



E-ISSN: 2278-4136  
P-ISSN: 2349-8234  
JPP 2018; 7(6): 323-326  
Received: 10-09-2018  
Accepted: 12-10-2018

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## Indigenous methods of harvesting, drying and processing of *Trapa natans* in Wular Lake - a Ramsar site in Kashmir valley

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**Abstract**

A study on *Trapa natans* locally known as Guar was conducted in district Bandipora of Kashmir valley located on the banks of Wular Lake. The study has discussed in detail the indigenous methods of trapa harvesting and processing in detail along with the various constraints faced by the fishers during the process of harvesting and processing. A list of fishing villages was obtained from the Department of fisheries and three villages were selected randomly for the study. Group discussion, Observation and PRA methods were used to collect the data. A semi structured interview-schedule was prepared wherein mostly open ended questions were asked from the respondents to extract the detailed information as per the objectives of the study. The study revealed that the trapa is found in abundance in Wular Lake of Kashmir. During the study it was found that despite its high production, fishers fail to get the desired economical benefits from the harvest. Harvesting along with processing and even marketing is mainly done by fisherwomen. However, during winters the harvesting process is done by men. Trapa enterprise has a potential to raise the socio-economic status and boost the livelihood opportunities of fishers of the district. However, for achieving this goal there is a need to explore the opportunities for technological interventions and research advances to be made in pre and post-harvest activities of trapa cultivation.

**Keywords:** Trapa, Kashmir lakes, ITKS, harvesting, processing

**Introduction**

*Trapa natans* also known as water chestnut and locally known as Gaur is rooted floating aquatic plant found in almost all the lakes of Kashmir valley. Wular Lake, one of the largest fresh water lake in South Asia is the biggest producer of Trapa. Water chestnut is an important commodity in food industry because of its unique taste. *Trapa bispinosa* or *Trapa natans* is an important plant of Indian Ayurvedic system of medicine which is used to treat the problems of stomach, genitourinary system, liver, kidney, and spleen. The whole plant is used in gonorrhoea, menorrhagia, and other genital infections. It is useful in diarrhoea, dysentery, ophthalmopathy, ulcers, and wounds. (Adkar *et al.*, 2014) [1] Trapa is green in colour in summers and turns brownish black when it sheds from the plant during winter season. During late summer the green trapa after harvesting is boiled in water and then it turns brown thus making the outer cover soft and easy to remove. Trapa is either sold green or after steaming or even dried. However, in winters the trapa after harvesting from the lake is dried/roasted and even grounded into flour. Trapa is a good source of nutrition with 16% starch and 2% protein (Anonymous).

The fruit is used as substitute for cereals in Indian subcontinent during fasting days. The importance of water chestnut in Kashmir dates back to times of Sir Walter Lawrence when the main crop of the valley was destroyed due to floods in 1893 and the flour of Singhara (Water chestnut) saved people from starvation. Trapa has a potential to be a powerful income and employment generator and can also stimulate the growth of a number of subsidiary industries. Trapa has medicinal properties also. Fruit extract of two varieties of water chestnut (Green & red) showed highest antibacterial properties. (Razvy *et al.*, 2011) [5].

This paper focuses on the traditional methods of harvesting, drying and processing of trapa extracted from Wular Lake. Attempt has also been made to highlight the drudgery faced by the fishers in all these mentioned activities. Ways and means have also been suggested to overcome the constraints thereby making this enterprise more and more profit driven.

**Methodology**

The state of Jammu and Kashmir constitutes of three regions Jammu, Kashmir and Ladakh. Kashmir valley has 10 districts and out of these district the study was conducted in district Badipora. The district contributes not only 60% of total fish production of the valley but also

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produces large quantity of trapa and nelumbo. A list of fishing villages of the district was procured from the Department of Fisheries in district Bandipora. There are around 2080 licensed fishers in the district. Four villages viz. Laharwalpora, Zurimanz, Kemha and Kehnoosa were selected for the study. 100 fishers were interviewed 25 from each of the villages. The data was collected by personal interview and group discussions with the people in their households and while working in the lake.

Data about the harvesting and processing of trapa was collected through observation and interview method. A semi structured interview schedule was prepared for the purpose of data collection. Some PRA techniques were also used for data collection.

## Results and Discussion

### Methods for harvesting of trapa

Trapa harvesting is usually done by the fisherwomen in late summer. It is harvested by two methods 1) Hand-Picking 2) Bottom collection.

**Hand-Picking:** The fisherwomen move into the lake in the morning hours in their traditional wooden boats. During July to October trapa is hand-picked. In general harvesting of trapa involves lot of drudgery. Nuts lying underside the plant are collected by bending the trapa plant and then handpicked and collected in the boat. As trapa is a thorny fruit, the hands of fisherwomen often get pierced by thorns ther by causing pain. After hard work of 5-6 hours the fisherwomen carry the harvested trapa in big plastic tubs or gunny bags to home and then wash them under running water. Then they carry the trapa to market for selling. Trapa is also sold after steaming. Steaming turns green thick cover of trapa brown and soft. Sometimes the fisherwomen remove the trapa cover and sell it without cover. Though the trapa without cover fetches them more money but removing the cover is again a tedious job as it requires lot of time and causes injuries to hands due to the thorns. Thus the whole process of harvesting of trapa to selling of trapa involves lot of hard work and drudgery.

**Bottom collection:** When the plant wilts during the off season i.e. during winter season, the water chestnuts fall on the bottom of lake into the mud. Collection of trapa from the mud is again a very difficult job. The fishers have to move into the lake in the early chilly winter mornings. A big wooden pole is fixed in the mud. The boat is tied with the pole with ropes. The fisherman moves the boat around the pole in a specified area and gathers the trapa entrapped in the mud with the oar at one place. The mud is then beaten with a pole (chokdan) and a net Khushbu is put down and the nuts

are dragged into the boat. These are black in colour and are called as ripe water nuts.

### Trapa drying

The water chest nuts collected during winter are processed thereby forming various by-products. Various indigenous methods and tools are being used for the processing of trapa. Trapa is dried over the traditional fire places which are primarily used for cooking purposes in the rural areas of the valley. A mesh is fixed on a wooden stand at a distance over the chullah. The water chestnut is then spread on the mesh. Fire is lit in the chullah. Slow fire is used to generate the mild heat and smoke to completely dry the water chestnuts. The process of drying takes around 1-2 days.

Another traditional tool used for direct drying of water chestnuts is a porous pan called ouch. Ouchh (porous pan) is used for drying small quantity of trapa. The drying in Ouch is done on fast flames and takes around 20-30 minutes depending on the size of the pan and quantity of trapa.

Sun drying of water chestnuts is also done in the valley but at a very small scale. Sun drying in winters takes long time due to less sunshine, so this process is used rarely.

### Trapa processing

After complete drying the trapa hardens and becomes brittle. The trapa after drying is sold in different forms. The hard cover of trapa is removed with a specially designed knife and the kernel is sold in the market.

**Indermuhul:** Dried trapa is also crushed with the help of a traditional tool / machine known as indermuhul. This machine is used to break the dried chest nuts and also separate the cover from the kernel. Indermohl, is a wooden machine, constructed by combining joined various wooden structures with two grinding stones as the main processing tool, which breaks the brittle water chest nuts and separates the shells. These shells and other impurities are manually removed and sieved. The end product is locally known as 'gaer' that is the broken hard dried trapa.

**Hand mill:** 'Gaer' is consumed as such or grounded into flour using again a traditional hand mill. Most of the fishers sell the 'gaer' to middlemen at throwaway prices. They then send it outside the state where it is further transformed into useful products and sold at handsome prices. Instead of sending trapa outside the state it can be converted into useful by-products in the valley it-self and fishers can be trained in this process so that they can harness the maximum economic benefit out of it.



Fisherwomen harvesting trapa



Fisherwomen selling trapa



Traditonal flour mill locally known as *Gratt*



Oar locally known as *Khood*



Drying trapa on traditional chullah



Traditional, *Ouch* for drying trapa on



Fisherwomen separating



trapa cover from kernel



Indramuhul, used for dehulling trapa



Fisherwomen carrying trapa

### Conclusion

Water chestnuts are cheaply available in Wular Lake and can be promising not only with regards to the starch content and other nutrients but with respect to its unique taste. *T. natans* is an economic asset in its native range as it is an important food crop and a staple in many areas (Mikulyuk, and Nault). Trapa has a potential to enhance the livelihood opportunities and providing sustainable income to the fishers. However, traditional methods and the tools used right for harvesting of trapa upto its processing need technological refinement or technological intervention. Fishers face drudgery while harvesting trapa. Similarly trapa drying is traditionally done that is again tedious and slow process. Trapa processing using traditional machines is a time consuming task and needs more labour. Trapa can be processed into a number of value products that can fetch higher economic returns. Apart from being nutritious the trapa from Wular is very tasty also. Research can be undertaken to develop the various products from trapa that can be popularized not only in the state but outside the state also. The one and the only solution to all these constraints faced by fishers are low cost technological interventions affordable to poor fishers.

### Acknowledgement

Authors convey gratitude to the key informants and the village heads of all the villages (study area) for contributing in different ways and also for sharing their valuable traditional knowledge. Authors also humbly acknowledge the help offered by the Department of fisheries officials District Bandipora. Special appreciation is due to Mr. Gulam Hassan, fisherman from Zurimanz village for offering his services whenever required.

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