Grant awarded to develop management strategies for pulse insect pest complex

By Gadi V.P. Reddy and Govinda Shrestha, Montana State University, Entomology/ Ecology Program Unit, Western Triangle Ag Research Center, Conrad, Montana

Dr. Gadi V.P. Reddy was awarded $106,662 by the Montana Specialty Crop Block Grant, U.S. Department of Agriculture (USDA)-National Institute of Food and Agriculture (NIFA),for developing sustainable management strategies for pulse crops insect pests in Montana. Montana growers' interest to cultivate pulse crops has increased immensely in the recent years because of, less profitable income from cereal crops. In the past five years, pulse crops such as lentil, pea and chickpea have increased in growing acreage from 600,209 to 1,209,039 in Montana. Currently, Montana ranks #1 in the production of field peas, producing 48% nationally.

On one hand, there is an increasing trend in pulse growing acreage across Montana and on the other, there is strong pressure from pulse growers on methods to manage several insect pests that can cause yield losses. About a decade ago, when Montana growers began to raise pulse crops, there were only minor pest problems; but now several insect pests are known to occur at economic damage levels in pulse crop fields. The insect pests that are present in pulse crops include pea leaf weevil, pea aphid, lygus bug, armyworm, cutworm, wireworms, grasshopper, pea weevil and leaf hoppers. However, pea leaf weevil, pea aphid and lygus bug are currently causing the most economic damages to pulse crops across Montana. Pulse crops are especially susceptible in the seedling stage (two nodes) from pea leaf weevil damage and in the flowering and early pod formation stages from pea aphid and lygus bug. Feeding of these pests on these critical growth stages have shown to reduce yield levels. In Canada, the pea leaf weevil can cause yield losses of nearly 60 bushels per acre in the absence of a management intervention.

In recent years, growers and extension agents have requested help on the following pertinent issues: 1) suitable pea varieties with higher yields potential and improved resistant towards pest damage; 2) appropriate synthetic and biopesticide products for use; and 3) develop economic threshold level for treatment application. Currently, Montana pea growers may spray insecticides at least once or twice during the spring growing season and in addition use neonicotinoid insecticide treated seeds to avoid leaf and root damages inflicted by pea leaf weevil adults and larvae, respectively. The complete reliance on insecticide-based pest management may, however, raise the risk of pea leaf weevil populations developing resistance as well as their potential negative impacts on the environment and non-target organisms. In UK, for instance, Rothamsted Researchers have recently reported the failure to control pea leaf weevil by insecticide (pyrethroid) sprays, and the weevil adults were found to develop resistance to this insecticide group. Similar situations may happen in Montana pulse production systems; and could influence the expanding Montana Pulse Industry. In this context, it is pivotal to explore other management options including the suitable pea varieties with high yields and resistance to pea leaf weevil damage. Also identifying environmentally friendly effective biopesticides in conjunction with synthetic pesticides is needed to help safe guarding the Montana Pulse Industry. To battle the pea leaf weevil problem, we have started to investigate on pheromones and biopesticide based control options.

Our preliminary field work on pheromone experiments showed that pitfall traps baited with gray rubber septa captured significantly more pea leaf weevil adults than traps baited with membrane formulations or controls in both pea and lentil fields. These results can be very useful Montana pulse producers as they now can use pheromone-baited pitfall traps to monitor pea leaf weevil adult population level in Montana. This technique is very easy and cheap as the pulse producers can easily install pheromone-baited traps in spring when adults become active in pulse fields; the cost of pheromone lure can be about US 3 dollars and pitfall traps can be made easily using solo cups that are locally available. Adults capture in pheromone-baited traps within pea fields in the spring could be used to better target foliar applications of insecticides against weevils before egg laying in grounds. We have published this work in the peer reviewed journal Insects, https://www.mdpi.com/2075-4450/9/3/75).

Based on this results, we also aim to develop a pheromone field based low cost technology called "Attract and Kill Method". It will provide Montana pea producers an easy, effective, and an efficient system for pea leaf weevil management. The developed pea leaf weevil adult pheromone is an aggregate pheromone (4-methyl-3,5-heptanedione), known to attract the huge mass of both male and females. Since the pitfall traps baited with pheromone rubber septa attract pea leaf weevil adults, our research question is can we manipulate the similar technology under pea field condition? We hypothesize that placing phenome lure impregnated with biodegradable capsule and insecticide in small holes can attract and kill pea leaf weevil adults. In a simpler term, we will make several small holes in field edges where the pheromone biodegradable capsule and insecticide will be placed; and adults will be attracted and eventually killed there. If this method work, it will not only save producers a huge expense on chemical purchase and spraying; but also help to protect the environment.

Regarding biopesticide research, we have evaluated the efficacy of five commercially available biopesticides against pea leaf weevil under the laboratory conditions: Mycotrol ESO®, Pyrethrin, Xpectro OD®, Xpulse OD® and Entrust WP® (spinosad 80%). Spinosad was found to be most effective product and it caused 100% adult mortality at four days after the treatment application. Mycotrol and Xpectro were found moderately effective and they caused 60 % adult mortality after nine days after treatment application. The data from these experiments are compiled and incorporated in the 2016-WTARC Annual Report, (see page#145-149), http://agresearch.montana.edu/wtarc/reports-pdf/WTARC2016Report.pdf. We are planning to test these three products under field conditions. For more information about the pulse management project. Please contact Dr. Reddy at 406-278-7707 or by reddy@montana.edu.

#####

What do you call bears with no ears?
B