

Encouraging climate-smart agriculture

Rising temperatures and decreasing water availability are reducing yields particularly in Ananthapur district where agriculture is vital for the food security of the population. Extreme weather events such as droughts and floods are making cropping and animal production even more prone to crop failure.

Agriculture must also adapt to changes in climate in order to provide food security. Ecological farming methods using naturally prepared dung-based inoculants are the best way of practicing agriculture in severe drought conditions and traditional non-hybrid seeds are quite resilient against the vagaries of the climate. The inoculants can be prepared at a single place and one such unit is Bio Resource Centre (BRC) to benefit more farmers.

In order to cope with the change in climate in the drought prone regions of Ananthapur district in the state of Andhra Pradesh, APMAS is implementing a project, '**Climate Smart Village**' (CSV) in two mandals viz. Nallamada and Gudibanda. The project is being funded by AEIN Luxembourg and aims to promote affordable and replicable adaptation and mitigation practices to enhance livelihoods of vulnerable communities in the district of Ananthapur. One of the major interventions in the project is to reduce the usage of chemical fertilizers and replace with dung-based inoculants which will improve the health of soil and the quality of the crop produce.

Bio Resource Centre (BRC)

Bio Resource Centre was established under the component '**SMART Agriculture**. BRC is an enterprise, where time tested, locally prepared products/formulations utilizing biological entities or biologically derived inputs useful for improving soil health, crop growth, pest or disease management are made available for purchase by farmers. BRC serves as single-stop shop for all bio input needs of farmers in the area. It can also be an effective service delivery mechanism for climate resilient farming practices. The potential items prepared at BRC could be:

Improving soil fertility and soil health

- Seeds of green manuring crops
- Vermiculture / compost
- Neem / karanj cake
- Cow dung/cow urine
- Microbial preparations like Jeevamrith, Ghana Jeevamrith, Waste Decomposer
- Bio fertilizer cultures: VAM (Vesicular Arbuscular Mycorrhizae), Azolla, Rhizobium, PSB (Phosphate Solubilizing Bacteria), Azospirillum, Azotobacter, Potash / Zinc Mobilizers etc

Pest or disease management

- Seeds / seedlings of trap crops
- Botanical decoctions

- Panchagavya / Dasaparni
- Neemastra / bramhastra / agniastra
- NSKE (Neem Seed Kernal Extract)
- Bio pesticides – Beaveria, Verticillium, Trichoderma, Pseudomonas, NPV (Nuclear Polyhydrosis Virus) formulations / cultures.

Habitat management

- Seeds / Seedlings of Glyricidia, Drumstick, Pongam, Neem
- Seeds for Border crop/Inter crop/Cover crop/ Bio-fencing/ Fodder
- Yellow/White Sticky Traps, Pheromone Traps, Fly traps, Light traps etc.

Two entrepreneurs Shivanna from P.C. Giri village, Gudibanda mandal and Ranga Reddy from Pathabattalapalli village, Nallamada mandal were identified and taken for exposure. The BRCs established are preparing the following products:

Product	Advantage	Quantity (liters)	Cost (Rs)	Income (Rs)
Neemastram	5 kg of neem leaves are made into paste and boiled in water. This decoction is sprayed on the plant to control all the sucking pests	100	200	1000
Beejamrutam	Microbial seed coating through cow urine and dung-based formulations. Once the mixture is prepared, it is kept overnight and next morning the cow dung is squeezed out of Beejamrutham, seeds are treated well with this on a cloth spread on ground and shade-dried before sowing	20	100	1000
Jeevamrutam	It enhances soil micro biome through an 'inoculum' of fermented cow dung, cow urine, and other local ingredients. Once the mixture (inoculum) is prepared, it is to be supplied to soil through irrigation or directly by soil application. This can also be applied by spraying 10% of the prepared solution.	200	300	3000
Panchagavya	Foliar spray for nutrient supply for plants. This includes cow wastes, milk, ghee, water, jaggery, over ripen banana, curd, coconut water are mixed and left for a week and sprayed on the crop.	100	1500	5000
Dashapatra kashayam	Foliar spray to control pests in the field. It majorly requires 5kg leaf and 10lit water. They together are to be boiled for 1 hour. This decoction to be sprayed on the plant before flowers and fruiting.	200	500	6000
Pullatimajjiga dravanam	This is the mixture of fermented curd with water. This is sprayed on the plant to control fungal diseases such as powdery mildew and save the plant from yield losses	200	200	1500
Waste Decomposer	Mixture of bacterial culture extracted from cow dung-based materials to protect the crops from pest and diseases	100	300	2000
Total			3100	19500

There was an agreement entered between the BRC owner and the FPO with the condition that the entrepreneur has to share 10% of the profit with the FPO and has to return the materials back to the FPO if he/she decides to close the BRC.

Total investment cost of BRC is Rs.73760 and the capacity of each unit is about 15 to 20 bio products which can supply to 300 farmers in a month. The FPO members buy the products at 50% subsidized rate where as others at normal prices. Due to more interest in the farming community towards using the bio fertilizers and pesticides more products such as Agniastram, Inguva dravanam, Panchapatra kashayam etc are in the process of development to be used in the next season.

Outcomes

Initially, around 5 farmers in Nallamada and 15 farmers in Gudibanda started using the bio products. After realizing the importance of using the bio-control agents, another 125 farmers began using the products where the intervention reached to 150 farmers in both the mandals. About 15 farmers from Gudibanda and 6 farmers from Nallamada were encouraged to prepare their own products at their field level.



Preparation of neem oil



Preparation of waste decomposer



Preparation of Jeevamrutam

The Entrepreneur, Shivanna says *“This intervention has generated income with naturally available products and preparation of these bio products has no bad effects to human as well as environment”*

Farmer Ramu says, *“I had 5-6 loans during my chemical farming days- a loan for my daughter’s marriage, others for fertilizers. Now my farm expenses reduced, and income has increased for the family. I owe nothing to anyone.”*

Farmer Anjaneyulu says *“Our expenses are very low. Use of BRC products improved the crop yield, conserved the soil, quality of produce is increased, income, and health. We experienced reduced farm expenses and a reduced need for credit. I’ve added intercrops to this, so I get income from many crops, not just one. Yield is not an important concept for us.”*

Application of bio pesticides and fertilizers is an important intervention in the Climate Smart Village Project and expected to result in the following outcomes:

- Avoids usage of synthetic fertilizers and pesticides and hence contributes to tackle climate change by reducing greenhouse gas emissions
- Minimizes energy consumption by eliminating the energy required to manufacture synthetic fertilizers, and by using internal farm inputs, thus reducing fuel used for transportation
- Establishes closed nutrient cycles and minimizes losses via runoff
- Contributes to sustainable climate-friendly production system that delivers enough food
- Combat global warming by storing carbon in the soil, which means less carbon in the atmosphere
- Helps farmers adapt to climate change because high soil organic matter content and makes soils more resilient to floods, droughts, and land degradation processes
- Minimizes risk as a result of stable agro-ecosystems and yields, and lower production costs
- Requires locally available materials for preparation of bio pesticides and bio fertilizers and thus reduction in cost and saving of time and energy.
- Avoids use of synthetic fertilizers, pesticides and genetically modified organisms results in minimizing pollution of air, soil and water, and optimizes the health and productivity of interdependent communities of plants, animals and people
- Provides nutritious food which adds to healthy diet and enhanced immunity