

AINP ON SOIL ARTHROPOD PESTS
RAJASTHAN AGRICULTURAL RESEARCH INSTITUTE
(S.K.N AGRICULTURE UNIVERSITY)
DURGAPURA, JAIPUR- 302018 (RAJASTHAN)

Report on Success Stories

A. Nano gel Technology:-

The already isolated and characterized pheromone methoxy benzene of predominant species of groundnut ecosystem *Holotrichia consengunia* is aggregating pheromone but it is highly volatile in nature so, daily putting of new septa on host tree does require. To overcome this problem for farmers slow release pheromone lure is prepared by Nano gel technology with the help of Dr. Deepa Bhagat, Principle Scientist, NBAIR, Bangalore for beetle management and the technology has been tested in white grub endemic areas of Rajasthan and perfected, which is ready to release now. This pheromonal lure is effective in aggregation of beetles up to one month and now daily loading of new septa wouldn't be required upto one month. (Fig 1).

B. Synthesis and field testing of pheromonal compounds of *Lepidiota mansueta*

Pheromonal compounds of *L. mansueta*, a biennial species of white grub endemic to Majuli river island, Assam were investigated in collaboration with NBAIR, Bangalore during 2014-15. GC-MS analysis revealed the presence of 4 compounds (cis-9-Hexadecenal, cis-9-Hexadecenoic acid, Octadec-9-enoic acid and 1-Hexacosene) in the Prothoracic gland (PTG) extracts of males and 4 compounds (cis-9-Hexadecenoic acid, 18-Nonadecenoic acid, Octadec-9-enoic acid and 9,19-Cyclolanost-24-en-3-ol, acetate) in the abdominal extracts of females. Synthesis and field testing of the aforementioned compounds were attempted under the aegis of ICAR funded extramural project on "Synthesis and field evaluation of pheromonal compounds from root grub, *L. mansueta*" in collaboration with NBAIR, Bangalore during 2016-17. Altogether 35 numbers of synthesized pheromonal lures were received from NBAIR and were tested in *L. mansueta* endemic villages of Majuli and recorded some erratic data as regards to the total beetles trapped.

During 2019, an attempt was also made to synthesize two already identified compounds (Cis-9 Hexadecenoic acid & Octadec- 9 enoic acid) which were common in both the male and females of *L. mansueta* in collaboration with ATGC Biotech Pvt. Ltd., Hyderabad. The synthesized compounds in both pure form and their five different blends were tested in a highly *L. mansueta* endemic field of Maharichuk village, Majuli during April, 2019. Experimental data revealed that out of all the treatments tested, only the slow release lure of Cis-9- Hexadecenoic acid (250 mg) could able to

attract beetles consistently for 3 days. It was also observed that more than 95 per cent of the beetles trapped were found to be males only. Field testing of the blends of different concentrations of the aforementioned compounds could not be done during April, 2020 due to COVID-19 pandemic. Further testing of those compounds has been planned during April, 2021 (fig. 2).

C. First ever application of artificial intelligence for insect pest surveillance in North East India

The All India Network Project on Soil Arthropod Pests, Department of Entomology, Assam Agricultural University, Jorhat Centre has made the first ever attempt to explore the drone technology for the surveillance and incidence of white grub beetle (*Lepidiota mansueta*, a biennial species of white grub) in Majuli river island of Assam during April, 2019. Through this technology, altogether 5 villages were surveyed within a day. The application of drone technology has been found very effective to detect breeding grounds of *L. mansueta* as well as their incidence in different crops (fig 3).

D. Social engineering for the adult management of *L. mansueta*

Social Engineering for the adult management of *L. mansueta* through light trap and hand scouting was conducted in Majuli river island of Assam during 2010-2019. The mass campaigning programme was conducted by involving 400 farmers belonging to 40 different endemic villages as well as with the involvement of local Self Help Groups, Gaon Panchayats, N.G.Os and district administration. The programme received overwhelming response and was exceedingly successful leading to massive collection and killing of about 11.33 Lakhs beetles during 2010-19. In recognition of the aforementioned programme, Dr. Badal Bhattacharyya, the principal investigator of the centre has received “Fakhruddin Ali Ahmed Award for Outstanding Research in Tribal Farming Systems, 2014” –bestowed by ICAR, New Delhi, “Best Researcher Award, 2018” bestowed by AAU and “Dr. H.K. Jain CAU Award 2015-16 for excellence in Agricultural Research in the North Eastern States of India” bestowed by CAU, Imphal. Demonstrating the power of Social Engineering, AAU created history by entering into “India Book of Records” by setting a national record of “most beetles collected in three hours” by collecting 73,700 white grub beetles at Majuli river island in 2018. The event has glorified AAU by making it the first ever Agricultural University to have entered the “India Book of Records”. The impact assessment of the aforementioned mass campaigning programme is in progress in collaboration with Department of Agricultural Economics & Farm Management, AAU, Jorhat.

By observing the acceptance of *L. mansueta* beetles as culinary delight by the populace of Majuli, complete nutritional profiling of this beetle was analysed. Analytical studies indicate that the beetles contained 76.42 per cent of crude protein along with other proximate parameters like crude fat (4.10%), crude fibre (5.16%), total mineral (2.98%), carbohydrate (9.18%), moisture (2.16%) and energy (379.29 kcal/100g). The samples also revealed the presence of 7 minerals viz., Na (27.76), K (14.20), Ca (33.33), Fe (1.64), Cu (6.52), Zn (15.55) and Mn (1.30) mg/100 g of sample. Appreciable amount of antioxidant properties as well as acceptable limit of antinutritional compounds were also recorded in the beetles. Presence of sufficient quantities of both essential fatty and amino acids were also recorded in the samples.

Inspired by the nutritional profile data of *L. mansueta*, extensive efforts were also made to develop some recipe to prepare an attractive “ Beetle fry dish” to popular the same among the populace of Majuli as well as tourists visiting to the island during the time of beetle emergence. For this, extensive method demonstration to explore the beetles for entomophagy purposes at various strategic locations of Majuli were organized. This effort has been credited as the first ever systematic and concerted attempt to convert a pest in to cuisine to uplift both nutritional and livelihood security in the island.

Thanking you,

Network Coordinator



Preparation of Pheromone lure



Installation of Pheromone lure in field



**Attraction of beetles towards
Pheromone lure**



Collected beetles in Pheromone trap

Fig 1 Field testing of pheromonal lure of methoxy benzene at white grub endemic areas of Rajasthan, from 19th June, to 19th July, 2019



Fig 2 Field testing of pheromonal compounds of *L. mansueta* at Maharichuk village, Majuli during 24-26th April, 2019



Operating drone in white grub endemic fields of Majuli



L. mansueta breeding ground



L. mansueta beetle holes



Beetle holes in the ground nut field

Fig 3 Use of drone technology to assess the incidence of white grub in the endemic villages of Majuli