



Spider Toxin Wonder venom for insect pest management!!!

T. Prabhulinga and V. Chinna Babu Naik

“when spiders unite, they can tie down a lion”.

Spiders are predatory in nature which devours the prey by venom and feeds on it. Except few, all spiders rely upon their venom to kill or subdue the prey. At present, around 46055 spider species belonging to 114 families have been recorded by the spider taxonomists. Of these, the venom component of only 174 species has been characterized and remaining large number of species waits for detailed studies.

Content of the venom is extraordinarily complex and less studied compare to the venoms of marine cone snails, scorpions, and snakes. It contains many salts, small organic compounds, large presynaptic neurotoxin peptides etc. Disulphide rich peptide neurotoxins are the major player in the spider's venom. Except very few, all the characterised venoms are highly selectively as these were found to be very much safe to the humans and certain insect natural enemies. It is because of this selectivity, it qualifies to become an insecticide.

At present, there is a great demand for anything which is organic in the whole world right from vegetable to the insecticides. Hence, it is imperative to use spider venom as a bio-insecticide owing to its incredible insecticidal property ($LD_{50} < 1500 \mu\text{mol g}^{-1}$). A report from Queensland University, Australia suggests that spider venom peptide (ω -HXTX-Hv1a fused to the C terminus of thioredoxin) was found to be as effective as chemical control on second-instar *Helicoverpa armigera* and *Spodoptera littoralis* larvae.

Besides, using the spider venom as foliar spray can be in preparation of insect baits and insecticidal spider venom peptides (ISVP) transgenes can also be incorporated in to the plant genome just like Bt gene into the cotton plant for insect resistance. Development of transgenic cotton using spider venom genes is being attempted at National Institute for Biotechnology and Genetic Engineering (NIBGE), Pakistan. The Development of resistance to the GM crop can be addressed through gene pyramiding or trait stacking. Since mechanisms of action of ISVP transgenes are completely different from the Bt genes, they can be a good candidates for pyramiding or trait stacking.

Source

GF King and MC Hardy (2013). *Spider-Venom Peptides: Structure, Pharmacology, and Potential for Control of Insect Pests*, *Annu. Rev. Entomol.* 58:475–96.
Omar A and Ali Chatha K. (2012). *National Institute for Biotechnology and Genetic Engineering (NIBGE): genetically modified spider cotton*. *Asian J. Manag. Cases* 9:33–58.

Dr. V N Waghmare Took Over as HOD, Crop Improvement Division

Dr. V N Waghmare, Principal Scientist (Plant Breeding) has been appointed as Head, Division of Crop Improvement, ICAR-CICR Nagpur, by Agricultural Scientists' Recruitment Board (ASRB), New Delhi. He has already taken the charge on the forenoon of 15th July, 2016.



Whitefly incidence – Surveys

- Sh. Kamlesh Kumar, S.R.F. TMC 1.6 (e-Kapas) project, Sh. Hanwant S.R.F. AICCIP and Sh. Rajpal Jhajharia surveyed the farmers' field locations at Bathinda and Faridkot against whitefly on 14th July, 2016. The whitefly population recorded in these locations was below ETL.
- Dr R.A. Meena surveyed the farmer's fields at locations Alikan, Paniwala of Sirsa district and observed that whitefly population at all these locations was below ETL.
- Dr. K. R. Kranthi, Director, Central Institute for Cotton Research, Nagpur along with DR A. H. Prakash, PC and Head, CICR Regional Station, Coimbatore and Dr M. V. Venugoplan, Head, PME cell visited the North cotton growing zone of India to assess the status of cotton crop. The visit at Regional Station started with planting of a sapling to initiate the VAN MAHOSTAV. He also visited the newly developed compost pit under Swachh Bharat Mission to decompose the farm and household kitchen waste and make good quality compost by NADEP technique. This was followed by visit to demonstrations and important trials laid out at the station. The experiments and laboratories and poly house were also inspected along with demonstration of suction trap.



Visit to demonstrations and experimental trials



Demonstration of adult whitefly suction trap

Sapling plantation



Visit to compost development facility

Meetings attended

- Dr Rishi Kumar, Principal Scientist, CICR, Regional Station, Sirsa attended a meeting of Interstate Consultative Committee to discuss the incidence of whitefly on 18.07.16. The meeting was chaired by V.C. PAU, Ludhiana and addressed by Director Agriculture, Punjab and JDA Cotton Punjab. In the meeting he presented the survey and incidence report of whitefly in the north zone and population dynamics of whitefly.

Publication

- Nagrare V. S., Kranthi S., Kranthi K.R., Naik V. Chinna Babu, Deshmukh Vrushali, Naikwadi Bhausaheb and Dahekar Ashish (2016) Relative toxicity of insecticides against cotton mealybug *Phenacoccus solenopsis* Tinsley (Hemiptera:Pseudococcidae) and its fortuous parasitoid *Aenasius bambawalei* Hayat (Hymenoptera: Encyrtidae). *Journal of Applied and Natural Science* 8 (2): 987 – 994.



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