

Lasora: A Wonder Fruit for Nutritional Security in Arid and Semi-arid Regions

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Introduction

Cordia myxa L., commonly known as Indian cherry, is a fruit tree belonging to the Boraginaceae family, native to the Indian subcontinent. This underutilized fruit crop is particularly significant in North India. It is a deciduous tree that undergoes winter dormancy and has a variety of uses beyond its fruit. The tree's immature fruits, known locally as lasora, are commonly used in culinary applications such as vegetables and pickles, often combined with raw mango. Additionally, these fruits can be dehydrated for preservation and use during off-seasons.

Cordia myxa L., commonly known as Gonda, Lasora, Lehsua, Indian Cherry, Assyrian Plum, or Bird's Nest Tree, is a rapidly growing species valued for its ornamental qualities and practical uses. This tree features a distinctive inverted dome or umbrella-shaped crown, making it a popular choice for landscaping and furniture. Its ovate, alternate, and stalked leaves are utilized as fodder during summer months when green grasses are scarce, and they also serve as a habitat for lac insects. In March, the tree produces white, hermaphroditic flowers, and its green, drupaceous fruits mature and are ready for harvest from April to June. The unripe fruits, known as lasora, are commonly used as vegetables and pickled, especially during periods when conventional vegetables are less available. Lasora fruits are rich in antioxidants, including carotenoids, ascorbic acid, phenols, and essential minerals. They also contain crude fiber, protein, and vitamins, which contribute to human health and are used in treating various ailments such as skin conditions, dropsy, dysentery, dyspepsia, cholera, and headaches. Due to its high productivity, adaptability to challenging soil and climatic conditions, and significant processing value, *Cordia myxa* is increasingly cultivated in planned orchards, particularly in arid and semi-arid regions.

Nutritional Composition

Table 1: Nutritive value of lasora fruits per 100 g edible portion.

Nutrient	Quantity	Nutrient	Quantity
Moisture	74-82.5 g	Ash	2.13 g
Protein	1.8-2.0 g	Fiber	0.3 mg
Fat	1.8-2.0 g	Calcium	40 mg
Crude Fiber	0.3 g	Magnesium	0.2 mg
Carbohydrates	12.2 g	Phosphorus	60 mg
Calories	65 Kcal	Iron	0.5 mg
Oxalic acid	25 mg	Cooper	0.16 mg
Pectin	4.5%	Zinc	0.02 mg

Source: (Agro-India).

Table 2: Antioxidant attributes of lasoda.

S. No.	Attributes	Contents
1	Polyphenols (mg/100g)	137.56
2	Flavanol (mg/100g)	14.32 3
3	Flavonoid (mg/100g)	434.28 4
4	0-dihydric phenol (mg/100g)	45.67
5	Total AOX activity (MTE/100g)	10.67

Source: (ICAR-CIAH, Bikaner).

Climate and Soil

Lasoda, a fruit crop suited for tropical and subtropical climates, thrives in environments with temperatures ranging from 20°C to 40°C. It adapts well to various soil types but performs optimally in sandy loam soils with excellent drainage. The ideal soil pH for lasoda cultivation is between 6.5 and 8.5, ensuring proper nutrient availability and root development.

Varietal Diversity

Lasoda is an underutilized fruit that is commonly grown in rural backyards. There is significant varietal diversity within lasoda, which is evident in the range of its characteristics. Various improved cultivars are being explored for processing and value addition in a sustainable manner. Notable varieties of lasoda include Karan Lasoda, Thar Bold, and Maru Samridhi.

Karan Lasoda (JL-07): Developed by SKNAU, Jobner, Rajasthan, Karan Lasoda is a perennial variety characterized by its vigorous growth. The budded plants grow rapidly, reaching a height of approximately 5.45 meters, and begin fruiting within 4 to 5 years.

Thar Bold: This variety, identified through selection at ICAR-CIAH, Bikaner, is known for its prolific and early bearing nature. Thar Bold produces large fruits in clusters, yielding 1.5 to 2.0 quintals of fruit per tree annually. The tender fruits are suitable for consumption as vegetables, pickling, and dehydration. It is recommended for block plantations and as part of agro-forestry systems in arid and semi-arid regions.

Maru Samridhi: Maru Samridhi, developed by ICAR-CAZRI, Jodhpur, is characterized by its drooping growth habit. This variety produces an average of 14 fruits per cluster, with each fruit weighing approximately 10 grams. The plant can yield around 90 kilograms of fruit per tree.

Propagation Methods

Seed propagation:

Seed propagation is a common method for lasoda cultivation. Seeds should be extracted from fully ripened fruits, which typically become yellowish cream and drop from the plant between May and June. Freshly extracted seeds are preferred as they lose viability quickly. Before sowing, seeds should be treated with Bavistin at a rate of 4 grams per kilogram. In the first week of May, seeds are sown in polythene bags (25×10 cm) filled with a compost, clay, and sand mixture (1:1:6). Seeds are planted 1.5 inches deep, covered with soil, and watered immediately. Germination usually occurs within 75 days.

Vegetative propagation:

Budding is the primary vegetative propagation method for lasoda. Rootstock seedlings, 75 to 90 days old, are used for this process. These seedlings are trimmed to a height of 15-20 cm above ground, and side branches and leaves are removed. Budding is done using the I or T method with bud wood from selected, high-quality mother plants. The budded plants are ready for transplanting after 30-40 days, typically in August or September.

Planting Practices

For block planting, the field should be cleared of wild bushes, leveled, and prepared in a square or rectangular layout. Pits measuring 2×2×2 feet should be dug a month before planting and filled with a soil and well-rotted farmyard manure (FYM) mixture (20 kg per pit). Budded plants are ideally planted in the first week of July. Post-planting, regular watering every 3-4 days is essential until the plants are well-established. Although July and August are ideal planting months, planting can also be done in February and March if irrigation is available.

Manures and Fertilizers

When preparing the planting pit, 20 kg of FYM should be mixed with the soil. In the second year, 10 kg of FYM per plant is applied in July and August. From five years onwards, apply approximately 40 kg of FYM or 30 kg of compost per plant annually. This should be done in two equal doses, once in July and once in February, prior to fruiting. The standardization of chemical fertilization doses for lasoda is still in progress.

Canopy Management

To manage the canopy, which tends to grow laterally, the plants should be pruned to encourage upright growth. This involves removing basal shoots and promoting 3-4 upright shoots in all directions. Shoots originating from the rootstock should be removed promptly. Pruning of dried and overcrowded branches should be carried out in the first week of February.

Water Management

Regular watering is crucial during the initial growth stages. Once established, lasoda trees require minimal irrigation during wet and winter months. Irrigation should be paused from October to January to facilitate leaf defoliation. Begin irrigation in early February and continue at 7-10 day intervals, providing around 400 liters per plant per irrigation until early May. Flowering typically begins in mid-February, with fruit set occurring in March.

Defoliation

To promote early and uniform fruiting, lasoda plants require leaf defoliation, which should be carried out at the beginning of January. Defoliation can be done manually or through chemical means. A foliar application of ethrel at 1000 ppm is recommended in the first week of January to enhance uniform leaf drop. After defoliation, the fallen leaves should be spread around the tree basin and covered with soil to retain moisture.

Intercultural Operations

During the monsoon season, regular weeding is necessary to manage unwanted vegetation. This can be achieved through harrowing or manual removal. Keeping the plant basins weed-free can be effectively managed by using leaf mulch and performing manual intercultural tasks.

Diseases and Pests

In March and April, lasoda plants may experience gummosis and branch drying. Gummosis involves gum flow from the phloem, which obstructs sap movement and causes branch dieback. The exact cause of gummosis is not well-understood. To address gummosis, prune affected branches, remove damaged ones, and apply Bordeaux mixture. Although lasoda generally has few pest issues, aphids or jassids may occasionally infest young leaves and inflorescences during cloudy periods. These pests usually do not

cause significant damage as they tend to disappear when the weather clears. Persistent infestations can be managed with a monocrotophos 25% SL solution at 1 ml per liter of water.

Harvesting

Flowering starts in the last week of February, and fruiting occurs in March-April. Fruits should be harvested approximately 30-40 days after fruit set, ideally before they begin to ripen. Harvesting should be staggered to accommodate the different maturation rates of the fruits, with the process completed by the first week of May. The fruits turn yellowish cream when fully ripe, and while ripe fruits are not typically sold in markets, they are valuable for seed extraction and as rootstocks. Ripe fruits can also be sold to nurserymen at a premium.

Value Additions

After draining the water, the fruits are surface dried under a fan. After cooling to ambient temperature, the stones are carefully separated from the fruits by pressing it. To improve the quality of dried fruits and avoid discoloration, destoned fruits are fumigated with sulphur powder (3 g kg⁻¹ fruits) for 43 hours. Fruits are next dried in the sun or in a mechanical drier at 50-60°C until they are totally dry and emit a cracking sound when pressed (4-5% moisture). Dehydrated fruits can be kept in airtight containers for about a year at room temperature. Fruits blanched for 3 minutes with 0.3% Potassium Metabisulphate had substantially higher ascorbic acid, protein, and carbohydrate contents, as well as an organoleptic score. In general, harvesting at 45 days following fruit set and blanching for 3 minutes with 0.3% (KMS) resulted in higher quality sun dried fruits of gonad. Dried fruits must be soaked in water for 4-5 hours before they are used to make vegetables in the off-season. Green fruit is also used to make high-quality pickles, which are popular among locals and can be commercialised. Pickles are best made using medium-sized immature green fruits. Fruits are rinsed twice in water and cooked till tender. Fruits are removed from the hot water, cooled, and weighed. Raw mango gratings equal to one-fourth of cooked fruit are mixed into gonda fruits. This is mixed with spices mainly 10 g red chili, 5-7 g turmeric powder, 5 g blackpepper, 5 g nigella, 5 g fenugreek, 5 g cumin, 10 g fennel, 5 g aniseed, etc. in 1 kg of gonda fruits. The mixture is kept for 1 day after adding 125 g common salt and next day 350 mL of mustard oil is heated and after cooling the oil is poured in the vessel containing mixture up to brim. The mixture is kept in sun for few days and after 1 weeks pickle is ready for consumption.

Marketing

Freshly collected fruits can be sold directly in the market for 30-60/kg. Tribal commu-

nities sell fruits in adjacent towns and markets. Some sellers put up stalls along highways and selling fruit in bamboo baskets. The introduction of several processing industries has improved the economic conditions of tribals. They buy fruits from locals and sell them at a greater price than in markets. The involvement of Krishi Vigyan Kendras, NGO's, and Self-Help Groups (SHG's) boosts their popularity and sales of both fresh and value-added products. They also provide training facilities in rural places.

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