-propane guaiacyl, and syringyl. The roots, stems and leaf of S. aculeata imparts good nutritive worth to the field soil, and exhibited the occurrence of poriferasterol, tricontanol, poriferasterol glucoside, â-sitosterol glucoside, 5,12-dihydroxyoctadec-6(Z)-enoic acid, 14,20-dihydroxycos-6(Z)-enoic acid, heptadecanoyl-1-tridecanoic acid, and pinitol (an antidiabetic compound) (Misra and Siddiqi, 2005). A novel hydroxyl fatty-acid was observed in *S. aculeata* seed oil and named as ricinoleic acid ((Z)-12-hydroxyoctadec-9-enoic acid) (Parveen and Rauf, 2008; Sharma *et al.*, 2014).

Sesbania seed contains various anti-nutritional factors such as saponin, tannin, and trypsin inhibitors. These anti-nutritional aspects are the main problem when its seeds are utilized as feed for animals (Hossain and Becker, 2001). Biochemical reearch on seed managed to identify and isolate, galactomannan, stigmastane-5.24 (28) – diene - 3â-O-â-D-galacto-pyranoside and oleanolic acid (Das *et al.*, 2011). Kathiresh *et al.* (2012) reported that this plant seed extracts have a rich amount of flavonoids, phenols and anthocyanin compounds. The leaves and pods have beta-sitosterol and campesterol. Flowers are rich in delphinidin and cyanidin glucosides. Pollen and pollen tube contains pyruvic acids, oxaloacetic and alpha-ketoglutaric (Pandhare *et al.*, 2011). From the root extracts of *S. sesban*, Das *et al.* (2011) reported

Oleanolic acid, 3-â-D-glucuronide which has potential spermicidal properties. According to Vadivel *et al*. (2012), among the glucuronides, the end products of saponin and oleanolic acid were accountable for the molluscan properties of this plant species. On their biochemical screening studies carried out by Mythili and Ravindhran (2012). They repoted that the root as well as stem extracts of *S. sesban* contain alkaloids, phenols, phytosterols, proteins, carbohydrates, flavonoids, gum and fixed oils. But, studies on the leaf extracts displayed the occurrence of all these biochemical except fixed oil and phenol.

Ecological adaptation

Sesbania found growing as a natural vegetation in areas with a semi-arid to sub-humid climatic conditions (Degefu *et al*., 2011; Arya and Kumar, 2021), with a rainfall between 500and 2000 mm per year and temperature ranging from 18 to 23°C (Orwa *et al*., 2009; Nigussie and Alemayehu, 2013). In the areas of low rainfall however, it occurs mainly on poorly drained soil fields which are generally exposed to sporadic flooding or water-logging conditions. Because of its good tolerance against the low temperature conditions (Heering, 1995), it can be planted at an altitude ranging from 100 to 2300m (Orwa *et al*., 2009; Nigussie and Alemayehu, 2013). It is also revealed that *Sesbania* has moderate tolerance to shade therefore, it can the grown successfully under agroforestry system. In addition to this, it was also found well adapted to a wide range of soils, from loose sand to heavy clay soils. Even-more, it also expressed a remarkable tolerance pawar against flooding or water-logging conditions as well as saline, acidic, alkaline soils (Nigussie and Alemayehu, 2013) and soils laden with heavy metals (Gupta *et al*., 2011). Under water logged conditions, *Sesbania aculeata* develops areal roots the collor region of stem sothat the roots respiration process to be remain continued. This remarkeable adaptability increases its adaptation t water logged conditions (Personal communication: RK Arya, 2026).

Insect pests and diseases

In natural field conditions, *Sesbania* is attacked by several insects such as leaf-eating beetles, nematodes, fungi and viruses. The leaf-eating beetle, *Mesoplatys ochroptera* has been described as a severe pest of *S. sesban* in Kenya, Ethiopia, Malawi, Tanzania, Mozambique, Uganda and Zambia; likewise, some other leaf-eating beetles (*Exosoma* and *Ootheca* spp.) have been also found from Zambia and Malawi (Sileshi and Hailu, 2006). *M. ochroptera* is so much heavy feeder of forage parts and may completely defoliate the plants that may cause mortality of plants, if monitoring was not taken during early establishment phase of the crop (upto 60 days after sowing) (FAO, 2007). Insects such as *Hilda patruelis Anoplocnemis curvipes, Formicomus* sp., *Medythia quaterna*, and *Exosoma* sp., have been also reported to attack *Sesbania* in southern part of Africa (Sileshi *et al*., 2000). A weevil, *Alcidodes buho* was also damages its plants. *Azygophelps scalaris* larvae also attacks on young shoot of this plant by boring the stem. Likewise, a bacteria, *Xanthomonas sesbaniae* also found affecting the foliage and stem. The seeds of *Sesbania* are often destroyed by different types of beetles and bruchids (Orwa *et al*., 2009; Nigussie and Alemayehu, 2013).

USES DESCRIPTION

Sesbania is a multi-purpose plant, it's some species, if grow in isolated may achieve sufficient height and looks like a tree. The medicinal properties of *S. aculeata*, includes antibacterial, anti-inflammatory, antioxidant, and anticancer effects (Ekor, 2014). The different plant parts of *Sesbania* (bark, root, seed, leaf and stem) are used for numerous purposes and discussed one by one:

Green manuring

Sesbania is a quick growing leguminous plant responsible for fixing atmospheric nitrogen into the soil and has the capability of fast decomposition after incorporation in the field soil to serve as a green manure (Patra *et al*., 2006) in alley cropping (Heering, 1995) which could bring about considerable augmentation in crop accessible nitrogen and also enrich the soil organic carbon status (Singh and Arya, 2016) (Table 1).

Forage

Sesbania plants have good amount of foliage nitrogen and it also serves admirable supplement to protein deficient grasses (Manaye *et al*., 2009; Sabra *et al*., 2010; Nigussie and Alemayehu, 2013). The soft

and tender branches along with leaves of this plant have extraordinary ranks of crude protein (from 20 to 25%), and digestible effortlessly when eaten by goat, cow & buffalo (Pravin *et al*., 2012). The cutting of *Sesbania* plants for animal fodder purposes has a long history (Naik *et al*., 2011). In Ethiopia, feeding *Sesbania* young twigs with leaves gaining importance as a rich protein addition to a basal diet of poor quality forage/ grass for the ruminants (Tessema & Baars, 2004). According to, Manaye *et al*. (2009), the sheep feeding with diet having 300 g/kg *Sesbania* foliage exhibited 103 g/day average every day weight gain of animal.

Anti-inflammatory effect

The biomolecules isolated from the tender leaves with stems have excellent potential for pharmaceutical anti-inflammatory drug development. A new flavone-glycoside isolated from the stems of *S. aculeata*, 5,7,8-trihydroxy-6,4′ -dimethoxyflavone-7-O-α--rhamnopyranosyl-(1→4)-O-β--xylopyranosyl-(1→4)-galactopyranoside, which exhibited effective antioxidant properties (Satnami and Yadava, 2012). From *Sesbania aculeata* leaves extract, three biomolecules were isolated i.e. ceramide, cerebroside and triterpene acid 3-O-α-L-rhamnopyranoside along with other nine known biocompounds (Tricontanol, Lauric acid, Palmitic acid, Heptadecanoyl-1-tridecanoic acid, β-sitosterol, stigmasterol, poriferasterol glucoside, ononitol and pinitol). The anti-inflammatory prospective of all three bio-compounds were assessed by using in vitro technique and revealed significant results (Sharma *et al*., 2014).

Reproductive and milk production enhancement

According to Sabra *et al*. (2010) the animal feed supplementation with *Sesbania sesban* improves the reproductive enactment of sheep; and its addition up to 30% in animal feed improved feed-intake, animal growth, onset of puberty and early reproductive development. Furthermore, sheep feed supplementation with 30% *S. sesban* in the ration exhibited a 13% increase in milk production over supplementation with concentrates only (Mekoya *et al*., 2009). Sesbania pods and leaves have been taken by lactating females to stimulate or increase milk secretion. Ochse (1931) reported that tender pods and leaves of *S. grandiflora* are especially given to nursing mothers. According to Brown (1954), feeding *S. sesban* leaves to cattle is believed to increase their milk production.

Vegetable

Raw or lightly steamed after removing calyx and pistil of *S. grandiflora*, are utilised in soup, salad and vegetable dish. Moreover, its leaves are also eaten as a vegetable after cooking. In Sri Lanka, *S. sesban* leaf is cooked with chopped onions in coconut milk, making a vegetable component of meal. In India, *S. grandiflora* leaves had bitter test, therefore, utilized by mixing with other leafy vegetables (Gopaldas *et al*., 1973).

Nitrogen fixation

The nitrogen fixing bacteria (*Rhizobium*) found associated with the root nodules of Sesbania plant, it catches the atmospheric nitrogen and fix into the soil (Singh and Arya, 2016). According to Shaheen *et al*. (2004), in symbiotic association with *Rhizobium* bacteria, Sesbania can fix up to 542 kg N per hactare. Likewise, Degefu *et al*. (2011) also stated nitrogen fixation level 500 - 600 kg N/ha/year and is predominantly helped for soil fertility renewal.

Bioenergy

The thick stem and numerous branches of Sesbania plant are generally used for fire-wood & char-coal making because it yields a comparatively smokeless, fast sparking and hot fiery woody by-product within a small period (Naik *et al*., 2011; Pravin *et al*., 2012). According to Sileshi et al. (2000), *S. sesban* yields fuelwood about 10 - 20 t per ha if planted as pure crop. The tree year's old plant has calorific yield around 4350 kcal/ kg (Orwa *et al*., 2009). Due to its speedy growth and soft woody nature, this plant has an immense potential for the production of pulpwood (Pravin *et al*., 2012).

Ethno-medicine

The leaves of *S. sesban* helps to discharge abscesses/boils and raptness of rheumatic inflammations (Pravin *et al*., 2012; Dande *et al*., 2010). Furthermore, fresh leaves juice has anti-helminthic activity (Orwa *et al*., 2009). Its fresh roots are also serves as good cure for scorpion bites (Vadivel *et al*.,

TABLE 1
Uses of *Sesbania spp*. medicinal, agriculture and other areas

Use	Type of use	Parts used	References
Medicinal uses	Ethnoveterinary use	Leaf	Wondimu *et al*. (2007); Orwa *et al*. (2009); & Vadivel *et al*.(2012)
	Anti-inflammatory effect	Leaf	Sharma *et al*., (2014)
	Traditional medicines	Leaf & roots	Orwa *et al*. (2009); Dande *et al*. (2010); Vadivel *et al*., 2012 & Pravin *et al*. (2012)
	Antimicrobial activity	Flowers	Mythili & Ravindhran (2012); Kathiresh *et al*. (2012); Alagesaboopathi (2012) & Vadivel *et al*. (2012)
	Antioxidant effects	Flowers	Mani *et al*. (2011) & Kathiresh *et al*. (2011)
	Anti-diabetic roles	seeds & leaves	Pandhare *et al*. (2011); Boddupalli *et al*. (2012) &Vadivel *et al*. (2012)
	Anti-fertility agent	Seeds	Singh (1990); Tirkey (2006) Das *et al*. (2011) & Saravanan *et al*. (2012)
Agricultural uses	Controlling *Striga asiatica*	Leaves	Sikwese *et al*. (2003); Gomba & Kachigunda (2005) & Matata *et al*. (2011)
	Weeds control	Leaf	Tamado & Milberg (2000)
	Reproduction & milk production enhancement	young twigs with leaf	Sabra *et al*. (2010) & Mekoya *et al*. (2009)
	Forage source	Leaves and young twigs	Tessema & Baars (2004); Orwa *et al*. (2009); Manaye *et al*. (2009); Sabra *et al*. (2010); Naik *et al*. (2011) & Pravin *et al*. (2012)
	Nitrogen-fixation	All plant parts	Shaheen *et al*. (2004); Degefu *et al*. (2011) & Singh and Arya (2016).
	Green manuring	All plant parts	Heering (1995); Patra *et al*. (2006); Kumar *et al*., (2001) & Singh and Arya (2016).
	Live support	Tree	Orwa *et al*. (2009); Naik *et al*. (2011) & Kathiresh (2011)
Other uses	Polluted water and soil treatment	Whole plant	Yang *et al*. (2003); Indieka & Odee (2005); Dan and Brix (2009); Dan *et al*. (2011) & Gupta *et al*. (2011)
	Bioenergy source	Stem and thick branches	Sileshi *et al*. (2000); Orwa *et al*. (2009); Naik *et al*. (2011) & Pravin *et al*. (2012)
	Decorative food ingredient	Flower	Orwa *et al*. (2009); Naik *et al*. (2011); Kathiresh *et al*. (2011) & Pravin *et al*., 2012
	Vegetable	Flowers	Gopaldas *et al*.(1973); Singh and Arya (2016).
	Schistosoma control	Wood	Hasheesh *et al*. (2011); Mahmoud *et al*. (2011) & Nirmal et al. (2012)
	Stimulating effects	Stem bark	Naik *et al*. (2011) & Pravin *et al*. (2012)
	Fiber	Stem bark	Orwa *et al*. (2009) & Singh and Arya (2016)

2012). The ethno-medicinal value privileged the leaves of Sesbania are in form of a tonic, lexative, di-uretic, colic, anti-helmintis, and anti-dote for skin problems. The astringent bark is used for bitter tonic, small pox and diarrhea. Pods are utilized in anemia, fever, bronchitis, jaundice, tumors, pain and poisoning. Seeds of Dhaincha are quite useful in t, diarrhea and spleen enlargemen. Its roots found useful in painful swelling and rheumatism expectorant (Chanda & Sarwar, 2019).

Anti-diabetic role

Misra and Siddiqi (2004) studied Dhaincha (*Sesbania bispinosa*) leaves and reported it as a good source of antidiabetic (+)-pinitol. Likewise, several other researchers reported that the leaf extract of *S. sesban* has anti-diabetic influence (Pandhare *et al*., 2011; Boddupalli *et al*., 2012). More precisely, *S. sesban* seeds able to manage type II diabetes with the help of natural dietary antioxidants (Vadivel *et al*., 2012).

Controlling *Striga asiatica*

Gomba & Kachigunda (2005) revealed that leaf extracts of *S. sesban* able to retard the *S. asiatica* germination from 50 to 100%. *S. sesban* manure application in the *Striga* infested soil reported to be reduced by 88% (Matata *et al*., 2011). Additionally, *S. sesban* control *Striga* in inter-cropping by trapping/ catching crop from the parasite in a rotation (Sikwese *et al*., 2003) and stimulating suicidal germination of *Striga* seeds (Matata *et al*., 2011).

Stimulating impact

The crude extracts of *S. sesban* bark have a potential value to stimulant the central nervous system (CNS) that can be discovered for healing benefit as an alternate management in medical situations related with sedative and dizziness (Pravin *et al*., 2012; Naik *et al*., 2011).

Snails control

Along the river side field area, snails are the major problem and very difficult to eradicate them. Nirmal *et al*. (2012) utilized the successfully the coarse wood powder of *S. sesban* shade dried plants, and noticed the antinociceptive activity. The planting of sesbania is useful for minimizing the transmission and interrupting of *Schistosoma mansoni* (Hasheesh *et al*., 2011; Mahmoud *et al*., 2011).

Fiber source

Dhaincha fibres have been systematically examined to consisted of lignins, cellulose and galactomannans (Salpekar & Khan, 1997). According to Orwa *et al*. (2009), *Sesbania* bark fibres are useful for manufacturing ropes and fishing nets. To separate the fibre from stem bark rating in done by putting the *Sesbania* sticks bundles in water for 15-20days.

Antioxidant effect

The *S. sesban* petals have an anti-oxidants that protects the cell counter to the ill effects of free-radicals by hunting them and retard the progress of cancer and vascular diseases (Kathiresh *et al*., 2011). *Sesbania aculeata* leaf and stem extract have vibrant bioactive combination, such as new kaempferol derivatives, flavone glycosides, and mearnsetin-3-O-alpha-L-rhamnopyranoside, that reveal solid free-radical hunting ability in DPPH and hydrogen peroxide tests (Sharma *et al*., 2014). Sesbania grandiflora revealed substantial in vitro and in vivo anti-cancer properties and inhibited the tumor growth, by decreasing viability of cell, and stimulate apoptosis (programmed cell death) (Sreelatha *et al*., 2011).

Ethno-veterinary use

The *S. sesban* odder is unpleasant for mosquitoes and acts is as repellent of mosquitoes. The sprinkling of water extract of S. sesban on animals protects them from mosquitoes biting during wawn and dusk (Vadivel *et al*., 2012). Orwa *et al*. (2009) noticed leaves decoction utility to repel tsetse fly from cattle. According to Wondimu *et al*., (2007) *S. sesban* is also used for veterinary purposes in crushed and homogenized water. Furthermore, its leave are utilized by farmers of Bangladesh for curing retention of urine (Nigussie and Alemayehu, 2013).

Decorative food ingredient

The flowers of Sesbania for beautiful yellow and attractive and potential to be utilized for decoration of food items.

Flowers of *S. sesban* are recognised to be supplementary to omelets and stews at more or less places, possibly mostly as a decorative or festive ingredient in food items (Kathiresh *et al*., 2011).

Anti-fertility manager

Inserting *S. sesban* seed paste (15g) placed in cotton swap into vagina causes abortion in females (human beings). Moreover, drinking freshly prepared root decoctions in morning and evening for 3 - 4 days succeeding menstrual stage oblige as an anti-fertility manager (Tirkey, 2006). Moreover, seed powder *S. sesban* also obstruct the ovaries usual task, and avoid establishment, thus, regulats the female fertility (Saravanan *et al*., 2012). According to, Das *et al*. (2011), Kandha tribe of India uses this plant root extracts as contraceptive (Nigussie and Alemayehu, 2013).

Anti-microbial action

Several researchers exhibited that *S. sesban* extracts from petals serve as antimicrobial action (Mythili & Ravindhran, 2012; Kathiresh *et al*., 2012).

Additionally, Alagesaboopathi (2012) described diarrhea, and skin itches that can be treated by using leaf decoction mixing with hot-milk and given one time in a day for 7 days. The biological prospective of *S. aculeata*, converging on its antibacterial, and antifungal activities. Its plant extracts have essential compounds such as alkaloids, tannins, saponins, carbohydrates, proteins, and phenolic compounds (Sowmika *et al*., 2025).

Antioxidant activity was assessed using DPPH and Hydrogen Peroxide tests, with leaf extracts demonstrating the most excellent radical-scavenging capacity. Significant inhibitory effects were observed across a range of extract doses when the antibacterial activity was evaluated against both Gram-positive and Gram-negative bacterial strains. Significant inhibition of the antifungal activity against *Aspergillus niger* was also observed, particularly in the leaf and root extracts. These antibacterial agent, which adds to its significance in traditional medicine and sustainable farming. Sowmika *et al*. (2025) suggested that *S. aculeata* has therapeutic prospective and could be utilized as an alternative to conventional medicine.

Live support

Sesbania is also used as a live-support for grapes, betel vine, black pepper and cucurbits. Moreover, its scattering canopies also provides shade to tea, coffee, cocoa & turmeric plants (Orwa *et al*., 2009; Kathiresh, 2011; Naik *et al*., 2011). It is also utilized as a windbreaks for coffee, bananas and citrus orchards (Orwa *et al*., 2009) and as fence material around the field. One year old plants serves an excellent live-support for giloe, stawari and other vine plantation crops (personal communication RK Arya, 2026).

Polluted water and soil treatment

Different research workers showed the great potential of *Sesbania* to proliferate under different ammonium concentrations in problematic soils. They reported that *S. sesban* seedlings have wonderful ability tolerate ammonium toxicity up to 800 mg/L. This finding reflects the potential utility of this plant in purification of polluted/waste water (Dan *et al*., 2011) and for the elimination of heavy-metal toxicity of cultivated fields, it is considered as the best bio remedy of heavy-metal contaminated sites (Yang *et al*., 2003; Gupta *et al*., 2011).

Weed control

Sesbania being a fast growing plant covers the field rapidly, thus the weeds on the earth surface does not receive the proper light and automatically controlled by this crop. *S. sesban* leaves extract & dried crop residue could inhibit parthenium seed germination and its plants growth, which is presently measured as one of the supreme thoughtful weeds in grazing lands and cultivated fields, as it imparted huge crop damages (Tamado & Milberg, 2000; Nigussie and Alemayehu, 2013)

CONCLUSIONS

Sesbania aculeata is a highly versatile shurb and has important impact to attain food security in rural area through its diverse uses and ethnomedicinal properties viz., green manure, pasture improvement, livestock feed, fire-wood, live support, mosquito repellent, weed control, and *Schistosoma* control, antimicrobial activity, antioxidant effect, and anti-inflammatory properties for sustaining the crop-livestock mixed farming system. It is widely adapted different soil and climatic conditions. Its capability to oblige as a nitrogen-fixing and green-manure crop increases its worth in organic production system, providing a twofold advantage for health and safe environment. It is rich in biochemical compounds, viz., saponins, tannins, proteins, carbohydrates, alkaloids and phenolic compounds, in different parts of plant revealed its nutritional and medicinal value. Antioxidant activities, revealed that the plant has an excellent free-radical-scavenging abilities, particularly controlling oxidative stress. Moreover, the anti-fungal and anti-bacterial utility revealed its important antimicrobial property against both Gram-negative and Gram-positive bacteria, as well as the fungus (*Aspergillus niger*). Keeping in view, its high bioactivity, it may serve as natural alternative to traditional medicine. Further, more research is required to reveal its usefulness in developing safe, natural, and effective remedies for different types of health issues.

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