

High Quality Edible Gum Production from *Kummat* (*Acacia senegal*)



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Preamble

Acacia senegal (L.) Willd., commonly known as *Kummat* in arid western Rajasthan is a deciduous shrub/tree, growing upto 9-10 m tall and usually branched above the ground. Branches fork repeatedly and in mature trees commonly form a rounded, flat-topped crown. The trunk diameter of the species varies from 15-30 cm. The colour of the bark is greyish-white, although in old trees growing in open lands it may sometimes get darker. *A. senegal* has wide ecological amplitude and grows in countries like Sudan, Senegal, Zambia, Ivory Coast, Ghana, Nigeria, Mali, Burkina Faso, Niger, Central African Republic, Chad, Ethiopia, Somalia, Uganda, Kenya, Tanzania, Rwanda, Zaire, Mozambique, Oman, Pakistan and India. The bulk of gum producing *Acacias* grow in an area known as “gum belt” stretching from Ethiopian border through Central Sudan and across Chad into Senegal, where the gum producing trees were first identified by Linnaeus in eighteenth century. It is commonly known for gum production however, its uses in agroforestry and silvipasture are also well known in some regions. In arid-western Rajasthan it is an important constituent of traditional agroforestry systems. India imports about 40 thousand tons of gum-arabic mainly from African countries costing huge foreign exchange. Arid-western Rajasthan and many parts of semi-arid tracts where *A. senegal* grows abundantly, can be used for exuding gum-arabic in large quantities by employing gum exuding technology. On one hand it will reduce the dependency of the country on import of gum-arabic from other countries and on the other hand will save billions of US\$ worth foreign exchange.

Significance of *Acacia senegal*

As a source of gum-arabic: Gum-arabic is the most important produce of *A. senegal*. It is a very valuable commodity and is used in food industry, pharmaceutical industry, cosmetics, adhesives, paints, inks and textiles.

As human food: The seeds are dried and preserved for human consumption.

As animal fodder: The young foliage is main source of fodder. Its leaves and pods are browsed by sheep, goats and camels. The leaves are very nutritive.

As fuel wood: Its wood is an excellent fuelwood, sometimes it is the only wood species to survive in dry areas. The dense wood also yields charcoal.

As material for agricultural tools: The heartwood is almost black and takes polish well. It is used for making carts and Persian wheels, agricultural implements, and tool handles.

Tree as live fencing: Tree is planted around farm boundaries in closer spacing to protect the illicit grazing. It is one of the most suitable live fencing because of unique thorn structure.

Tree in agroforestry systems/plantation forestry: In Senegal and Sudan, it is planted for gum extraction and plantation place is commonly known as 'gum-garden', whereas in arid part of India, the farmers grow it in their agricultural fields/grass-land to protect the land from soil erosion, to enrich soil fertility, to provide shade for livestock and to collect the seeds for vegetable purpose.

CAZRI Gum-arabic Inducing Technology and its Sustainability

In traditional method of gum tapping in different parts of the world, a number of tapping spots on tree trunks and branches depending on its size are made and in the process, plants get injured at various points and produce only low amounts of gum. Thus, traditional method of gum harvesting is not profitable for gum tappers. The technology developed by ICAR-Central Arid Zone Research Institute, Jodhpur has advantage over the traditional method in view that the plants do not get injured. CAZRI gum-inducer (Ethephon in standardized concentration i.e. 780 mg/4 ml of solution) is injected in tree trunk by making a small hole on trunk just above the ground and in turn it

produces on an average 300-400 g gum-arabic per tree per season. The process of injecting CAZRI gum-inducer is given below:



Making hole
with hand drill



Making hole with
Battery operated drill



Injecting Ethephon
solution



Covering the hole
by moistened clay



Exudated gum tears



A single gum tear

Procedure

- A 45° slanted hole of 18 mm diameter and about 3 cm deep is made on tree trunk at 1-2 feet above the collar of the tree with the help of a hand drill or battery operated drill machine.
- After that, 4.0 ml dose of 19.5% concentration Ethephon (39% SL) is injected in the hole with the help of syringe (active ingredient 780 mg/4 ml of solution).
- Immediately after injecting the dose of Ethephon, the hole is covered (patched up) with moistened clay.
- The tree starts exuding gum tears after 8-10 days of the treatment.

Important Points

- One should avoid treating the tree if weather is humid, cloudy or rain is expected.

- The best season to treat the tree starts from after leaf fall (mid-March) to before initiation of new leaves (last week of May).
- The best results are found in trees of more than 10 years old and growing on sandy soils, sand dune and inter-dunal areas.
- It should be ensured that while covering the hole, the clay should not enter into the hole, otherwise the chemical can be spoiled. Therefore, for patching up (covering), the clay should be pressed only at periphery of the hole.
- Gum tears are exuded from different parts of stem and branches from base to top.
- For collection of gum tears, first allow them to dry on the tree itself for 5-7 days, once tears are semi-solid they can be removed by hand from lower parts of the tree. On the upper portion of the tree, gum tears are removed by a hook fitted on a bamboo stick. A clean cloth sheet should be spread beneath the tree canopy so that gum tears fall on cloth sheet only.
- Drying of gum tears should be accomplished only in shaded area.
- For best results, alternate year treatment of trees is recommended.

Extension and Adoption of Technology

Technology has spread in parts of arid western Rajasthan where *A. senegal* is dominant constituent of vegetation complex. The major reason behind rapid extension and adoption was due to its simplicity. In this context the information we have is self explanatory.

Potential of Technology

The total world export of gum-arabic is about 319 million USD every year. Indian imports amount is 27 million USD, which is about 8.5% of world imports. It is estimated that in arid regions of Rajasthan have around 65 million trees (Fig. 1). Thus there is a huge unexploited potential of the technology. The Institute has made extension of this technology. CAZRI gum-inducer sale from Institute's counter indicated that in last seven years one lakh eighty thousand five hundred trees of

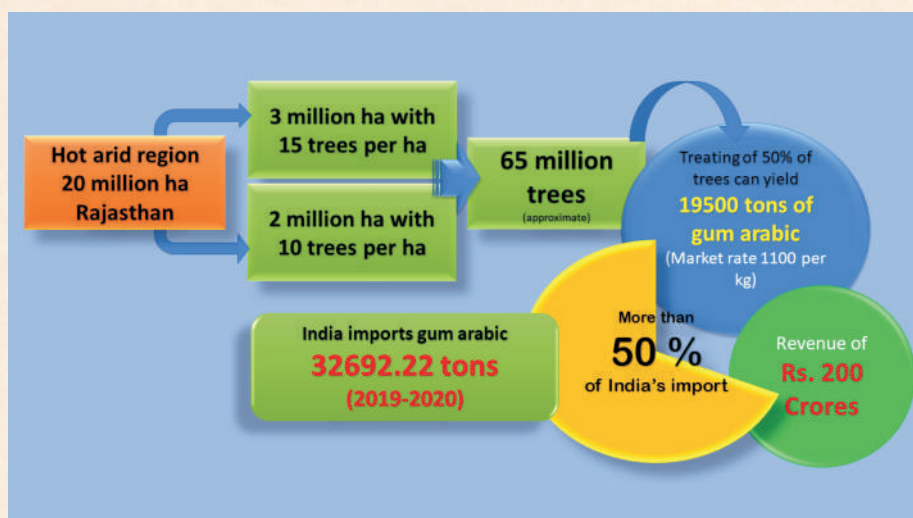


Fig. 1 Estimated *Acacia senegal* population and gum production potential

A. senegal were treated by the villagers resulting in production of 76.35 ton of gum-arabic which gave an income of ₹ 487.19 lakhs to farmers (Table 1). This data was gathered from 45 villages of Barmer, Nagaur and Jodhpur districts of arid-western Rajasthan which are precisely monitored by CAZRI since last seven years. As the technology is in public domain, many private organization, NGOs and individuals are involved in selling of CAZRI gum-inducer. We expect in addition to the sale of CAZRI gum-inducer from CAZRI, more than double amount such ethephon doses are reaching to farmers for treating the *A. senegal* trees. So it can be estimate that 228.9 ton of gum-arabic was produced in arid-western Rajasthan in last seven years.

Table 1. Extension and adoption of CAZRI gum inducing technology

Particular	Year										
	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Number of <i>A. senegal</i> trees treated (in thousands)	12.10	20.95	22.61	27.50	30.00	34.17	20.70	19.50	22.00	19.30	13.70
Production of gum-arabic by farmers (t)	5.45	10.48	7.67	11.00	12.00	13.67	8.28	7.80	8.80	8.67	6.16
Total income earned by farmers (₹ Lakhs)	27.23	52.38	38.33	77.00	84.00	95.69	57.96	62.40	88.0	69.36	49.28
Revenue generated by CAZRI (₹ Lakhs)	1.21	2.10	2.25	2.75	3.00	3.42	2.07	1.95	2.20	1.93	1.37

To further enhance gum production the Institute is focussing on production of

- Large scale multiplication of plus trees of *A. senegal* and other high quality gum yielding trees viz. *Anogeissus rotundifolia*.
- Methodology for commercial extraction of gum from trees like *A. tortilis*, *A. nilotica*, *A. leucophloea*, *Prosopis cineraria*, *P. juliflora* etc. has also been standardized.

However, for further upscaling the technique could be included as component of the following Government schemes viz.

- Skill Training of Rural Youth (STRY).
- Farmers Capacity Assessment and Certification (FCAC).
- Diploma in Agricultural Extension Services for Input Dealers (DAESI).
- Government support would also be necessary for spreading knowledge by organizing exhibition, fairs, Kisan Melas at National/ Regional level and their coverage by mass media.
- Informing Extension Education Institutes (EEIs), model training and kisan call centers about the technique.
- Partnering with KVKs, state agriculture departments and NGOs would also help in to spreading the technology.

Success story of Sh. Mohan Ram Saran, Village-Daikara, Jodhpur

After adopting CAZRI gum inducing technology, Sh. Mohan Ram Saran, Village-Daikara, Jodhpur collected 67 kg gum-arabic this year. He sold pure gum-arabic obtained at ₹ 1500 per kg online. Thus, he earned revenue of Rupees one lakh approximately from the 1.25 ha land. Now, he has started large scale plantation of the species on the farm and has purchased 500 seedlings of



Successful farmer felicitated at CAZRI Kisan Mela



A. senegal (Nigerian origin) from Central Nursery of CAZRI and out planted them as a second row on the farm. The most important thing about his diversified integrated farming system is that it is 100% organic. Seeing the success of Sh. Mohan Ram Saran at least 15 farmers in around Daikara village have adopted the model developed by Sh. Mohan Ram Saran.

Success Story of Sh. Hari Singh, Village-Phalsund, Tehsil-Pokaran, District-Jaisalmer, Rajasthan

Sh. Hari Singh, Village-Phalsund, Tehsil-Pokaran, District-Jaisalmer treated 300 trees of *A. senegal* with CAZRI gum inducing technology and collected approximately 120 kg gum-arabic and sold it in local market at ₹ 1000 per kg and earned a revenue of ₹ 1.20 lakh.



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