



Current Status of Management of *Harar* (*Terminalia chebula* Retz.) in Shivalik Hills

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ABSTRACT

Harar (*Terminalia chebula* Retz.) has been given the status of mother and king of medicines in Ayurveda. Its fruit has astringent, purgative, antibacterial, antifungal and laxative activity. Shiwalik hills of Panchkula and Yamunanagar districts in Haryana upto an altitude of about 1200m above mean sea level boast of best *Harar* in the country in terms of quality. The country's richest germplasm exists here. It has become endangered in Haryana and adjoining Himachal as its regeneration is not taking place. Out of an estimated number of about 2000 *Harar* trees existing in Haryana, about 3/4th are on farmers' fields and only about 1/4th trees exist in forests. About 90 per cent of these trees exist in and around Raj Tikri, Hathiya and Thandog village of Panchkula district and adjoining Sirmour district in Himachal. Trees existing on farmers' land are commercially utilized by the farmers. However, the trees existing in forest are inaccessible due to thick undergrowth of *Lantana camera* growth which makes human movement difficult. This fruit is neither collected by the Forest Department nor is it auctioned. While in forest, it is thick growth of *Lantana camera* which does not allow young seedlings to come up, outside forest. Premature fruit drop as a result of attack of a beetle borer insect and leaf rust takes its toll by reducing the size of fruits and causing economic losses to the farmers.

Key Words: *Harar*, *Terminalia chebula*, Distribution, Harvesting, Processing, Value Addition.

INTRODUCTION

Harar or *Haritaki* (*Terminalia chebula* Retz.) is an unique gift of nature to mankind. The fruit of *Harar* has the magical healing powers. It has astringent, purgative, rejuvenating, antibacterial, antifungal and laxative activity. This activity is due to the presence of substances - tannic acid, chebulinic acid, gallic acid, anthraquinone and sennoside. It is used in India to treat many diseases such as urinary, digestive diseases, diabetes, skin diseases, parasitic infections, heart ailments, fever, flatulence, constipation, ulcers, vomiting, colic pain and hemorrhoids (Bag *et al* 2013).

It is a deciduous tree and grows up to 1600 m above mean sea level and is mainly found in Himachal Pradesh, Jammu and Kashmir, Haryana, Utrakhland, Madhya Pradesh Maharashtra, North Eastern States, Assam, Kerala and Karnataka. According to Ayurveda, there are seven varieties of *Harar* (Vijaya, Putana, Rohini, Amrita, Abhaya,

Jivanti and Chetaki) and each has different properties. Chetaki is in two colours i.e., white and black. *Harar* grows in the northern Shiwalik belt and found scattered everywhere but largely is found in Morni area. Morni area of Haryana is located at an altitude of about 1200 m above mean sea level. Morni and some part of adjoining Himachal boast of a very rich germplasm of *Harar*. The villages in Morni (Raji Tikri, Hathiya, Thandog and Mandhana) have larger concentration of *Harar*. Adjoining Jaman ki Ser area of Sirmour district of Himachal Pradesh also has same germplasm and patch of *Harar* trees.

The *Harar* produced in Morni and the adjoining part of Haryana is in great demand in Pakistan, Afghanistan, Iran, Iraq and other Gulf countries. The govt. in Haryana has not imposed rules for the transport of this produce from the state, therefore the farmers are benefited a lot, but the information regarding the actual quantity of

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Harar being sent from Morni and adjoining areas in Himachal is lacking. At present, there is no restriction on the movement of *Harar* from the state of Haryana and Himachal. As country's best germplasm of *Harar* exists here because of favourable conditions, this needs to be conserved. A lot of problems are being faced by the farmers in terms of pests, premature fruit fall, marketing, transport of the produce value addition, etc. In the absence of any scientific method of harvesting, the farmers continue to harvest *Harar* fruits by crude method using stick, which damages the fruits. The damaged fruits are sold in the market at throw away prices. There does not exist any cooperative or local mandies for the sale/purchase of *Harar* either in Haryana or in the Himachal/Punjab. There is lot of scope to improve the existing *Harar* stock and maximize the returns besides conserving the existing germplasm and strengthening it by introducing genetic material from other parts of the country. Hence, the study was planned to know the present status of *Harar* tree distribution in Morni hills, their fruit harvesting, transportation, marketing, regeneration, improvement in stock, insect/pest attack, value addition, etc.

MATERIALS AND METHODS

The survey was conducted in entire Shiwalik belt of Haryana with large emphasis on Morni area in the year 2011 to 2013 and adjoining Jaman Ki Ser area of Himachal Pradesh. To begin with, the first hand information was collected from the Forest Guards and Foresters/Deputy Forest Rangers of both Haryana and Himachal Pradesh states stationed in the area of the study. A series of meetings were conducted with the *Harar* growers and local contractors regarding the management of *Harar* trees growing on their fields, contribution of *Harar* in their income, harvesting and collection method followed, sale, processing and value addition at local level, and problems faced by them in terms of marketing, insect pests and diseases.

The information regarding the number of *Harar* trees growing on their fields was collected from the villagers. The similar information was collected from Haryana Forest Department field officials at compartment level. After obtaining the

preliminary information about the number of trees, the ground truthing was done by conducting actual survey in the forest as well as on the fields of *Harar* growers'. The number of trees growing in the forest was estimated by physically counting the trees in the forest. The amount of *Harar* collected annually was obtained from the contractors operating in the area. Fruit samples were collected at the time of tree counting to assess the insect/pest damage and serve as germ plasm for future evaluation. Fruit physical parameters were also recorded. The mechanism of marketing of *Harar* fruits from individual farmer to the local contractor and thereafter of these fruits in big market was studied. The *Harar* fruits are sold at two places (Khari Bawali in New Delhi and Majitha in Amritsar district). However, for the purpose of present study, only Khari Bawali was selected. The problems faced by *Harar* growers, the local contractors and the problem of the traders at Khari Bawali in New Delhi were also studied by interacting with the *Harar* traders and the leader of herb traders. Regeneration studies in Shiwaliks (both Haryana and Himachal) were also initiated for future saving of valuable resources.

RESULTS AND DISCUSSION

Plant population

The villages in Morni area of Haryana and Himachal Pradesh have *Harar* trees on the farmers' land and forest area around them. The moderate climate prevailing in this area (average maximum and minimum temperature around 37 and 5°C, respectively) favours the growth of *Harar* trees and development of active principles in the fruits. However, both in the forest and in the fields, *Harar* never exists in pure stands. It is found mixed with other tree species like Jhingan/Wodier Wood of India (*Lannea coromandelica*), *Beul* (*Grewia optiva*), *Behra* (*Terminalia bellerica*) and *Ainy/Sain* (*Terminalia elliptica*). On the farmer's fields, the *Harar* grows on the bunds of fields on the hilly terrain and the fruits are harvested by the farmers. However, in the forests, the thick mat of *Lantana camera* makes human movement difficult and therefore, the fruits are not collected from there.

Owing to the hilly terrain and absence of means of transport, no efforts were made in the

Status of Management of *Harar*

past to explore the richness of *Harar* in Haryana, however, some initiatives have been taken in Himachal and Jammu & Kashmir (Sharma *et al* 1995; Saleem *et al* 2010). Forest Department never conducted survey on the regeneration status and number of *Harar* trees existing in the state. Forest Department never collected *Harar* fruits from the wild nor were ever auctioned. The locals are not ready to reveal the fact that they collect *Harar* fruit from the wild. As a result of this, no information was available on the status of *Harar* in Haryana. On the basis of the extensive survey conducted in the Shiwalik belt of Haryana state, the number of *Harar* trees existing in Haryana was ascertained (Table 1).

Table 1. Number of trees of *Harar* existing in Shiwalik belt of Haryana.

Sr. No.	Name of village	District	Estimated number of trees
1.	Mandhana	Panchkula	500
2.	Raji Tikri	Panchkula	550
3.	Thandog	Panchkula	50
4.	Hathiya	Panchkula	450
5.	Forest	Panchkula and Yamunanagar	400
Total			1500

Production and fruit quality

The figures regarding the total *Harar* being sold from Morni area taken from the local contractors and the record of this produce being maintained at Berwala Forest barrier revealed that about four thousand quintals of *Harar* is sold from Morni area. However, the whole produce does not belong to Haryana. Out of this, about one thousand quintals come from Himachal Pradesh (district Sirmour).

No study is available in the country as to which part of the country produces best *Harar* fruit in terms of desirable characters like anthraquinones, tannins, chebulic acid, chebulinic acid and gallic acid. However, the shape and the size of *Harar* fruit produced in Morni area, is the best in the country. This is the reason that most of the *Harar* produced in Haryana is exported via Pakistan to Afghanistan, Iran, Iraq and other Gulf countries where meat consumption is very high. A typical variety has attractive long fruits, which touches a

maximum length of 8.5 cms. This variety is comparable with Raj *Harar* variety found in Jammu (Saleem *et al* 2010). Raj *Harar* is the best variety of *Harar* in the country.

Harar starts bearing fruits somewhere in the tenth year of its age and it continues bearing fruits upto the age of about 70 years. During the first year, the tree bears about ten kg fruit, but, a fully grown tree can bear fruit upto one quintal. At site, one kg *Harar* fruit fetches price varying from Rs.12 rupees to Rs.35 depending upon the quality of the fruit, which normally is adjudged on the basis of fruit size.

Harvesting of fruits

The harvesting of *Harar* fruits starts by the end of August when the rains start receding. It is at peak between 15th of September to 15th of October. Thereafter, the harvesting, transportation and sale of *Harar* in Haryana continues right up to the end of January but the fruit collection at that time is very less. Normally, *Harar* fruit ripens in the month of January but as mentioned above, the harvesting of the fruit starts in the last week of August. The study revealed that it is not that the *Harar* growers are in a hurry to harvest their produce. The fact however, is that the *Harar* growers are forced to harvest their produce due to attack of beetle borer during rainy season. The feeding by the insect pest on the fruit renders the fruit very weak. This leads to premature fruit fall. Such damaged fruits are of no use.

Attack by Beetle

Both larva and the adult of the beetle pest first bore the soft epicarp and mesocarp of the fruit and, thereafter, the pest bores the hard endocarp with the help of its sharp mandibles. The pest has then access to the nutritious kernel inside. After finishing the contents of the kernel, the pest returns to the soft mesocarp to further feed on the soft pulp. The mature larva feeds on the ground for pupation. Adults after emergence reach the fruit by flying, though it is a poor flyer. The eggs are laid just below the epicarp. The hatching takes place inside the fruit and the grub start feeding thereafter. The borer beetle alone is not a problem rather, during the rainy season, the *Harar* foliage is badly affected by a foliar rust disease. In this

case, yellow spots appear initially on the leaves in the month of July. These spots later on turn black. Many such spots join together to form big patch, leaving very small green portion on the leaves. Photosynthetic activity is lost in such leaves and they fall prematurely. By the end of October, the tree is almost leafless, which considerably reduces the fruit size and such fruit fetches very low price in the market.

Harvesting technique

The harvesting technique adopted by the farmers is also not appropriate. Instead of handpicking of the fruit, they use the stick to harvest the fruits. The branches are beaten with the stick and no cloth or tarpaulin is used for collecting the fruits on the ground. During the process of harvesting, some fruits get damaged while bearing the impact of stick, others get damaged while falling on the ground. Such fruits are attacked by fungus in less than a week and have to be sold immediately at throwaway prices. The fruits after harvesting are packed in gunny bags of 50 kg each. The local contractor then buys the fruit depending upon the quality.

Marketing of fruits

Khari Bawali (New Delhi) is known for the sale and purchase of *Harar* fruit all over the country. Along with Majitha in Punjab, it is regarded as the hub of trade of medicinal plants activity in India. The commission agents at Khari Bawali knows it very well that there is no other place to sell medicinal plants including *Harar* and the local contractor from Morni will not be in a position to carry back *Harar* fruits because it is highly perishable. Also it is known that if not processed in less than a week, the fruits will be attacked by the fungi reducing them to black powdery mass. So, the commission agent at Khari Bawali purchases *Harar* fruits at his conditions and price. The contractor is forced to sell the produce at the prices, which are usually between Rs.25/- to Rs. 50/- kg.

Processing of fruits

There is no trader as such in Khari Bawali who solely deals with *Harar*. This is one of his activity and there are fixed days for the sale of *Harar* fruit in Khari Bawali. Finally bulk fruits are sold to the

big company representatives, where the prices are fixed on quality. Company carries out grading and damaged/diseased fruits are separated and good quality fruits are further processed. Low grade fruits are processed separately including damaged fruits. The green fruit is roasted in big sand pans on slow flames to reduce the moisture content. The green fruit as such has about 80 per cent moisture content. It has to be reduced to about 10 per cent. It takes about three hours for roasting of fruits on low heat in sand. During the processing of the roasting or cooking, the pan has to be stirred constantly to prevent any black burning spot on the fruits.

Ripening of fruits

The fruit is considered ripened when the color changes from golden green to golden yellow. Such fruits are kept for further drying in shade for a fortnight. Drying in sun reduces the anthraquinone and tannin contents. Hence, the sun drying has to be avoided. The grading of the fruit is done after drying. There are few trees in Morni area of Haryana whose fruit falls in grade-1. The bulk falls in grade -2 and grade-3. Grade-4 is lowest grade and it fetches the least price.

Value addition and its export

Harar market at Majitha (Amritsar, Punjab) consumes most of *Harar* fruit produced in Morni area of Haryana and adjoining Jaman Ki Sher area of H.P. While there is no consumption of *Harar* fruit for preparation of murabba at Khari Bawali, there is full fledged market for murabba making in Majitha in Amritsar district of Punjab. It is very well organized industry for this purpose. However, it is not the best quality *Harar* fruit that goes for murabba making. The inferior and damaged fruits are used for this purpose. The traders at Majitha have links with their Pakistani counterparts and the fruit is immediately exported to Pakistan. The local contractor revealed that traders at Majitha make handsome money from this trade as Morni area *Harar* is liked in Pakistan, Afghanistan, Iran, Iraq and other gulf countries.

The study also revealed that *Harar* from Majitha is processed in Pakistan after grading only, it is exported to other countries. Possessing high grade of processed *Harar* is considered a matter

Status of Management of *Harar*

of pride in Pakistan and adjoining countries. Infact consumption of *Harar* after meals is customary in this part of the world. Therefore, the grade of *Harar* placed for consumption speaks about the financial status of the family. It is for this reason, the grade-1 *Harar* is placed during marriage ceremonies.

Conservation of *Harar*

Harar is an endangered species of Shiwaliks of Haryana, Punjab and Himachal Pradesh and probably of Utrtrakhand as well. So, there is an urgent need for putting all varieties of *Harar* existing in Haryana and H.P. at one place to serve as reservoir for the future breeding programme. For this purpose, the fruits of different varieties of *Harar* were collected from Haryana Shiwaliks in January 2010 and grown in nursery of Haryana Forest Department, Panchkula. These plants were planted at a spacing of 6m x 6m at a place called Dakhrog in Panchkula district of Haryana. Five hundred plants of improved varieties of *Harar* were also purchased from Horticulture Research Station Nurpur, Kangra (HP). These plants were also raised at Dakhrog. This plant material included all best germplasm available with the institute. Although Morni area of Haryana has superior germplasm of *Harar*, yet the bulk of fruit that is marketed is not of very good quality.

Future scope

Not many efforts have been made in the past to rehabilitate and restock dwindling *Harar* population. Haryana Forest Department at present raises only a few hundred plants in its nursery. To provide superior quality plants to the *Harar* growers, chip budding method has been used. Forest Department Haryana is also planning to provide training to the *Harar* growers on the vegetative propagation method to produce good quality panting stock. Efforts will be made to provide genetically and phenotypically superior *Harar* plants to the farmers and improved methods of harvesting causing minimum damage to fruits will be introduced. Farmers would be made aware of conservation of available resources. Probably govt. interventions are required for regulating sale and utilization of *Harar* fruit including value addition. The farmers are also required to be trained for handling pests

and diseases, managing trees scientifically and collecting the fruits with minimum injuries.

CONCLUSION

Much needs to be done in the case of *Harar* as regards the scientific investigations. No studies have been conducted anywhere in the country regarding the chemical contents in each variety of *Harar* as mentioned in Ayurveda. In this era of scientific advancements, tannic acid, chebulinic acid, gallic acid, anthraquinone and sennoside contents of each variety and their variation in different parts of the country need to be determined so that the tree improvement program is followed accordingly and farmers get good quality planting stock for future planting. All varieties need to be put at one place and their germplasm needs to be conserved for posterity. The farmers need to be trained for vegetative propagation of improved varieties, control of pests and growing best quality fruit. In the forest, some gaps have to be created by removing *Lantana* in patches to pave way for natural regeneration of *Harar*. The Government support in terms of value addition and market facilities for the farmers of *Harar* are of utmost importance.

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