

***Trichoderma* - an ecofriendly approach**

Background & Objectives:

The increase in population becomes alarming in our country, as a result, there is shrinking of land and water resources for agriculture which results in greater change to the availability of food in India. Farmers are using chemical pesticides indiscriminately. As a result of high consumption of pesticides, the problems of soil health, pollution, human hazards problems, residue and resurgence, development of resistance, secondary disease/pest outbreak etc. are more evident in crops like cotton, rice, vegetable and fruits. Plant Protection scientist will have to play a major role in increasing food availability by protection through management of plant pest and diseases. Biopesticides have the potential to replace or augment conventional pest disease management practices which are based mainly on use of synthetic pesticides. Soil borne disease problems are cumbersome to manage by any conventional method, so biological control strategy will only be effective and useful method.

The use of synthetic pesticides cause residual problem, hence ecofriendly approaches for the management of the soil borne diseases is taken up for cultivated crops of south Gujarat viz. banana, sugarcane, groundnut, castor and chickpea by mass production of native biopesticides. This management objectives have been carried out by production, demonstration and training to farming community of south Gujarat farmers.

- To find out native strains of bioagents from soils of south Gujarat area and compare the efficiency in net/green house with other proven bioagents.
- To develop the protocol for mass multiplication of bioagents.
- To produce biopesticides commercially.
- To demonstrate the effective biopesticides.
- To educate the farmers.



Mass Production of *Trichoderma* Technique

Intervention:

Isolation of native strains of bioagents and biofertilizers and by developing good quality formulation of bioagents for disease management. This was achieved by bringing awareness to south Gujarat farmers by use of biopesticides through training and demonstrations, in terms of increasing the yield, reduction of disease and reducing environmental pollution which can reduce threat to global warming. Step taken to carry out the programme: Establishment of Biopesticide Unit for the mass production of biopesticides, isolation, identification and standardization of carrier based protocol for biopesticides, mass Production of Biopesticides in large scale after evaluation against various seed and soil borne pathogens *in vitro*, as a PGPR *in vivo* and quality and shelf life parameters.

Biopesticides demonstrations in major crop soil borne diseases of south Gujarat. Training on biopesticides was achieved through conducting field demonstrations and distribution of Biopesticide Kits, literature and lectures to educate the farmers, scientists and students.



Distribution of Biopesticides Kit



Awareness programmes and trainings

Steps taken to fulfill the objectives: twenty isolates of *Trichoderma*, *Pseudomonas* and *PSB* spp. were isolated and reported new species *Trichoderma fasciculatum* from south Gujarat. Developed the mass production protocol for the carrier based *Trichoderma* with maintaining the quality parameters (2×10^7 cfu.g) and shelf life of one year. The product is effective against Sugarcane wilt, red rot, Castor wilt, Banana rhizome rot and Chickpea wilt which are major diseases of south Gujarat. Eleven demonstrations of biopesticides on different crops and diseases were conducted on different crops diseases such as sugarcane wilt and red rot, castor wilt, banana rhizome rot, chickpea wilt, pigeon wilt and groundnut wilt. 64 trainings with 27,876 farmers, students, scientists and teachers were trained on use of biopesticides by live demonstrations on seed and soil application, distribution of kit and literature through KVK, SSK, Khedut Shibir, Sugarcane factory, Krishimela, Krishi Ratha and ATMA projects. Mass production of Biopesticides was achieved by developing carrier based formulation by the use of native strains of *Trichoderma* and biofertilizers of south Gujarat. Compared the yield data of the farmer's field without the use of biopesticides with use of biopesticides. Awareness on biopesticides use was achieved by distributing literature, biopesticides kit and lectures. Various protocols for the mass multiplication of biopesticides were compared with the protocol developed by Department of Plant Pathology, Navsari Agricultural University. The innovative, enthusiastic and adoptive farmer fields were selected for demonstrations. Field level demonstrations on yield data were achieved by recording the disease incidence in treated and untreated field. Feedback sheets were prepared to evaluate the impact of lectures, literatures, live demonstrations and use of kits from farmers. Talcum powder based mass production of *Trichoderma* was achieved. The yield was increased in biopesticide applied fields in comparison with untreated biopesticides plots. 27,876 farmers, scientists and students were educated on use of biopesticides to keep the environment ecofriendly. Established solely Biopesticide and Biofertilizer Unit to educate and distribute biopesticides and biofertilizer to the farmers of south Gujarat. The farmers feedback letter of appreciation on biopesticide use was received. The farmers approach towards eco-friendly plant disease management has been increased and reduced the use of pesticides and chemical fertilizers.

Field Visits



Demonstartions



Table 1: Results of demonstrations of biopesticides and biofertilizer at farmers field in different crop diseases in south Gujarat

Sr. No.	Crop/Place	Yield		Percent Increase yield over untreated plot	Disease incidence (%)		Percent Disease decrease over untreated plot
		Treated with complex of biopesticide and biofertilizer	Untreated (control)		Treated With complex of biopesticide and biofertilizer	Untreated (control)	
1	Sugarcane wilt (Bardoli)	110 t/ha	95 t/ha	13.63	1.00	4.00	75.00
2	Castor Wilt (Vyara)	5.0 q/ha	3.8 q/ha	24.00	4.60	12.50	63.20
3	Pigeon pea Wilt (Bharuch)	10.80 q/ha	8.00 q/ha	25.92	4.00	13.00	69.23
4	Groundnut wilt (Dediyapada)	2.5 q/ha	1.2 q/ha	52.00	2.50	11.33	77.93
5	Chickpea wilt (Waghai)	9.5 q/ha	7.0 q/ha	26.31	4.60	14.00	67.14
6	Banana Rhizome rot (Navsari)	63.8 t/ha	59.0 q/ha	7.52	5.60	12.50	55.20

During the period of 2008-11, Biopesticides like *Trichoderma* (5,275 kg), *Pseudomonas* (67,4799 lit) in combination with Biofertilizers like *Azotobacter* (54,979 lit), *Acetobacter* (6,22 lit) and *Rhizobium* (4,88 lit) distributed among the south Gujarat farmers as components of Organic farming. These figures shows impact of biopesticides in combination with biofertilizers help in increasing the soil health and reduce environmental pollution. The initiative and primary work on adoption of biopesticides among the south Gujarat farmers was started after the implementation of the RKVY project. Utilization of the chemicals fertilizers and pesticides cause soil degradation and reduce fertility level. As Gujarat soil is acidic and alkaline in nature application of biopesticides and Biofertilizers like *Pseudomonas* spp., *Azotobacter*, PSB helps in reducing alkaline condition of soil. The fertility of soil has been increased with reduction in soil degradation and reducing the alkaline condition of soil. The productivity of soil has been increased with good soil health status. (As per the feedback of farmer given by Mr. Hemraj Warade, Bharuch (Gujarat). The same feedback given by Chaganbhai Patel (Bardoli), Chimanbhai Patel (Navsari), Mangubhai Garasiya (Waghai) and Maheshbhai Vasava (Dediyapada).