

Wide area management of white grub in groundnut through bio-agent based IPM module: A success story

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Preface

White grubs also known as root grubs are soil dwelling polyphagous pests feed on organic matter in soil as well as the root system of many economic crops. This is one of the most important insect pests of national significance. White grubs infest almost all *Kharif* and few *Rabi* season crops and damage is as high as 50 to 90%. In India groundnut is the most important oilseed crop covering nearly half of the area under oilseeds. The genus *Holotrichia* includes the major species of white grubs inflicting serious damage to groundnut cultivation in rainy season. *H. consanguinea* is pre-dominant in Rajasthan, Gujarat, Haryana, Punjab, Bihar and Uttar Pradesh whereas, *H. serrata* is most destructive in states like, Karnataka, Andhra Pradesh, Tamil Nadu and Maharashtra. White grub damage to groundnut ranges from 20 to 100%; the presence of one grub per m² may cause plant mortality of 80 to 100%.

Despite several methods to control white grubs *viz.*, cultural, mechanical, biological and chemical methods, successful management of this pest is not realized at expected level. Meticulous integration of different approaches is the ongoing need for impressive control of white grub. Bio-control agents always take up notable attention in the current era of organic agriculture. A number of biocontrol agents have been reported by various workers. Among the microbial control agents, fungi, *Metarhizium anisopliae* and *Beauveria bassiana* were identified as entomopathogenic to the predominant white grub species of the region i.e. *H. consanguinea*. Moreover, emphasis for adoption of control strategies in large area is the present day obligation.

Roadmap

In the year 2018-19 and 2019-20, AICRP on Biological Control of Crop Pests, Anand Agricultural University, Anand, Gujarat in association with NGOs (Triveni Kalyan Foundation & Gram Nirman Samaj, Mahuva, Bhavnagar District, Gujarat) under the aegis of Pidilite Industries, Mumbai adopted 100 ha area of groundnut to demonstrate bioagent based IPM module to curb white grub menace. Large scale demonstration was carried out at cluster level in farmers' fields of Gundarna and Kojnli Village, Mahuva Taluka, Bhavnagar, Gujarat.

Strategy

- Deep summer ploughing and pruning of host trees of white grub beetles in the border of fields
- Collection and destruction of beetles by using light trap
- Seed treatment with chlorpyrifos 20EC @ 25 ml/kg seed
- Soil application of bio-pesticide (*Metarhizium anisopliae* - ICAR-NBAIR Ma4 - 1%WP - 2×10^8 cfu/g) @ 2 kg/ ha

Outcome

Significant difference was observed between bioagent based IPM module and farmers' practice. Lower incidence of white grub (0.41/ meter row length) was noticed in IPM module compared to farmers' practice block (1.51/ meter row length) and similarly the higher pod yield in IPM module (22.70 q/ha) than farmers' practice block (15.50 q/ha). The demonstration module revealed 73% reduction in pest incidence and 46% higher pod yield ensuring net profit of approx. Rs. 38,000/ ha compared to farmers' practice where sole application of chemical insecticide was noticed. Impressive observation was also documented with the recovery of *M. anisopliae* from white grub cadaver and soil as well in the adopted fields. We conclude that the large scale adoption of bioagent based IPM module is promising for the effective management of white grub in groundnut crop.

Table 1: Influence of bio-agent based IPM module on pest incidence and yield attributes of ground nut (Mean of two years observation)

Treatments	Larval count/ meter length row	Pod yield (q/ha)	Reduction in pest incidence over control (%)	Increase in yield over control (%)	Net profit (Rs/ ha)
Bioagent based IPM module	0.41	22.70	73.00	46.00	38,000
Farmers' practice/ Control	1.51	15.50	-	-	-

Further, to meet the farmers' need of biopesticides, Pidilite Industries, Mumbai has come forward to establish biopesticide production laboratory at Mahuva, Bhavnagar involving women in self help groups. AICRP on Biological Control, AAU, Anand and ICAR-NBAIR Bangalore technically assisting the Pidilite Industries, Mumbai to establish successful biocontrol laboratory at Mahuva, Bhavnagar.

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Biological Control is Not an Option; It's a Necessity



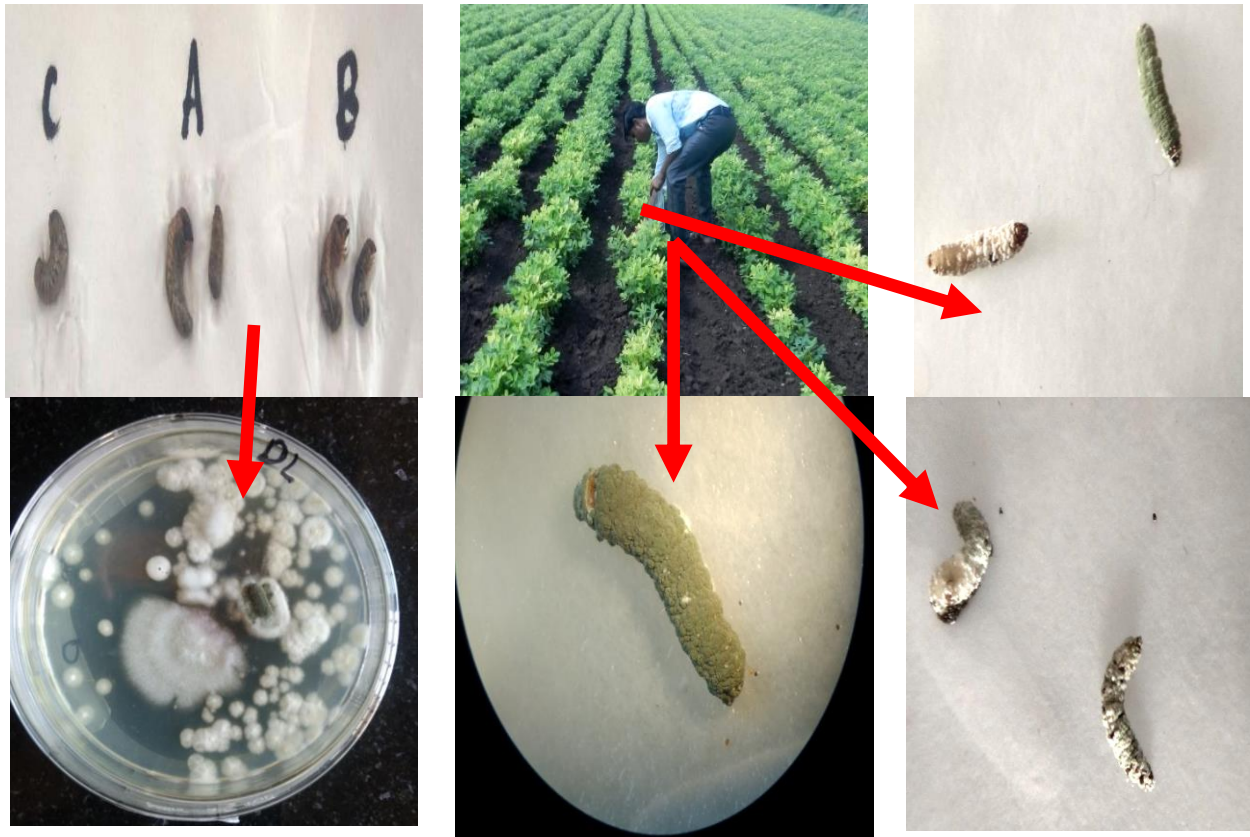
Awareness campaign on bio-agent based IPM module



White grub incidence in untreated/farmers' practice fields



Bio-agent based IPM module adopted groundnut fields



Field recovery of *Metarhizium anisopliae* from white grub cadaver and soil

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