

Pesticide tolerant strain of aphid lion *Chrysoperla zastrowi sillemi* (PTS 8), an important predator of sucking pests



Pesticide tolerant strain of Chrysopid larva feeding of *Helicoverpa armigera* larva

Technology Description

The Common green lacewing, *Chrysoperla zastrowi sillemi* (Neuroptera: Chrysopidae), is an important biological control agent of sucking pests in different agroecosystems. In India, several chemical insecticides are used indiscriminately to control insect pests, which have led to resistance in many insect pests. Therefore, release of insecticide resistant predators would improve their survival in sprayed situations for potential use in augmentative biological control or integrated pest management strategies in many crops. Further, such predators can play an

effective role in delaying the development of resistance in pest populations. Keeping the above facts in view, a strain of *Chrysoperla zastrowi sillemi* (PTS-8) having tolerance to different groups of pesticides viz., organophosphate, organochlorine and synthetic pyrethroid has been developed. PTS-8 recorded highest resistant factor (RF) for acephate (277.5), fenvalerate (66.11) and endosulfan (50.36). Biochemical assays revealed that the PTS-8 has got higher detoxifying enzymes activity i.e. $>0.04 \mu\text{M}/\text{min}/\text{mg}$ protein for esterase and $21.1 \mu\text{M}/\text{min}/\text{mg}$ protein for glutathione S-transferase as compared to susceptible population. Biocontrol potential of PTS-8 strain is better than the susceptible strain under pesticide stressed condition. Field studies revealed that the strain was effective against sucking pests in pesticide stressed conditions and are also effective under normal conditions.

Background

Agricultural productivity in India is affected largely by insect pests and diseases, which cause losses to the tune of 10-30%. Though there has been increasing awareness in India about the hazards of indiscriminate use of insecticides in agriculture, use of biological agents for pest management has not taken off in a big way due to the susceptibility of bioagents to abiotic and insecticides-induced stresses. The Common green lacewing, *Chrysoperla zastrowi sillemi* (Neuroptera: Chrysopidae), is an important biological control agent of sucking pests and eggs and neonate larvae of lepidopteran pests in different agroecosystems. It has long been considered as a promising candidate for pest management programs worldwide due to its wide prey range and geographical distribution, voracious larval feeding capacity and commercial availability.

Benefits /Utility

No such pesticide tolerant strain of *C. zastrowi sillemi* is currently available in country. The existing strain of the predators are not effective in insecticide affected fields, whereas pesticide tolerant *Chrysoperla* feed on insect pests under pesticide and high temperature stressed cropping systems. However, at normal condition, i.e., under unsprayed situation both behave in similar way.

Scalability & Market potential

The technology can be extended to any extent. *Chrysoperla* production is a profitable business as there is only less than 1% cropped area is covered by these bioagents.

Economic analysis

Pesticide tolerant strain of *Chrysoperla* is very effective against sucking pests especially aphids, thrips, mealybugs and whiteflies and have great impact on cultivation of cotton, vegetables and other crops which will generate employment.

Financial requirement

Initially an investment of Rs. 20.0 lakh is required for coverage of 100 ha of cropped area. The investment on rearing facility is one time only and all equipments and rearing boxes can be used for 10 years. A mass rearing unit consisting of rearing boxes, egg laying cages, adult rearing cages, oviposition cages, refrigerator, table UV hood and vacuum unit.

Business and commercial potential

- No toxicological data or registration is required for its commercial use.
- Since these strains are multiple pesticides and high temperature tolerant, theses can be used field alone with farmers practice and go well with IPM.
- These can be used in most of the crops like cotton, several vegetable and other crops.



Pesticide tolerant strain of Chrysopid larva feeding of *Helicoverpa armigera* eggs



Supply of pesticide tolerant strain of Chrysopid to cotton farmers



Field validation of pesticide tolerant strain of Chrysopid on cotton pests

Target Market/Customer

- Farmers
- Contract farming companies
- Farmer's federations/Groups
- Biocontrol producing companies
- This technology already commercialized to one firm.

Social Impact of the Technology

- Chrysopid predators are safe biological control agents and are specific against insect pests.
- Cost-benefit ratio will be improved
- Unemployed youth can start small production units through NABARD support to help farmers