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Research Note :

CHIRONJEE : A PROMISING TREE FRUITS OF DRY SUBTROPICS

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Chironjee (*Buchanania lanzan*) is a common tree in dry deciduous forests. It is endemic to tropical dry deciduous forest of India. In english language it is known as little gooseberry tree (Janick and Paull, 3). It is also known as Cudappah almond or almondette. *Chironjee* fruits are considered as one of the delicious wild fruits. Its seeds are edible and are regarded as substitute for almond nuts. These seeds, in many cases are rushed to generate a powder for flavouring or use as spice in many Indian dishes. Besides, *chironjee* nuts are occasionally useful to thicken sauces and stews. The kernels have a pleasant, sub acidic flavour and are eaten raw or roasted. It is a high value minor fruit plant. However, it is yet confined to the forest area as stray plantation. The tribals collect chironjee fruits and sale them in local market. For them it forms the backbone of economy. In view of utility and commercial demand, the species needs to bring under commercial farming.

Chironjee is regarded for its high value kernel. It is a common substitute of almond amongst dry fruits. Its kernel oil is useful in curing glandular swellings of the neck. Chironjee paste is excellent skin conditioner. Besides fruit, its bark finds uses in natural varnish and is used for tanning also. Gum exudates obtained from tree trunk are used for dressing textile. Gum is also useful in treating diarrhoea, intercostal and rheumatic pains. Leaves are used in the treatment of skin diseases. Fruits are used in treating cough and asthma. The leaves possess cordiotonic properties. Leaf powder is a common cure for wounds. They constitute high class feed for cattle. The roots are acrid, astringent, cooling, depurative and constipating, and are useful in treatment of diarrhoea. It is a good species for growing over bare hill slopes. The tree serves as host of rearing kusumi strain of lac.

Thus, *chironjee* has wonderful utilifarious attributes. In view of this, a detail account of chironjee cultivation has been furnished hereunder to help favour its cultivation beyond wild ecosphere.

Chemical Composition

Chironjee fruits as well as kernel are very nutritious. Its fruits contain 74.3 % moisture, 2.2 % protein, 0.8 % fat, 1.5 % fibre, 19.5 % carbohydrate, 78 mg/100 g calcium and 28 mg/100 g phosphorus. Its calorific value is 49 k-cal/100 g. Its kernel contains- moisture 3 %, protein 19 %, fat 59.1 %, carbohydrate 12.1 %, mineral matter 3 %, fibre 3.8 %, calcium 279 mg /100 g, phosphorus 528 mg/100 g, iron 8.5 mg/ 100 g, thiamine 0.69 mg/100 g, riboflavin 0.53 mg/100 g, niacin 1.5 mg/100 g and vitamin C 5 mg/100 g. The clorific value of kernel is 650 k-cal/100g. The kernel also contains 34-47 % oil (Gopalan, 2).

Origin and Distribution

Chironjee, originated in the Indian sub-continent, is found growing naturally as wild stand in the tropical deciduous forests of north, western and central India mostly in the states of Madhya Pradesh, Bihar, Orissa, Andhra Pradesh, Chhattisgarh, Jharkhand, Gujarat, Rajasthan and Maharashtra. This is found growing throughout India, Burma and Nepal (Hemavathy and Prabhankar, 4). Its distribution has been marked upto an elevation of 1200 m in subtropics and up to 900 m in Sub-Himalayas. Besides India, the plants are found distributed in other tropical Asian countries, Australia and pacific islands too. About seven species have been reported from India of which two yield edible fruits. It is a common

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associate of Sal (*Shorea robusta*), Teak (*Tectona grandis*) Dhok/Kaldhi (*Anogeissus pendula*), Salai (*Boswellia serrata*) forests and occupies lower to middle canopy in dry deciduous forests.

Taxonomy

Chironjee (*Buchanania lanzan*), belongs to family Anacardiaceae, is a medium-sized deciduous tree, growing to about 50 ft tall. It bears fruits each cotaining a single seed, which is used as an edible nut. It has tickly leathery leaves which are broadly oblong, with blunt tip and rounded base. Leaves have 10-20 pairs of straight, parallel veins. The tree sheds its leaves for a very short period during May-June under subtropics. Pyramidal panicles of small bisexual greenish white flowers appear in auxiliary and terminal panicles during early spring in January-March. A single panicle bears about 3000 – 5000 flowers. When buds start growing externally, it takes about 18-28 days to anthesis. Fruit set is around 3 per cent. Fruits ripen during April and they continue to ripen till May. At ripening stage pericarp of fruits changes its colour from green to dark tan. Fruits remain on the tree for quite longer. Fruits are drupe, ovoid or globose, black, 8-12 mm in diameter with hard stones. Unripe fruit are green in colour.

Area and Production

Chironjee is not cultivated as regular plantation. It is found growing as stray plantation in natural habitat. However, its regular plantation is seen under some botanical graden. Exact statistics as regard to area is not available. However, density of population across various forest range, gives an idea as regard to plant stand and the production. In Lalitpur (U.P.) forest ranges the density of *Chironjee* plants recorded was 4.5 to 23.66 tree/ha. Tewari *et al.* (18) reported relatively higher plant population of *Chironjee* near water sourses. Similarly, Prasad and Pandey (7) reported a density of 4 to 23.66 tree/ha in teak dominant forest of Seony (M.P.) and concluded that the density of plants was greatly influenced by its vicinity to habitation. Prasad and Bhatnagar (8) reported that in Madhya Pradesh and Chhattisgarh alone, *Chironjee* seeds to the tune of 1108 tonne/year were collected.

Soil and Climate

Chironjee is commonly grown in forest area mostly in eroded ravine lands. It doesn't found growing in waterlogged areas, but occurs locally in clay soils. It prefers soils which are neutral in reaction and medium to deep in depth. In its natural habitat, it withstands absolute maximum shade temperature upto 45°C and minimum 1°C. Annual precipitation of 750 mm to 12150 mm suffices the need of crop. The plant prefers dry sub-humid climate. The plant is susceptible to frost injury.

Species and commercial varieties

Seven species of *Buchanania* have been reported in India of which two *B. lanzan* (Syn. *B. latifolia*) and *B. axillaries* (Syn. *angustifolia*) produce edible fruits. *B. lanceolata* is an endangered species. It is found in the evergreen forests of Kerala. *B. platyneura* is found in Andaman only. Other species of the genus are *B. lucida, B. glabra, B.accuminata.* It is reported that the fruits of *B. platyneura* are also edible. The B. exillaris are reported to be dwarf in size and produces excellent quality of kernel.

Variety

There is no identified cultivar of *chironjee*. Attempt is in progress to identify and release some high yielding, dwarf and suitable selections of *chironjee.* As a part of improvement, collection and evaluation, fifteen genotypes were evaluated for various horticultural traits at Central Horticultural Experiment Station, Godhra (Gujarat) and CHESC-7 was found promising. In this type, peak flowering was observed during first week of February and fruit set was noticed during third week of February. The fruit ripened during third week of April.The fruit had 1.20 g fruit weight, 22 % TSS, 13 % Total sugar, 50 mg/ 100 g vitamin C, 0.12 g kernel weight and 30.0 % kernel protein (Singh *et al.,* 12).

Propagation

The tree is propagated from seeds which remain enclosed inside a hard shell. To get better germination, the shell of the fruit should be cracked carefully .Fresh seeds give better germination. By using such seeds 70 % germination has been reported (Srivastava, 14). Singh et al. (13) reported that one kg weight of *chironjee* contains 4300-5300 seeds. The seeds have 55-65% germinability. The seed is recalcitrant in nature and they lose viability soon even after 3 months of haresting. Fresh seeds give good germination. Seed, exposed to hot sun quickly lose viability and germination is low. Shukla and Solanki (9) reported that 48-hour seed soaking in ordinary water gave as high as 71 per cent seed germination, Mechanical breaking of stony endocarp resulted in 83 per cent germination. However, mechanical breaking is time consuming and posses high risk of damage to embryo. Seed can be stored in air tight containers upto one year. Choubey *et al.* (1) reported best germination with 1 per cent HgCl treatment.Vegetative propagation through soft wood grafting and chip budding is successful but rarely tried as no demand of plants has been generated in want of commercial cultivation.

Vegetative propagation

Chironjee is hard to root. In a study, Singh *et al.* (11) reported 67 per cent rooting in root cuttings of *Chironjee* with 1600 ppm IAA treatment. Best rooting was reported from 1.5-3.5 mm thick roots. Air layering and patch budding didn't produce successful results (Tewari and Bajpai, 15). Chip budding in the month of August showed promise (Shukla *et al.,* 10). Tewari *et al.* (19) reported veneer grafting successful for propagating chironjee in the month of August -September.

Planting

Chironjee should be planted at a spacing of 8-10 metre. Seedlings tree may be planted at a spacing of 10 x 10 m and those vegetatively prpopagated ones at a spacing of 8 x 8 m. Before planting the pit should receive 20 kg FYM, 300 g super phosphate and 200 g muriate of potash. Planting on barren land leads to less survival of plants (Prakash, 6; Tewari *et al.,* 16).

Tree architecture and Pruning

Chironjee is not pruned regularly. It doesn't tolerate the rigour of regular pruning. When pruned, gum exudation starts. It further restricts pruning. The species is a moderate light demander and hence doesn't require regular pruning. However, while pruning dead, damaged, diseased and interlacerating branches should be removed. The main stem of the plant should be maintained free of branches for about 60 cm from ground level. Above it 4-6 scaffold branches scattered in all four directions are allowed to grow.

Nutition and water management

There is need to standardize nutritional requirement of *chironjee* tree. However, Srivastava (14) observed the use of 20-30 kg FYM and 100-500 g urea beneficial for the tree before flowerig stage. After flowering stage the plant should be fed with FYM 30 kg, N 400 g, P 400 g and K 600 g/plant. The plant is grown mostly as rainfed. However, for better growth regular irrigation is required.

Harvesting and Yield

The fruits of *chironjee* mature in 4- 5 months. They are harvested during April- May. At the time of maturiy fruits change their colour from green to purple. Ripening starts from proximal end of fruit. As soon as one or two drupes change colour, the fruits are considered ready to harvest. Manual harvesting is done. The branches are shock to force the fruit to drop to collet the fruits. Fruit bearing shoots (peduncle) is harvested with a sickle attached to a long bamboo pole. If this is not done carefully, there is damage to the growing shoot of plant and this is damaging to chironjee.

Yield depends upon growth of plant. Generally, a full grown plant may produce 1.0 q fresh fruits with a bulk yield of 40 kg stones and 7-8 kg kernels in a year. However, 3-4 kg kernels per

plant per year is normally harvested (Tewari *et al.,* 17). *Chironjee* has long gestational period. Exact age of bearing of *Chironjee* has yet not been established. It is believed that it takes about 15-18 years to come into bearing.

Processing

Kumar *et al.* (5) has standardized the traditional method for processing *chironjee* fruits and kernels. There are following three steps for its processing.

De-skinning

The harvested nuts are soaked overnight in water. They are then rubbed with palm and with jute sack for large scale procesing. The water containing fine skin is decanted. To get clean nuts, they are washed in clean water. The clean nuts are dried in sun for 2-3 days and stored for shelling.

Shelling

It is the process of separating kernel from hull. For small scale processing, the dried nuts are rubbed using stone slab on a rough stone surface. The kernels are then manually separated. However, for large scale shelling horizontal stone under runner or burr mill is used. The impact and arasive forces separate coat from kernel and split the kernel.

Grading

This is done to separate kernels from hulls and also to separate kernels of different sizes. The shelled or splitted keranels are passed through a grader. The graders are fitted with three oscillating screens of various sizes. The grader separates the produce as per its opening size.

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