

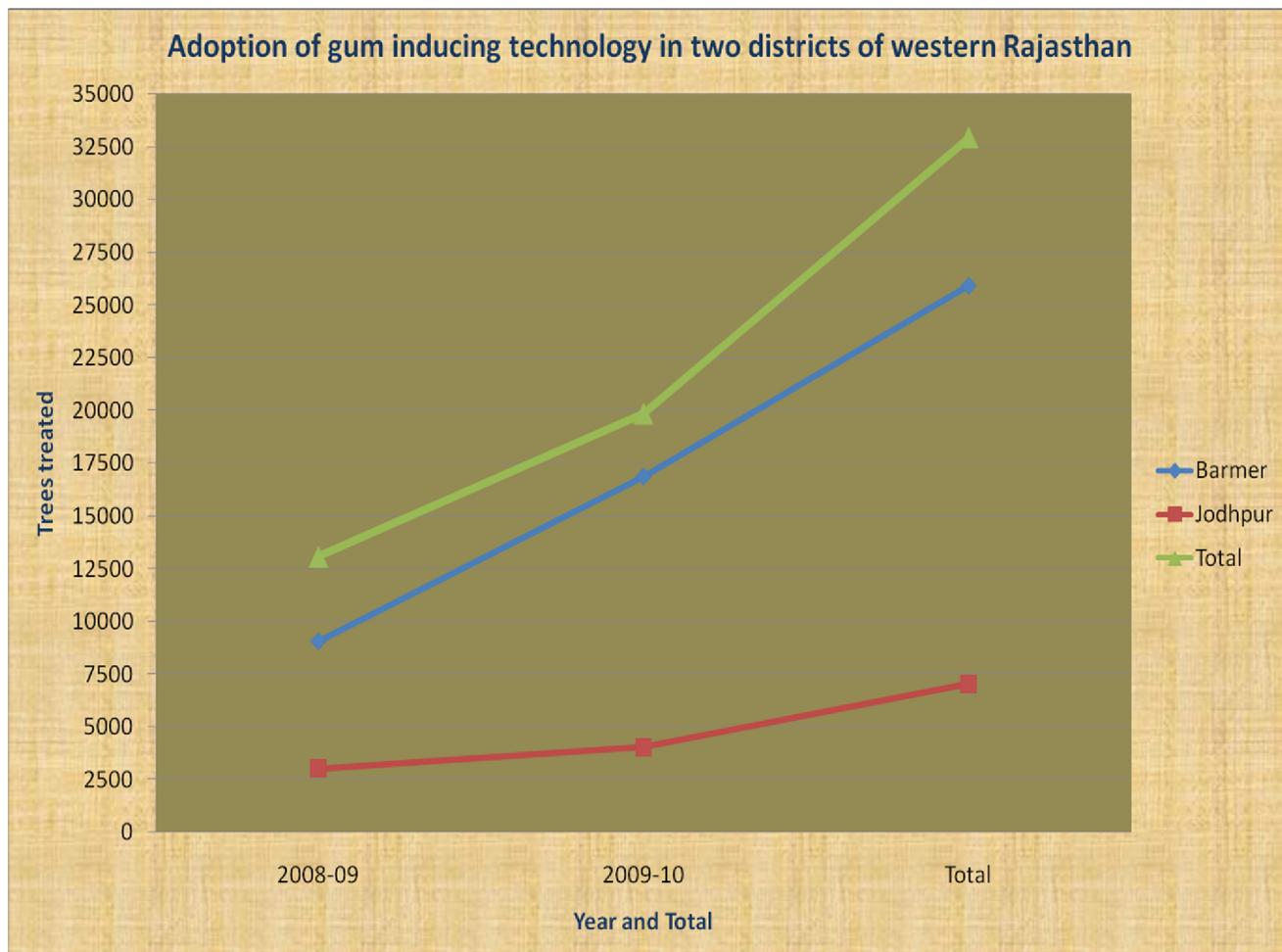
TREE GUM EXUDATION TECHNIQUE DEVELOPED BY CAZRI

Numerous trees, found in India, exude gum. Only some of these have gained commercial importance, the most important being Gum Arabic. When properly tapped, gums are renewable and sustainable natural resources, important for the economy of many regions. Main gum producing regions of India are those in Rajasthan, Madhya Pradesh and the tribal and forest areas of Gujarat, Haryana, Jharkhand, Maharashtra, Andhra Pradesh, Karnataka, Orissa and Chhattisgarh.

Due to consistent drought in the recent past, the uneven supplies of the gums have brought down demand of international gum from 70,000 tonnes to 24,000 tonnes. A handful of countries dominate trade in gum Arabic. In 1998, 95% of the world exports came from three countries viz. Sudan (56%), Chad (29%), and Nigeria (10%). Likewise imports were concentrated in three countries: France is the largest importer (46%) & re-exporter, followed by United, States (21%) and United Kingdom (12%)

The consistent and systematic efforts in India towards sustainable Gum production can lead the country to tap the considerable chunk of the International Gum Exports. If all the trees producing gum are explored in an organized manner, it can reduce the import bill of India to a considerable extent. Keeping in view, the importance of exude gum, seed gums and resins, ICAR, Govt. of India has approved a network project on harvesting, processing and value addition of natural resins and gums in 2008 having six centers, viz. Central Arid Zone Research Institute (CAZRI), Jodhpur; YS. Parmar University of Horticulture and Forestry, Solan; Indira Gandhi Krishi Vishwa Vidhyalaya, Raipur; Jawaharlal Nehru Krishi Vishwa Vidhyalaya, Jabalpur; Marathwada Agricultural University, Parbhani; and NRC for Agroforestry, Jhansi. In the recent past keeping in view the optimum exploitation of trees for gums & resins, the Lac Research Institute has been changed to Indian Institute of Natural Resins & Gums, Ranchi which is monitoring the project as coordinator.

Under network project on harvesting, processing and value addition of natural resins and gums, the CAZRI centre has developed a gum inducer and studies were carried out on standardization of dose of gum inducer, time of application of gum inducer dose, and the viability of gum cultivation through plantation. The research shows that the technique developed by CAZRI under the network project is excellent and can ensure better gum extraction. The gum inducing and tapping technology has been widely adopted by the farmers, KVKs and Agricultural Dept. The gum inducer can be obtained from Silva section of CAZRI during February to June @ Rs. 10/dose (price may increase slightly in next season). This technology has national importance as it compliments very well in employment & income generation in drought prone areas.

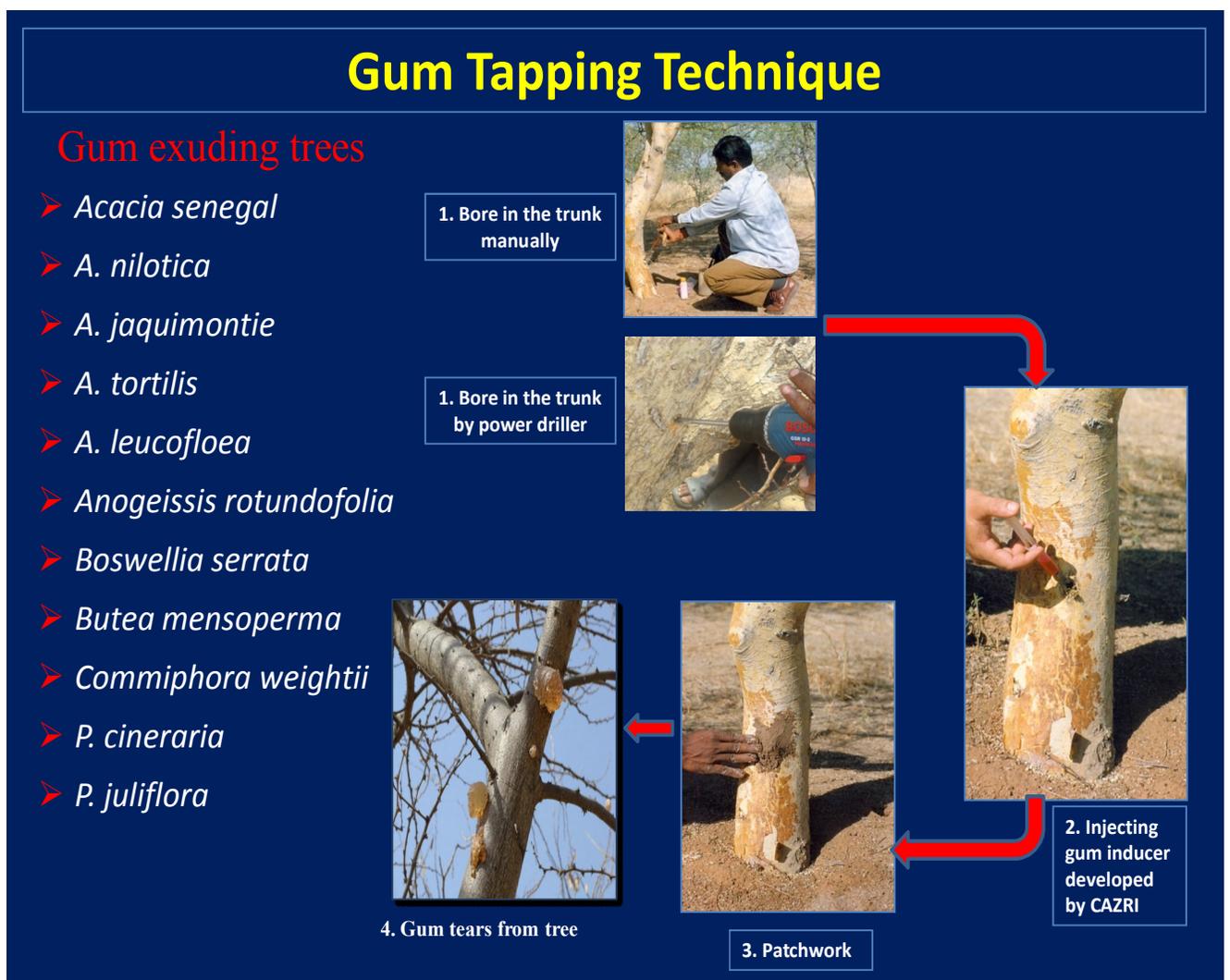


Gum collected by farmers and local trader in Barmer



TECHNIQUE OF GUM EXUDATION

- The trees of more than 8 years old having more than 6" diameter are selected for treatment. Generally trees growing on sand dunes, sandy plains and water courses are most suitable.
- A hole of about 1.5 to 2 cm diameter with 1 to 1.5" deep is made at one feet above the collar of the tree with the help of hand drill or mechanized drill.
- The tree is then injected in the hole with a 3.5 to 4.0 ml gum inducer solution. The dose varies from species to species (2 ml to 4 ml per tree).
- The tree hole is patched up with the help of bee wax or clay or pond silt.
- It is observed that the tree starts exuding gum tars after 5-10 days of treatment.
- The best period of the treatment is February to May. However *B. serrata* can be treated in November - December.



Important gum producing trees

1. *Acacia senegal* (Local Name: *Koomat*)

A shrub or tree usually 4-8 m high, rarely smaller. Bark on trunk yellowish to grey or greyish-brown, rough or smooth, papery and peeling off . Crown variable, loose and rounded to dense and flattened, sometimes open with long whippy branches. Pods dehiscent, straight, grey to brown or yellowish brown, pubescent. 8 - 12 cm long, 1.3-3.4 cm wide. Seeds 4-8 per pod, more or less transverse. It exudes a amber or peach colour gum, The scattered density varies from 10 - 50 trees / ha. It is the main source of gum Arabic. The maximum yield was recorded from the plants growing on sand dunes (>500 g/tree), while in rocky sites; yield is very low (100 - 300 g/tree) by the use of gum inducing technology. In this plant 4 ml per plant of gum inducer of CAZRI is applied from March to May depending upon environmental conditions.



Distribution: Africa, Arabia, Indian and Pakistan. In Western Rajasthan it is prominent in Barmer, Jodhpur, Jaisalmer, Sikar, Nagaur and Churu districts. It also has presence in Madhya Pradesh, Gujarat & some parts of UP, Punjab & Haryana

2. *Acacia tortilis* (Local Name: *Israeli Babool*)

Usually a tree, sometimes a shrub or bush 1.5-18 m high, occasionally to > 20m. Bark on trunk usually rough and fissured, grey to black or dark brown. Crown usually flat and spreading but sometimes rounded. Flowers white or yellowish-white scented, in round fluffy heads 0.5-1.1 cm in diameter, on axillary peduncles 0.4-2.5 cm long. Pods variable indehiscent or slowly dehiscent, contorted or spirally twisted, rarely with spreading hairs. Seeds oblique or parallel to long axis of pod. In Africa its gum is known as poor man's gum. Recently gum tapping techniques have been developed for this plant. The gum quality is almost similar to gum Arabic and it can be a good source of gum if properly exploited. By application of gum inducer of CAZRI it produces gum to the tune of 400 g per tree.



Distribution: Africa, Saudi Arabia, India, Israel and Pakistan. In India it was introduced in 1960's. It is the best suited species for sand dune stabilization. This species has been planted on more than 500,000 ha area in Rajasthan. Besides Rajasthan, it has been planted in Gujarat, Andhra Pradesh and dry parts of Tamil Nadu.

3. *Acacia nilotica* (Local Name: *Desi Babool*)

A tree usually 2.5-15 m high, sometimes as low as 1.2 m up to 2.5 m. Bark or trunk rough and fissured, black to blackish grey or brown, never powdery or peeling. Crown in India and West Pakistan varying to hemispherical or narrow and erect. Pods very indehiscent, dark brown to grey, straight or curved, glabrous to velvety, compressed but rather thick. Seeds 6 - 16 per pod. It also responded positively to gum inducer application.



Distribution: Africa, South Africa and India. In India it is dominating tree in semi arid regions having sandy loam to clay loam soils of Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Madhya Pradesh. In Rajasthan it dominates on North Eastern parts, particularly in districts of Jaipur, Bharatpur, Alwar, Sawai Madhopur, Dausa, Kota and Bundi.

4. *Acacia jacquemontii* (Local Name: *Bhoo Baoli*)

A heavily branched, small, bushy shrub, 1.5 - 2.5 m high with stiff, smooth, brown - branches. Leaves 2 - pinnate; stipular spines, straight, slender, 2.55 cm long, ivory-white, connate base; pinnae 2-4 pairs, 6-12 mm long; common petioles 2.5-5 cm long.; glands small, indistinct; leaflets 5-10 pairs, 2.5-3 mm long, linear - oblong, glabrous. Flowers yellow, sweet-scented; inflorescence globose heads, 12-

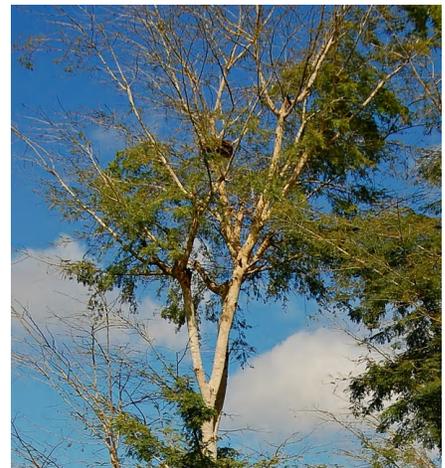


16 mm in diameter; peduncles 2-3, slender, axillary, fascicled; bracts 2, inserted almost in the middle of peduncle. Calyx campanulate, 1.2-1.5 mm long; the teeth short, deltoid. Corolla 3 mm long; lobes ovate-oblong, acute. Pods 3-6 x 1.2-1.5 cm, ovate-oblong, rounded at base, flat, straight, transversely or reticulately veined, glabrous. Seeds 5 - 8 compressed. The application of gum inducer of CAZRI in *Bhoo Baoli* enhanced the gum production and its gum is commonly used in Bikaner district.

Distribution: It is mainly distributed in arid parts of India and Pakistan. In Western parts of Rajasthan it dominates on sand dunes in Bikaner, Jaisalmer and Barmer.

5. *Acacia leucofloe* (Local Name: *Ronj, Bada Khejara*)

Tree 5-20 m high with a dense spheric crown, stems and branchlets usually dark to black coloured, fissured bark, grey-pinkish slash, exuding a reddish low quality gum. Thin, straight, light, grey spines in axillary pairs, usually in 3 to 12 pairs, 5 to 7.5 cm long in young trees, mature trees commonly without thorns. Pods grey, thick, softly tomentose, straight or slightly curved, 5 to 15 cm long on a pedicel, 0.5 to 1.2 cm wide, with constrictions between the seeds giving a necklace appearance. It is also a good source of exude gum.



Distribution: East Africa, Arabia, and lateritic soil in the Himalayan foothills in India. Himalayan foothills & semi - arid tropics of the country especially in Maharashtra, Gujarat, Madhra Pradesh and Rajasthan

6. *Boswellia serrata* (Local Name: *Salai Gugal*)

It is a medium sized deciduous tree with ash coloured papery bark. The leaves, 2-4 cm long, imparipinnate, crowded at the end of branches, alternate leaflets 8-15 pairs opposite, usually unequal sided, serrate or crenate, dark green and are like neem plant and have small white flowers. *Boswellia Serrata* tree, on injury, exudates an oleo-gum-resin known as *Sa/ai Gugal* or Indian Frankincense. The treatment with gum inducer is most suitable in the winter season and suggested dose is 2 ml gum inducer of CAZRI per plant.



Distribution: In India it grows in Semi Arid Tropical parts especially in MP, Rajasthan, A.P, Maharashtra, Chattisgarh, parts of Tamil Nadu and Karnataka.

7. *Butea monosperma* (Local Name: *Dhak, Palash*)

A large shrub or a small tree, attains a height up to 15 - 18 m, with stunning flower clusters. It loses its leaves as the flowers develop, January - March. With good salt-tolerance, it can be used in coastal areas, but should be protected from direct exposure to salt spray, which can burn the leaves. The red gum of this species has very high medicinal value. The local people call this gum as *Kamar kas* i.e. very good for back ache.



Distribution: Pakistan, India, Bangladesh, Nepal, Sri Lanka, Myanmar, Thailand, Laos, Cambodia, Vietnam, Malaysia, and western Indonesia. In India it grows in semi - arid regions of Rajasthan, Madhya Pradesh, Gujarat and Maharashtra.

8. *Prosopis cineraria* (Local Name: *Khejri, Khejara*)

It is a small moderate sized evergreen thorny tree, with slender branches armed with conical thorns and with light bluish-green foliage. The leaflets are dark green with thin casting of light shade.

The tree is evergreen or nearly so.

The pods are formed soon thereafter and grow rapidly in size attaining full size in about two months time.

It produces the gum when trees are lopped in October - November. In Sikar district of Rajasthan its gum is commonly used in diet.



Distribution: UAE, Southern Asia, Afghanistan, Persia, Baluchistan, Pakistan (Sind) and India. In India it grows well in Rajasthan, Haryana, Punjab, Gujarat, Western Uttar Pradesh, drier parts of Deccan and extends as far as South in Tuticorin.

9. *Prosopis juliflora* (Local Name: *Angrezi Bawalia*, *Vilayati Babool*)

A large shrub or a small, evergreen tree, branches long, sarmentose, younger ones pubescent, armed with 3-9 mm long pair of straight, conical, spinose net stipules. Leaves 1-3 at each node, bipinnate, pinnae 1-2, common rachis 1-4 cm, rachis of pinnae 2-4 mm, leaflets 13-25 pairs, 3-7 x 1.7-2. Inflorescence in axillary spikes, 6-8 mm long. Pods linear, compressed, straight or often falcate, indehiscent, 10-15 x 0.8-1 cm, indistinctly and interruptedly beaded. It is a hardy plant that grows fast and is likely to be very useful for afforestation of arid land. The ripe pods are greedily eaten by cattle and goats. Seeds 20-25, compressed, ovoid. It also exudes gum which is dark brown and is not edible but commonly used in industries. Its seeds contain 25-30% endosperm gum whose quality is at par with *Guar* gum (cluster bean). The Galacto-mannan is 1 : 1.8.



Distribution: A Mexican species, introduced in Jodhpur in the year 1914 and now growing throughout India except frost-prone areas.

10. *Moringa oleifera* (Local Name: *Sanjana*)

A medium sized tree, with younger parts pubescent tomentose. Leaves alternate, 3- pinnate, upto 7 cm long, rachis thickened and articulated at the base, pinnate and pinnules opposite, deciduous, rachise articulated and solitary gland at each articulation, leaflets 6-9 pairs, 12-25 x 6-12 mm. The laterals elliptic, the terminal obovate, slightly larger than the laterals; petioles short. Flowers white or yellowish. It is generally planted and its unripe fruits are eaten: The flower buds are used as vegetable. It produces the gum which has medicinal value.



The gum is a good polymer and absorbs water three to four times of its weight.

Distribution: It grows in Baluchistan, Pakistan, and India (Konkan, Rajasthan).

11. *Anogeissus rotundifolia* & *Anogeissus pendula* (Local Name: Dhauro, Indrok)

A medium sized tree, about 6 m long. Young parts (branches, leaves and inflorescence) cinereo-tomentose. Leaves alternate, many younger ones elliptic or suborbiculate, the mature ones orbiculate or sub orbiculate, slightly broader than long, upto 2cm in diameter, apex obtuse or emarginated, generally mucronate, silvery pubescent, petioles upto 3mm long. Gum ghatti, as its gum is known is an exclusive product of India and Sri Lanka. Total Gum



Ghatti production is 900-1150 Mt per year and over 80% of it is exported to USA and Europe. In this plant low dose (2 ml per plant) is suggested as higher doses have resulted in bark detachment which cause the plant mortality after 3-4 years.

Distribution: The tree is a characteristic of deciduous forest throughout the sub-Himalayan tract and outer hills from the Ravi to Nepal, ascending to 400 ft, Bihar, Chota Nagpur, Central India and southward to the greater parts of Indian Peninsula including Sri Lanka, Burma, Bangladesh and Pakistan.



J. C. Tewari

Principal Scientist (Forestry) & PI



Moola Ram

Research Associate

Network Project on Harvesting, Processing and Value addition of Natural Resins & Gums

Central Arid Zone Research Institute, Jodhpur