Organic cultivation of Fingermillet variety VL Mandua 352 brings smile to Farmers

The Northeastern Region of India, renowned for its harsh growing conditions, including erratic rainfall and hilly terrain, has long faced significant agricultural challenges. VL Mandua 352, a high-yield finger millet variety, significantly benefits farmers in East Khasi Hills, Meghalaya. It enhances productivity and sustainability, particularly for organic farming. Developed for drought and pest resilience, VL Mandua 352 flourishes in the region's tough climate. Its capability to grow in poor soils and endure dry spells gives local farmers an advantage, ensuring reliable harvests unlike traditional varieties.The variety's robust root system and suitability for low-input conditions make it ideal for organic farming, which often lacks access to synthetic fertilizers and pesticides.

Farmers in the region report a 20-30% increase in yield compared to traditional finger millet varieties. This boost in yield particularly benefits smallholder farmers who depend on farming for their income. Mawrynkneng farmers, known for their organic practices, have improved both the quality and quantity of their harvests, allowing them to sell more produce and earn higher incomes.Another significant benefit of VL Mandua 352 is its shorter maturation period, which allows farmers to grow it within a limited farming window. This has enabled them to better plan their agricultural activities and rotate crops more efficiently, improving overall land productivity.

Smt. Ladaphun, a smallholder farmer from Mawber village in East Khasi Hills, shares her experience with a smile "Before we began cultivating VL Mandua 352, our yields were poor, and we faced challenges with pests and diseases. However, since adopting this variety, we've seen a significant improvement in both the quantity and quality of our harvest, even without using synthetic fertilizers. The grain is now stronger, more nutritious, and we've managed to sell it at better prices."

Key results:

Year	Area	Production(ha)	Net Return	B:C ratio
2022	1ha	1.9t	3,48500	3.7
2023		2.1t	1,21240	2.3
2024		2.4t	2,01,418	3.3

The success of VL Mandua 352 in the East Khasi Hills stands as a testament to the benefits of modern agricultural science combined with traditional sustainable practices. By increasing productivity and ensuring a reliable harvest in challenging conditions, this variety has brought hope to many farmers in the region. It has not only helped increase their income but has also contributed to the broader goal of improving food security and promoting sustainable agriculture in the Khasi Hills.

Jalkund, an option for overcoming challenges of Rabi farming in the wettest place

The East Khasi Hills home to both Mawsynram and Cherrapunjee villages with highest rainfall in the world, receives an average annual rainfall of around 4700 mm; however, water scarcity remains a problem during the dry season, especially for irrigation, due to the lack of proper rainwater harvesting and water storage systems. As a result, the cultivation of rabi vegetables is hindered, impacting farmers' livelihoods by reducing their income during the dry months.

In 2015, a low-cost water harvesting structure, known as Jalkund, was introduced to the farmers of Laitkynsew village. The farmers were trained in water management, and recommended practices were encouraged. Seven Jalkund structures, each 4m wide, 5m long, and 1.5m deep with a water storage capacity of 30,000 liters, were constructed using affordable materials such as pond liners and silpauline sheets. Since the village follows organic and natural farming practices, inputs like seeds and manure for the rabi crops are sourced from farm resources.

As the village already practices organic farming, seeds and manure are sourced locally. The primary crops grown during the dry season include tomatoes, peas, mustard, and lettuce. The implementation of the Jalkund structures has expanded the area for rabi crop cultivation and has led to increased productivity.

Production and Income generated from rabi crops using Jalkund

Sl no.	Crops (All organic)	Area (Ha)	Production	Cost of Cultivation (Rs/ha)	Gross Return(Rs/ha)	Net Return(Rs/ha)	B:C ratio
1.	Tomato	1	5 t/ha	68500	233,000	164,500	3.4
2.	Pea	1	6 t/ha	73650	240,000	166,350	3.3
3.	Mustard	0.5	60,000 bunches/ha	48354	120,000	71,646	2.48
4.	Lettuce	0.25	45 q/ha	59800	225,000	165,200	3.76

The establishment of a Jalkund on farmers' fields has motivated them to expand their rabi crop cultivation, as irrigation water became more readily available and cost-effective. Many farmers have increased the land area for growing tomatoes, peas, and mustard, tripling their yields and significantly raising their income. This success encouraged farmers from neighboring villages in East Khasi Hills, such as Nongbsap, Tynring, and Shylleikriah, to adopt the technology. As a result, 12 Jalkund structures have been built, all of which are currently operational and well-maintained.

Success story on Maize and French Bean Intercropping

Intercropping maize with legumes, particularly soybean, is a well-established tradition in the East Khasi Hills district. However, the cultivation of French beans alongside maize has not been sufficiently embraced. Furthermore, the existing intercropping practices among farmers lack scientific rigor, leading to suboptimal yields. To address this issue, the KVK East Khasi Hills has decisively chosen Smti. Shopsimai, a progressive farmer from Laitjem village, to implement a focused intervention on intercropping French beans in maize fields through the adoption of proven agricultural practices. French beans command a strong market value year-round and are essential for boosting farmers' incomes while significantly improving soil conditions, both physically and chemically.

Vijay Composite maize and Selection 9 French bean varieties were provided to the farmer for cultivation. Training sessions demonstrated proper sowing techniques, with maize planted in lines at a 1:1 ratio with French beans. The importance of nutrient management was emphasized, and recommended practices were encouraged for optimal growth.

The introduction of intercropping French beans with maize has greatly benefited this progressive farmer, who has increased her income by harvesting two crops from the same area at different times. She achieved a maize yield of 3.2 tonnes per hectare, sold at Rs. 12 per kg, resulting in a return of Rs. 43532.00. The yield of French beans was 6.7 tonnes per hectare, sold at Rs. 20 per kg, yielding Rs. 133960.00. The total cultivation cost for both crops was Rs. 58948.72, with a net return of Rs. 113543.28 and a benefit-cost ratio of 3.01. This success has motivated her to continue intercropping, inspiring other local farmers to adopt the practice as well.

Cost of Cultivation for Maize+ French bean intercropping				
TOTAL without interest on working capital			55612	
Interest on working capital 12%			3336.72	
TOTAL COST OF CULTIVATION			58948.72	
Crop sold	**Yield/ha**	**Return frm stover (Rs)**	**Total Return (Rs.)**	**B:C Ratio**
Maize (Rs @12/kg)	**3211**	**5000**	**43532**	
French bean (@ Rs 20/kg)	**6698**	**-**	**133960**	
Total return from maize and French bean(Rs)			**172492**	**3.01**

“Improving income through Commercial cultivation of Gerbera”

Floriculture is becoming a popular part of horticulture in Meghalaya. Farmers are now growing flowers for sale, especially for cut flowers. In the past, they grew flowers mainly as a hobby and did not focus on commercial farming or house plants. Recently, farmers have seen the potential in the cut flower market, as well as in house plants and fillers. The farmers know that Meghalaya, especially the East Khasi Hills, has a great climate for growing flowers. There is a high demand for cut flowers because people use them for decorations and arrangements at many events. To support this growth, the KVK East Khasi Hills worked along with villages which were interested in commercial flower production. Simultaneously conducting market survey on the acceptability of the flowers wherein Gerbera stood out as a top choice because of its attractiveness, ease of production and reasonable price compared to other flowers.

Commercial cultivation of Gerbera flowers was initiated by the Krishi Vigyan Kendra office in East Khasi Hills at Laitjem village during the year 2016. It provided interventions through training on the scientific practices for growing Gerbera, as well as demonstrations on land preparation, soil treatment, seedling care, intercultural operations, propagation, and post-harvest processes.

Land preparation in low cost

Smti. Mary Pathaw, a resident of Laitjem village, initially focused on cultivating vegetable and tuber crops, earning a sufficient income from their sale. However, she desired an additional source of income to support her family. With dedication and hard work, she ventured into Gerbera cultivation, beginning her journey with a low-cost polyhouse measuring 100 square meters, built with an investment of just fifty thousand rupees.

To enhance her cultivation, she used readily available materials including farmyard manure, forest soil, and vermicompost. She treated the media and seedlings with a bio-fungicide, Trichoderma viridae, and employed a bio-pesticide, Beauveria bassiana, to control pests. The flowers demonstrated excellent vegetative growth, resulting in a significant yield of cut flowers. Thanks to the newly constructed polyhouse and properly treated media, there was a very low incidence of pests and diseases.

In her second year, Mary began to propagate and expand her Gerbera cultivation. As a result, her income increased significantly, allowing her to supply cut flowers during peak seasons. Her successful efforts not only enabled her to produce Gerbera cut flowers and suckers but also inspired her neighbours to start their own Gerbera cultivation for additional income.

Technology	Trials	Yield	Net Return (Rs./ha)	% Increase in net returns	B:C Ratio	Data on other parameters
Gerbera Production	3	Avg. Yield: 11000 nos./100 sq m	56289	35	2.7	Longest stem length: 58.37 (var. Shania) Largest flower diameter: 10.5 (var. Shania) Highest no. of cutflowers/10 sqm/year: 420 nos(var. Shania)

"On farm production of *Trichoderma* sp and *Beauveria bassiana*"

Low cost inoculation box

The East Khasi Hills boast a captivating temperature range of 1.7 °C to 24 °C, creating an ideal climate for a rich tapestry of horticultural treasures. Here, farmers cultivate an impressive variety of fruits, vegetables, flowers, spices, mushrooms, and medicinal plants. Unfortunately, the promise of this agricultural bounty is dimmed by a significant challenge: a high prevalence of pests and diseases that severely diminish crop yields and returns. In 2014, in a commendable move towards sustainability, the government of Meghalaya imposed restrictions on chemical pesticides and fungicides, setting the stage for a transformation into an organic state. Inspired by this vision, local farmers have embraced the use of biopesticides like Trichoderma sp. and Beauveria bassiana to combat pests and diseases. Through dedicated training and awareness programs led by KVK East Khasi Hills, these farmers have taken significant strides towards adopting this innovative technology.Yet, the journey is not without hurdles. Many farmers struggle to fully implement these practices, primarily due to the high costs and limited availability of essential biocontrol agents in the market. Additionally, the short shelf life of these biopesticides presents another challenge, forcing farmers to make continual purchases rather than stockpiling these vital resources. Despite these obstacles, the spirit of innovation and resilience among the farmers continues to shine through as they strive for a more sustainable and fruitful future.

In 2015-16, KVK East Khasi Hills introduced a low-cost method for farmers to produce biocontrol agents themselves. Various activities, including training sessions and demonstrations, were held in East Khasi Hills to promote this technique.Smt. Rihunlang Bairo, a farmer from Tynring village, took an interest in the technology and is now producing biocontrol agents like Trichoderma harzianum and Beauveria bassiana. She has produced 20-25 kg of Trichoderma harzianum but has not yet marketed it. Currently, she uses these bioagents in her ginger cultivation to combat soft rot diseases. Smt. Bairo has found Trichoderma harzianum effective against this issue and plans to increase her production for use on other crops and for sale to fellow farmers

The technology costs Rs. 10,000, which covers a low-cost inoculation chamber and materials for producing bioagents. Farmers can now produce their own biocontrol agents, allowing them to meet their needs promptly and at a lower cost. After applying Trichoderma harzianum, the incidence of soft rot in ginger was just 4%, resulting in an average yield of 10 tons per hectare, a net return of Rs. 142,507, and a benefit-cost (B:C) ratio of 3.1. In contrast, ginger crops without any management practices showed significantly poorer results.The farmer found that using Trichoderma harzianum effectively controls soft rot in ginger, reducing disease incidence to just 4%, compared to 30% in the local control group. This method also increased her yield by about 30%.With the simple and low-cost production of biocontrol agents, she intends to expand her production next year and sell to other farmers. She can now access and produce these agents as needed, allowing her to apply Trichoderma from the planting stage for healthier, more disease-resistant crops. Other farmers in the village are interested in adopting this technology and are willing to produce biocontrol agents on their own farms with support from KVK, East Khasi Hills.