PROCEEDINGS OF THE INSTITUTE LEVEL MONTHLY SEMINAR ON BIO-PESTICIDES: OPPORTUNITIES AND CHALLENGES IN FORESTRY HELD ON 28 AUGUST 2019

In the series of monthly seminars, a seminar on the topic Bio-Pesticides: Opportunities and Challenges in Forestry under the theme "Managing Forest and Forest Products for Livelihood support" was organized on 28 August 2019 in the Conference Hall of the Institute. Shri Akhil Kumar, Chief Technical Officer, Group Coordinator Research Section delivered a talk on the above topic. All the Scientists, Forest Officers, Officers and other technical staff of Technical Services, JRFs, JPFs, PAs and FAs working in various research projects attended the seminar.

Dr. S. S. Samant, Director, HFRI, Chaired the proceedings of the monthly research seminar. Dr. Rajesh Sharma, Scientist G and Group Coordinator Research initiating the proceedings of the seminar welcomed all the participants present in the Conference Hall and requested the presenter to follow the broad structure of the presentation. He also requested all the participants to actively participate in the discussion.

Shri Kumar made a detailed presentation on "Bio-Pesticides: Opportunities and Challenges in Forestry" and specifically focused on the issues and use of the Bio-Pesticides in Forestry. The presenter described that the insect-pests has changed with changed environmental conditions and had shown mitigation to overcome the defense mechanisms of the plants. Shri Kumar enlisted some examples of incidences of insect-pests in Forestry namely, aphid attack in willow in cold desert region, cutworms, white grubs and termites problem in forest nurseries, and problem of *Pinus gerardiana* (Chilgoza) cone and seed borer in Kinnaur region. He also informed about the outbreak problems in the past of *Ectropis deodarae* in Habban Forest Range, Kamraj Forest Division and Jhungi Forest Division and *Lymantria obfuscata* (Indian Gypsy Moth) outbreak in *Quercus leucotrichophora* (Ban Oak) in Charawag area of Sarahan Forest Division in Sirmour district. The presenter also cited example of *Ips longifolia* outbreak in *Pinus roxburghii* (Chir pine) Forest in Hamirpur Forest Division and *Pityogenes scitus* problem in *Pinus wallichiana* (Kail) in Akpa region in Kinnaur Forest and further said that to tackle these problems in the nursery we use

chemical pesticides, which has detrimental effects on the environment and to other non target organisms.

Shri Kumar highlighted the disadvantages of using chemical pesticides by citing examples of Biodiversity loss (Pollinators), Bhopal Gas tragedy and elimination of natural enemy complexes of forest insect-pests. He further highlighted the work done on different aspects like use of *Bacillus cereus*, *Trichoderma viride*, *Lymantria obfuscata Nuclear Polyhedron Virus* (LONPV), aggregating Pheromones and different Biotic agents (*Apanteles* and *Trichogramma* Sp.) for the control of forest insect-pests by HFRI, Shimla and other institutes of ICFRE. The presenter informed about some of the products like TREEPAL, CRAWL CLEAN, etc. developed by ICFRE institutes for effective management of insect-pests.

Talking about the challenges of Bio-Pesticides in forestry, he emphasized the relevant research needs of essential oil extraction in Lantana Sp. and other native plants extracts for the control of major key pests of forestry. Sharing the successful experience of work done on cotton crop by Wadhwani Institute of Artificial Intelligence (AI), Shri Kumar also talked about the use of AI in forestry as a big challenge.

During the course of discussion, Dr. Rajesh Sharma, GCR asked about how to control lantana in Forests, replying to the query Shri Kumar is of the opinion that through the use of biological agents like sap-sucking bug (*Teleonemia scrupulosa*) , a leaf-mining beetle *(Uroplata girardi*), *Spilosoma oblique*, *Rhizopus spp* and a leaf-mining beetle (*Octotoma scabripennis*), it is possible to control lantana but the biological control agents vary in their effectiveness against the many different types of lantana.

Later on Dr. Joginder Chauhan, CTO asked the presenter to throw some light on artificial intelligence (AI). responding to the query Shri Kumar told that Artificial intelligence is the technique by which we can save time and quantity of pesticides usage in the field. Sh. Akhil in continuation to this cited the example of Wadhwani Institute of

Artificial Intelligence, Pune, Maharashtra which has done excellent work on the pest management of cotton crop by reducing the quantity of pesticides usage and timely spray of pesticides to reduce the cost and the localized solution has proven a blessings to the farmers of Maharastra.

Sh. Dinesh Paul, DCF, enquired about the use of predators and parasitoids in forests, replying to his apprehensions Shri Kumar said that rearing and release of biotic agents in forests is a challenging task and their success rate is also subjected to various conditions like change of host etc.

Ms. Neha Sharma, JPF, Forest Protection Division asked about the human socio-ethical issues and health issues related to the field applications of Bio-Pesticides, replying to her query Shri Kumar told that in the literature reports some cases where people with immune deficiency has shown some allergies to Entomopathogenic fungi like *Beauveria bassiana, Metarhizium anisopliae* etc.

Director, HFRI concluded the session with the remarks that possibilities of use of *Artimesia* sp. and other weed species can be explored for essential oil extraction for management of forest insect – pests.

OUTCOME OF THE SEMINAR

A. Identification of research needs

1. In Vitro screening and development of plant based bio-pesticides including weeds like *Lantana*, *Artemisia* sp.etc.
2. Mass culturing of predators and parasitoids of major key pests of forestry.
3. Exploration, standardization and field applicability of old practices of bio-pesticides usage in forestry.
4. Development of Bio-insecticide and Bio-herbicide against Scrub Typhus and scrub vegetation.
5. Development of aquatic weedicide.
6. Development of Booklet of major insect-pests of nurseries and their control methods.

B. Formulation of Future Strategies/road map

Discussion after the seminar revealed that institute has worked on different aspects of Bio-pesticides but the possibilities needs to be explored on the use of essential oil of *Lantana* sp. and other native plant sp. for the development of Botanical pesticides.

It was also emphasized that priority should be given to development of Botanical pesticides for eco-friendly management of insect-pests problems so as to prevent the

toxic impacts of harmful insecticides keeping in view the importance of bio safety and pollution free environment.

C. Networking Research Options identified

A common consciousness emerged out of discussion that the collaborative programmes with SFD/other universities can be initiated on the development and application of bio-pesticides for eco-friendly management of insect-pests of conifers.

D. Future research directions discussed for implementation and opportunities for funding

The institute in collaboration with different identified funding agencies like HPSFD, DST, DBT, NMPB and MoEF&CC needs to prepare project for the development of Bio-pesticides.

In the end, the GCR thanked Dr. S.S. Samant, Director HFRI, Shimla and Chairman of the seminar, the presenter and all the participants for their active participation and suggestion for making it successful.

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GLIMPSES OF THE MONTHLY SEMINAR

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