

**Fact sheet- Spine Gourd cultivation around Manas National Park, Assam**  
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Wildlife Trust of India (WTI) is implementing a project for conserving biodiversity and improving management practices in the landscape of Manas National Park, Assam, India. WTI works in active partnership with the local communities and the government departments. One of the major objectives of the project is to work with the communities around the protected area to reduce their dependence on forests and to assist them sustainably improve their livelihoods. Towards this, the field team of WTI works in close coordination with the forest fringed communities to understand their lives and livelihoods.

Farmers adjacent to Manas National Park majorly grow Spine Gourd as a cash crop and WTI team is learning more about this crop from the community through interactions with individual farmers, surveys by field teams and focused group discussions with community groups.

This documentation tries to capture the overall status of Spine gourd cultivation in the project area.



Figure 1- The typical fruit of spine gourd from Manas project area.

Spine gourd or tealal gourd (*Momordica dioica*) (*Bhat-kerela* in Assamese) is a popular nutritious vegetable that is intensively cultivated by farmers around Manas National Park. The small, cute, immature and tender spiny fruits are cooked as tasty vegetable. The fruit may look spiny, but the spiny skin of tender fruits is very soft to the touch. Young leaves, flowers and tuberous roots are also eaten.

Spine gourd is a perennial climber with tuberous root and vigorous long vines. It is cultivated commonly in the NE, W Bengal, Orissa and Karnataka. It grows in wild state across India, particularly along the uncultivated lands like farm fences in the tribal areas. In the natural state, the plants are in active vegetative state from around June to October, and in a dormant state during rest of the time. The vines survive in the dormant period through their underground tubers.

Spine gourd is a popular vegetable in many areas of India. Not much scientific work on cultivation of this underutilised vegetable was done in the past. However, considering its great nutritional, medicinal and economic values, attempts are now being made across India to promote its systematic cultivation. The fruits generally sale for a high price of up to Rs 100 per kg and if production is properly managed, farmers can earn substantial cash income. The demand is strong in urban areas of Western India where production is limited. Large quantity is traded to W India from NE states through traders in W Bengal.

The fruits contain high amounts of protein, calcium, phosphorous, iron, and carotene. It is used in multiple ways in traditional medicines. Some scientists are even promoting this as a superfood of the future. While systematic efforts are on to promote cultivation of this vegetable in many areas of India, farmers from the project area of WTI around Manas National Park are already growing this vegetable since more than 20 years and have now achieved a high level of excellence in its systematic cultivation.



*Figure 2- Mr Surjo Bhan- Exceptional mastery of farmers on skilled cultivation of Spine gourd*

**Skilled farming:** This climbing crop has certain peculiar characteristics that require specialised skills to grow it. Only the experienced farmers grow them well. Those peculiarities are as below.

- **Requirement of propagation by tubers as a preferred method:** If propagated by seed, the plants segregate into around equal proportion of male and female plants whereas the ideal ratio is of 90% female and 10% male. The ratio can be maintained only if the crop is raised from tubers of the plants of known sex. The large tubers are not convenient to transport across long

distances. Also they need to be stored properly in the soil during dormancy. This slows expansion of cultivation to distant areas. About 200 plants can be grown in a Bigha of an area (1 Bigha is approx 1/3<sup>rd</sup> acre in Assam, 1300 m<sup>2</sup>) if the spacing is two by two metres.



*Figure 3- The underground tuber which is an ideal planting material*

- **Diocious nature of vines** ( male and female flowers are produced on different plants) and requirement of hand pollination: Due to this peculiar flowering habit, the plants do not effectively pollinate naturally. If artificial pollination is not done, yields are very low. Every morning, male flowers need to be plucked and their pollens need to be gently brushed against the stigma of female flowers to ensure proper pollination and fruit set. This activity of pollination, as assisted by human hands, requires daily attention during the growing season. The process is not difficult but is laborious. One male flower can pollinate around 10-20 female flowers depending on the stage of the crop. In the peak season,

one person will take about an hour every day to carry out pollination in a bigha of the crop. Employing hired labour for hand pollination is not feasible and the family members of the farmers contribute their time for this important activity. Farmers and their families have mastered the skilled activity.



*Figure 4- Mojmil Hoque 's Son ensuring hand pollination on the family farm*

- The tender vines grow vigorously when sufficient moisture is available in the soil. Profusely branching vines need to be supported and trained well on the extensive frames made with Bamboo, jute stems, plastic tapes etc to ensure that all branches get good exposure to light and air. Preparing such frame is a skilled as well as an expensive activity that is obligatory since the beginning. The project area has sufficient availability of Bamboo and jute to easlity do the activity.



*Figure 5- Intricate frame for training of vines of Spine gourd- requires hard efforts of farmers since beginning*



*Figure 6- Profuse growth of vines to fully cover the frames as moisture is available*

#### **Why farmers prefer Spine Gourd:**

Spine gourd is a major crop due to distinct advantages as below.

- It is a sturdy crop that can tolerate poor soil and reinfed conditions. Growth of the rainfed crop is perfectly synchronised with weather conditions, particularly with the rains. In the fully dry season, the tubers remain in dormancy in the soil. They begin to sprout when premonsoon rains are anticipated. If soil moisture is limited, the sprouted plants do not grow and just survive. As soon as major rains are received, the vines are stimulated to grow vigorously. This behaviour ensures that the farmers do not loose the crop due to irregular initial rains. Most of the farmlands in the project area are rainfed where any other remunerative crop may not be easily possible. Spine gourd remains the best option for them.



*Figure 7- A recently sprouted Spine gourd plant awaiting optimum soil moisture from rains*

- Once planted, it grows naturally on the same spot for next 4-5 years and there is no need of annual planting. This considerably reduces expenses of planting material.
- Traditionally farmers have mastered the delicate techniques of growing it.



*Figure 8- Farmer Mojmil Hoque simultaneously managing skilled tasks of hand pollination and fruit harvesting*

- The harvested fruits have good storage life of a week and are comparatively easy to handle and transport after harvesting.
- There is an established local market and it is a good cash crop comparable to other vegetable crops of the area. Farmer's experience is that Spiny gourds will be fully sold on the same day when brought in the market unlike other vegetables.



*Figure 9- Trading of Spine gourd in the local market of Bishnupur*

- The crop is generally not damaged by animals except by goats. In the forest fringed areas where conflict exists due to predation of crops by elephants, this crop is avoided by elephants and hence is grown by a large number of farmers.

**Challenges:** Though it is an established cash crop of the area, farmers still face major challenges as below. Those issues need to be resolved so that the crop becomes more dependable, profitable and more environment friendly.

- Indiscriminate use of pesticides: The crop is affected by multiple pests and diseases for which farmers spray pesticides at the intervals of about 15

days. This continues for 4-6 months of growing season. Sprays are done at the recommendation of local traders and there is no attention to use of most relevant pesticides or on the system of Integrated Pest Management (IPM). Farmers spend major costs on this input.



*Figure 10- Insect damage like this is avoidable even without intensive usage of pesticides*

- Requirement of skilled labour: The crop requires intensive attention and only those farmers whose families can contribute time and labour can grow it conveniently. Though financial benefits from its cultivation are well known, all farmers do not grow it if they do not have easy access to labour.
- Fluctuating market prices: Growth cycle of the crop is perfectly fine tuned with monsoon rains. With the onset of monsoon, almost all farms flourish resulting in a glut of harvested crop in the markets. Some of the farmers sale the vegetable in retail but most of them have to sale to traders in local markets like Bishnupur. Markets and prices are unpredictable and are dictated by the traders. In the peak season, farmers do not earn major profits due to exploitative market systems. The retail prices in the Western India always prevail above Rs 100 per kg. The prices during glut in the local

markets can drop to up to ridiculous levels of up to Rs 5-10 per kg. The farmers can earn marginal profits only when prices are above Rs 20 per kg.

- Changing weather conditions affect this climate sensitive crop once it is stimulated to grow by rains. A hail storm on the 23<sup>rd</sup> April 2023 caused major damage in some parts of the Chirang district where the crop was in the active growing condition.
- Cultivation of spine gourd is capital intensive: A major capital is required initially for erecting the Bamboo frame to support the vines. Some of the farmers have their own Bamboo clumps and can manage this conveniently. Most of them buy from other farmers and have to pay heavy cost for this. The Bamboo material requires repairing and replacement during the 4-5 years of growing period of the crop.

Under optimum crop management conditions, potential expected fruit yield could be of 20-25 q/ bigha ( 1/3 acre). Most of the farmers in the project area grow crop on limited areas of only 1-2 bigha as intensive management cannot be done on larger areas. The market price fluctuate mostly between Rs 20 to Rs 50 per kg. Some of the farmers having irrigation facilities start the crop from the month of October so that their crop is ready for harvest from March onwards when the market price of around Rs 100 per kg is possible. Cultivation on a bigha costs around Rs 50 -70 thousand from which expected gross income is of Rs 80 – 100 thousand depending on the market prices. Major costs are required for Bamboo and other materials for the trellies, pesticides and labour.

WTI has a priority mandate of conservation of biodiversity and wildlife. Improving livelihoods of the communities around the protected areas is an inseparable objective of their projects. Such communities in the forest fringed areas are generally small and marginal farmers that are highly dependent on cash crops like Spine gourd for their livelihoods. For the Manas project, Spine gourd is an ideal crop about which WTI needs to understand in much more details so that it can collaborate with a suitable agency to improve management and productivity of this crop. In the current production systems, the illiterate farmers use huge quantities of pesticides indiscriminately in the highly ecosensitive region. The farmers don't have access to reliable technical assistance on IPM and are guided by traders. Reducing usage of pesticides on the crop of Spine gourd could be a priority agenda of WTI in the future.



*Figure 11- A regular scene of a farmer spraying pesticides on Spine gourd*

**Opportunity for Bodoland Territorial Council (BTC):** The crop of Spine gourd is an important crop of farmers in all the four districts of the Bodoland territorial region (BTR). When other regions of India have identified Spine gourd as a highly promising superfood crop of the future, to be promoted with lots of efforts with unconventional farmers, the traditional farmers of the BTR have already mastered the skills of its cultivation. The existing advanced farming systems of Spine gourd in the BTR is a great cultural and economic asset for the Bodoland Territorial Council (BTC). BTC should support the Spine gourd farmers with investments to improve scientific advisory services for sustainable production and for improving value chains of its trade.

Vast farmlands in the BTR currently have no scope of sufficient irrigation and support the farmers only through rainfed farming. The highly porous substratum of the Himalayan foothills in the BTR does not retain much water in underground aquifers. So, open wells and bore wells have limited applicability in the area. The BTR has perennial rivers and streams that drain water from Bhutan and the protected areas of Manas in to the Brahmaputra basin without having any worthwhile utilization in the BTR. Small lift irrigation systems based on solar pumping systems should be activated by the BTC in the area to expand irrigated farming systems in the area.

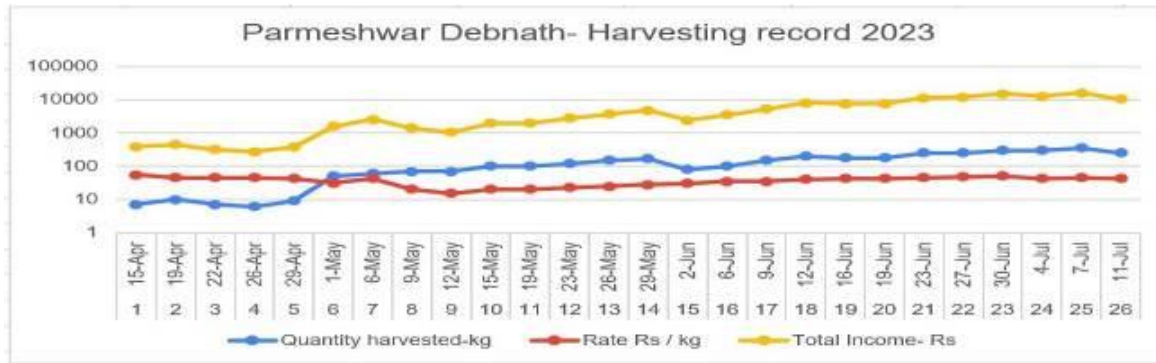


Figure 12- Harvesting record of farmer Mr Debnath, Dt of planting 15.2.23, Area 4 Bigha, 800 vines Quantity of 3500 kg harvested 26 times, Av rate Rs 37/kg, Minimum rate of Rs 15/kg & Maximum Rs 55/kg, Gross earning of Rs 135 thousand. (\* based on data of only up to 11 July 2023)

WTI is an Indian NGO dedicated to conservation for more than 25 years. It is based in Noida, Uttar Pradesh, India and has 40 projects dedicated to conservation across 23 states of India. For more information- <https://www.wti.org.in/>

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