

PLASTIC BOTTLES: Paving the Way to Perennial Farming



Finding a new use for discarded plastic bottles, now a ubiquitous and deathly hazard to the environment, a little revolution is underway in a tiny block in Khunti district, where tribal farmers are using it to water their crops in an innovative way through *machan* cultivation, opening up possibilities of greening land that lies arid most of the year.

DID YOU EVER THINK THAT the waste plastic bottle, which creates pollution, can ever be used for agriculture, especially in drought prone areas? Yes, it is being done by the tribal communities of Karra block of Khunti district, Jharkhand, by utilising discarded plastic bottles in farming.

The farmers of Karra block have experimented with using an advanced and unique technique of

machan (trellis) cultivation with bottle irrigation, which has transformed their drought-hit terrain into a green area. Karra is a drought-prone block, with acute water shortage, leading to an alarming food security situation. Almost 25 per cent of the households migrate, usually from December and up to June. Some of the families migrate for more than 10 months because there is very little engagement in agricultural activity during that period due to shortage of water.

Machan cultivation, or a 'multi-tier' system of cultivation, involves the simultaneous growing of multiple crops on the same land, to fully utilize vertical growing spaces, with the help of used plastic bottles for irrigation

The Indian Gramin Services (IGS), with financial help from the Indo-Global Social Service Society (IGSSS), incubated the concept of *machan* cultivation with bottle irrigation in this community towards the end of 2015. *Machan* cultivation, or a 'multi-tier' system of cultivation, involves the simultaneous growing of multiple crops on the same land, to fully utilize vertical growing spaces, with the help of used plastic bottles for irrigation.

IGS has acted as a catalyst for change in this area through the implementation of the 'Creating Livelihood Adaptation under Drought (CLAD)' project under IGSSS. The objective is to increase climate-resilient farming, to overcome adverse socio-environmental conditions. The families in these villages suffered from such extreme water crisis that when we asked them about the cultivation of creeper crops, their one and only one answer was. "*Humare gaon mein pani ki bahut samasyaa rahti hai, isliye hum logon ko bade paimane pe kheti karne me bahut dikkat aati hai* (We have an acute water scarcity in our village, so cultivating on a large scale is a big problem for us)."

Against this backdrop and through intensive participation and interactive exercises, IGS sowed the concept of *machan* cultivation. With the use of local available bamboo, polymer wire and fishing net wire, a *machan* is constructed and waste water bottles are used as an irrigation source.

In late 2015, Ranjan Sanga was the first farmer in Ludru village to come forward and experiment with *machan* cultivation through bottle irrigation. Earlier, he cultivated paddy and grew creepers on the ground. He did not get a good quality of

vegetables because the vegetable crop would rot and be infested with pests. Until two years ago, his family used to struggle to sustain themselves in the peak summer season. After he adopted *machan* cultivation, however, he plants ridge gourd and pointed gourd in the *machan* and planted chilli and tomato on the ground. He now remains very busy plucking and marketing his produce all through the year. The method of cultivation has enhanced his income by more than Rs 10,000 per month.

Delighted, he says, "*Maine yeh machan aur bottle dwara kheti*



Figure 1: Bitter gourd cultivation on a *machan*

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karke apne kheti ka kharch ko ghataya. Ab main bachche ko English medium school bhej raha hun, jo ki mera sapna tha. Main abhi azola pit banaunga aur kheti me azola ka upyog karunga (I have reduced my cost of cultivation by growing vegetables on the trellis. Now, I am living my dream of sending my child to an English medium school. I will now make an Azolla pit in my field and use it for cultivation)."

For bottle irrigation, a farmer requires a one-litre plastic bottle for each bamboo pole. The bottle is filled with water and attached upside down (Figure 2). With a

rope to the pole and a small hole is made in the bottle cap from which water drips down slowly and goes to the root of the plant. The dense soil retains the water as it drips on it. The water drips slowly and directly around the roots; therefore, it is available to the plant for a longer time, the plant thus get optimum water for its use. The water in the bottle lasts for a day and the bottles are refilled in the morning.

Machan cultivation leads to an increase in the production of various crops grown by the farmers and reduces the cost of production. It gives scope for

multi-tier and inter-cropping of many varieties of crops such as creeper crops in the *machan* and horticulture crops below the *machan* shed. It enhances resource utilization as well as profitability. Bottle irrigation reduces environmental pollution by reusing empty bottles; it lowers water usage because the soil retains the moisture in the roots of the plants and it also restricts the growth of weeds that grow when the entire area is watered.

The major challenge was to convince the families about the irrigation facilities as well as about the quality of the produce. Farmers have, traditionally, been doing creeper cultivation but they usually used dry tree branches for the creepers to grow. Or the creepers were usually grown on the roof tops of the houses or on homestead land, and the crop was mostly meant for household consumption. Farmers were introduced to creeper cultivation as a cash crop on a trellis in the medium uplands. In the improved trellis system, farmers now prepare the trellis using bamboo poles for pillars and GI wire



Figure 2: Construction of a *machan* with water bottles

However, all apprehensions were put to rest once the first crop was harvested. The farmers earned a minimum of Rs 10,000 from one decimal of land, with minimal irrigation through the year

and fish net thread, both more durable and cost-effective.

Initially, the farmers were resistant to this new method because the construction of the *machan* incurred a cost of around Rs 3000 to 5000 depending upon the size of the plot. Farmers were also apprehensive that using very little water and irrigating with bottles would not sustain the growth of the plants, which

would then die. However, all apprehensions were put to rest once the first crop was harvested. The farmers earned a minimum of Rs 10,000 from one decimal of land, with minimal irrigation through the year.

At present, Karra block is filled with green vegetables and a variety of crops. Many agri-households now cultivate all year long. Farmers are now

growing both creeper plants and horticulture crops at the same time and at the same place. It's a new beginning for them. Through the modest support of IGSSS, more than 15 households are full of smiles; the aim is to witness such smiles in all the other households as well.

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