

Guar - A nutrimental potent ethnomedicinal cultivated forage

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ABSTRACT

Bahraich U.P., India is blessed with diversified flora of more than 1200 plant species with Tharu tribals inhabiting inside as well as around the forests. The tribals have strong belief in magico therapeutic properties of plants for treatment of their ailments. The vegetation of the areas is mainly characterized by member of herbaceous plants growing on a variety of habitats along with scattered occurrence of many indigenous and exotic species of trees and shrubs in open areas or cultivated in gardens and along the road sides. The North Western Tarai belt in which Bahraich is situated is next to Himalaya which represents one of the thirty four hot spots of the World mega biodiversity. In spite of all, the wealth of traditional knowledge is being lost, as the traditional culture is gradually disappearing. *Cyamopsis tetragonoloba* (L.) Taub. belongs to Leguminosae, commonly known as cluster bean, guar, gvar, gwar or guwar bean, is an annual legume. This plant is cultivated for forage, to improve soil fertility, in mixed cropping as well as in crop rotation. It grows well in arid and semi arid soil, is drought tolerant and sun loving but susceptible to frost. There are a large number of health benefits of this bean. It is a good source of fiber protein and other nutrients. Lowers LDL bad cholesterol, improves heart health, and lowers risks of heart attack. The presence of fiber, folic acid and protein prevents heart complications. It improves haemoglobin, calcium and phosphorus strengthens bone. It has laxative property. It has low hypoglycemic property. It improves mental health, prevents birth defects in the foetus and vitamin K promotes foetal development. In addition it has a large industrial uses.

Keywords: Cluster bean, Guar, nutrimental, ethnomedicinal, forage.

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INTRODUCTION

Bahraich district is one of the districts of Eastern Uttar Pradesh, situated in Upper Gangetic Plain. It lies between 27°43' and 28°51' North Latitude and 81°8', and 82°10' East longitude with a total area of about 6944 sq km. Botanically, the area is very interesting. In north the Himalayas rise as a virtual wall beyond the snow line. Above the alluvial plain lies the Tarai strip, a seasonally marshy zone of sand and clay soils. Since this north Tarai region which has higher rain fall than the plains, and the downward rushing rivers of the Himalayas slow down and spread out in the flatter Tarai zone depositing fertile silt during the monsoon season and receding in the dry season. Tarai, as a result has higher water level and is characterized by moist sub tropical condition and a luxuriant turnover of green vegetation all the year around.

The study area is blessed with several plant species by

nature and it is referred as natural paradise and it is very rich in ethnic and floristic diversity. The Tharus tribes are endowed with vast knowledge of medicinal plant and have strong belief in magico-therapeutic properties of plants for treatment of various ailments. The district has a good population of tribal people mostly Tharus and their knowledge regarding plants has descended from one generation to another as a domestic practice (Brahman, 2000). Due to vast area of natural forests the Bahraich is also known as City of Forests.

The land surface is a level tract sloping gently from North West to South East. A remarkable feature of the landscape is the total absence of any hill or hillocks. The soil is composed of Gangetic alluvium. Since much of the ground is liable to inundation, the soil particles deposited are very fine. Bahraich enjoys monsoon type of climate

very much influenced by Himalaya. The climate is markedly periodic and is divided in to three seasons, that is, rainy, winter and summer. The general temperature ranges between 3 and 43°C. The general vegetation of the area is tropical deciduous type. However, some of the trees are evergreen and semi evergreen. The forests are only restricted to the northern portion of the district bordering up to the foot hills of Nepal. The middle and southern part of the area are under the influence of human and their domestic animals. Thus the vegetation of this area is being damaged by intense grazing, fire, cutting down of plants for fodder, fuel and for various developmental projects. A vast area is also under cultivation. The vegetation of these areas is mainly characterized by large number of herbaceous plants growing on variety of habitat along with scattered occurrence of many indigenous and exotic species of trees and shrubs in open areas or cultivated in gardens and along road sides.

Plants have a significant contribution towards the wealth of a country. During recent years exploration of plant wealth and its economic utilization have rightly been given due importance. The contribution on the economic aspects of plants are scattered over numerous literatures. The revision of the information based on modern collection and field observation has been advocated by Rao (1958). Gupta (1967) emphasized that the information already possess on the economic aspect of plants should be revised thoroughly based on personal enquiries and experimentations. India presents colorful mosaic of about 563 tribal communities which have acquired considerable knowledge on the use of plants for their livelihood, health care and other purposes through their long association with the forests, inheritance, practices and experiences. Plants with medicinal properties enjoyed the highest reputation in the indigenous system of medicines all over the world. India has one of the oldest, richest and most diverse cultural traditions called folk tradition associated with the use of medicinal plants. Traditional folk medicine is the application of indigenous beliefs, knowledge, skills and cultural practices concerned with human health. The ethnic people have provided several miraculous plants of medicinal value for modern civilization. Both the Ayurvedic and Siddha system of medicine originated more than 300 years ago and are prevalent in North and South India (Lgnacimuthu et al., 2006). The traditional definition of medicinal plant is given in Ashtaanga Hrdaya (2006 A.D) Sutra Sthana Ch 9, verse 10 as: "Jagatyevam anoushadham na kinchit vidyate dravyam vashaannarthayagayoh", that is "There is nothing in this universe which is non medicinal which can not be used for many purposes and by many modes" (Shanker et al., 2000).

India represents one of the twelve mega biodiversity centers of the World, had four of the world's thirty four bio diversity hot spots. This Tarai belt, well blessed and

inhabited by tribal community inside the forest as well as around the forest area is a natural paradise for ethnobotanical, mycological, plant pathological as well as work related with wildlife alone or interdisciplinary studies. World Health Organization (WHO) has also recognized the role of traditional system of Medicine and considers them a part of strategy to provide health care to masses. Folk medicines are gaining importance. Much of this wealth of knowledge is being lost as traditional culture is gradually disappearing (Hamilton, 1995). Tribal people throughout the world have developed their own culture, customs, cults, religious rites, myths, folk tales and songs, foods, medicinal practices etc. Numerous wild as well as cultivated plants play a very important and vital role among these cultures and this inter relationship has evolved over generations of experience and practices (Maheswari, 1983).

MATERIALS AND METHODS

The survey of the four districts of Devipatan Mandal viz Gonda, Bahraich, Balrampur and Shrawasti was carried out during Kharif and Jayed season of 2011 to 2014. Rapport was established with local elderly persons and the vaida (Ayurvedic physicians), Hakims of the locality as well as Tharu tribes of the surveyed area. Inquiries were made on the plant materials used for curing different ailments. Elderly men and women folk were interviewed by questionnaire method, resulting in heterogeneity of information. Participation in their feasts, festivals and other social events etc, was of great use in collecting information on guar - *Cyamopsis tetragonoloba* (L.) Taub. and its uses. The plant was collected in flowering and fruiting stages, it was identified by authentic literatures and floras (Hooker, 1872 to 1997; Sharma and Sanjappa, 1993; Sharma et al., 1993; Dubey, 2004; Saini, 2005). The herbarium of the plant species was prepared according to the method described (Jain and Rao, 1976; Rao, 1958) and deposited in Herbarium of the Department for the record and reference.

RESULT AND DISCUSSION

Guar - *Cyamopsis tetragonoloba* (L.) Taub belongs to the family Leguminosae. Synonym - *Cyamopsis psoralioides* (Lam.) DC. It is commonly known as Cluster bean, guar, gavar, gwar or guwar bean. It is an annual legume. The origin of *C. tetragonoloba* is unknown since it has never been found in the wild (Whistler and Hymowitz, 1979). It is assumed to have been developed from the African species *C. senegalesis*. It was further domesticated in India and Pakistan, where it has been cultivated for many centuries (Mudgil et al., 2011). The plant grows upright, reaching up to 2 to 3 feet. It has a main single stem with either basal branching or fine branching along the stem. The guar plant can access soil moisture in low soil depths with the help of taproots. This plant develops root nodule with nitrogen fixing soil bacteria, the rhizobia in the surface part of its rooting system. The leaves and stems are mostly hairy depending on the cultivar. First fine leaves are alternate in position and have an elongated

oval shape of 5 to 10 cm length. White or bluish colored flowers grow in clusters in plant axil. The developing pods are rather flat and slim containing 5 to 12 small oval seeds of 5 mm length. Normally mature seeds are white or grey, but in case of excess moisture the seeds may become black and lose germination capacity. The chromosome number of guar seeds is $2n = 14$.

Guar grows well in arid and semi arid areas but frequent rain fall is necessary. Though guar is very drought-tolerant and sun-loving but is very susceptible to frost. Even though it can cope with little but regular rainfall, it requires sufficient soil moisture before planting and during maturation of seeds. Frequent drought periods can lead to delayed maturation. On the contrary too much moisture during early phase of growth and after maturation lead to lower seed quality. It is also produced near to coastal areas in the Gandhi dham region of Kutch, Gujarat, India. It can grow on a wide range of different soil types. Preferably in fertile medium-textured and sandy loam soils well drained condition is preferred. Water logging condition decreases the performance. So for soil acidity guar grows best in moderate alkaline condition pH 7 to 8 and is tolerant of salinity. Guar is being cultivated as leguminous forage crop both in Kharif as well as Jayad. The crop is irrigated 3 to 5 days before forage harvesting so that next crop may be taken at an early date. The first irrigation is done after 15 to 20 days of sowing. Next irrigation is repeated after 15 to 20 days interval. The harvesting for forage purpose is done after 65 to 70 days of sowing. The forage is available in May, June in Jayad and October, November in Kharif.

During our survey in the study area we were informed by local inhabitants that they cultivate guar for purpose of vegetables for their own as well as to sell in the market and also to improve the soil fertility. They prepare vegetables from semi mature soft pods. They also use roasted or boiled pods mashed with common and black salt, green chillies, ginger and spices, the preparation locally known as Chokha, Bharta so as to break constipation, improve blood formation and strength. The dry beans are also being sold in local market and they them selves use to make pulse.

Guar is used as cattle feed but due to hydrocyanic acid in its bean, only mature beans can be used. Guar plant is also used shown as green manure which increases the yield of subsequent crops as this legume conserve soil nutrient content. Guar is cultivated as a mixed crop with Jowar (*Sorghum vulgare* Pers.) and Bajra (*Pennisetum typhoides* (Burm. f.) Stapf & C.E.Hubb.). It is also cultivated as in crop rotation. Guar leaves can be used like spinach and the pods are prepared like salad or vegetables. Its beans are very nutritious but the guar protein is not useable by human unless roasted to destroy the trypsin inhibitor.

The seed of the guar bean bears a very large endosperm. This endosperm consists of a very large polysaccharide of mannose backbone chain with single

galactose side units occurring on almost two out of every three mannose units with average molecular weight a about 25,000 Daltons known as galactomannan, a water soluble neutral polymer which exhibits a viscoisfying effect in water. This guar gum has a multitude of different applications. In several food and beverages the guar gum is used as additive in order to change its viscosity or as fiber source e.g. in baked goods it work as dough improver, in cheese it improves texture, in ice-cream it results smaller ice crystals, in fried products it reduces oil uptake.

Partially hydrolyzed guar gum (PHGG) is produced by the partial enzymatic hydrolysis of guaran, the galactomannan. This gives a PHGG which still assays and functions as a soluble dietary fiber.

PHGG as sold commercially is completely soluble, acid and heat stable, unaffected by ions. It has approximately 75% dietary fiber and has minimal effect on taste and texture in food and beverage items. PHGG is fully fermentable in the large bowel, with a high rate of volatile fatty acid formation. The pH of the feces is lowered along with an increase in fecal bulk that mainly consists of bacterial cell mass and water. It is used in food for particulate suspension, emulsification antistaling, ice crystal control and reduced fat baked goods.

Derivatives of guar gum is also used in industrial applications, such as the paper and textile industry, ore flotation, the manufacture of explosives and hydraulic fracturing (fracking) of oil and gas formations (Harris, 2012; NY Times, 2012). Guar gum is often crossed linked with Boron or Chromium ions to make it more stable and heat resistant. Guar and its derivatives make gel complexes with ions of Aluminium, Zirconium, Titanium, Chromium and Boron.

Guar meal korma and Guar meal churi are widely used as prime raw material for producing various kinds of cattle feed, aqua feeds, fish feed, poultry feeds, dairy feeds, swine feeds, etc.

Through the use of guar gum in the hydraulic fracturing (fracking) extraction of oil and shale gas the demand has increased substantially. Only 10% of Indian production stays within the country and the remaining 90% is exported for shale gas and oil industries.

There are a large number of health benefits of Cluster bean. Cluster beans or Guar are a flatter variety of French bean commonly used in vegetable and pulse preparations. They are slightly bitter in taste but a great source of fiber proteins and other nutrients. Cluster beans lower low density lipids (LDL) or bad cholesterol levels, thereby improves heart health and lowers the risk of heart attack. They also contain fiber, folic acid and Potassium which prevent development of heart complications.

The iron in guar beans increases hemoglobin production and thus allows blood to carry more oxygen around the body. Cluster beans contain Calcium and Phosphorous both of which help in strengthening bones.

These beans have a laxative property that improve

digestion and regulate bowels. They also flush toxins from the system and help to prevent irritable bowel syndrome. Cluster beans have a low glycemic index so they can be consumed by diabetics. They also contain glyconutrients that help to control sugar levels.

The hypoglycemic properties in cluster beans also soothe the nerves, reduce anxiety and stress level and thus improve mental health by keeping brain calm and controlled. They are very rich in nutrients as they have vitamin A, B, and K in addition to minerals like calcium, iron and potassium.

The folic acid in these beans helps to prevent birth defects in the foetus and the vitamin K promotes foetal development. The high nutritional content helps pregnant women make up for their nutritional deficiencies.

CONCLUSION

The rural and tribal repository of the studied area contains many medicinal plants used for the treatment of various ailments. It is hoped that this effort will not only provide additional support to the earlier findings, but also provide clues for new materials having traditional potentiality for the benefits of mankind.

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