MONITORING INSECT PESTS IN SOUTHERN OREGON HEMP FARMS

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Introduction

Industrial hemp (Cannabis *Sativa L.*) is prominently a dioicous plant that contain less than 0.3% of ***Δ***^9 *tetrahydrocannabinol* compound. This crop is native to Asian and one of humanity's oldest crops. It was grown until the mid-18th centry in the United States when it was placed on the Controlled Substance Act as a "Schedule 1" drug (having no medical use and a high potential for abuse). In 2018, the "Agriculture Improvement Act of 2018 Farm Bill" was introduced and legalized to authorize the hemp crop to grow as an agricultural commodity like other crops in US (Drugs Enforcement Administration 2020). This crop can be grown for several purposes, including flower, cannabinoid, grain and fibers. Since this is newly introduced crop, little research is available for producers on crop production and integrated pest management of insect pests on hemp.

To understand the insect pest presence and their potential to cause the economic damage, it important to monitor the insect pests during cropping seasons. Several techniques, such as pheromone trapping, sticky cards and beat sheet are common tools to monitor insect pests on agricultural crops. The monitoring of insect pests assists the growers to manage the pests in timely and effective manner. With specific to hemp, there is little information on monitoring of insect pests that are currently concern for growers, including corn earworm, leafhopper, lygus bugs and thrips.

The corn earworm, *Helicoverpa zea,* (Lepidoptera: Noctuidae) is a serious pest of hemp, particularly outdoor hemp grown for smokable flower and cannabinoid production. During the hemp flowering season, female moths lay eggs close to the bud on a stigma/pistol or sugar leaf. Within a week, eggs hatch into caterpillars; they feed on flower buds that cause bud to rot; and thereby, it reduces the economic value of the crop (Kadie et al. 2022). Older caterpillars are aggressive feeder than young caterpillars and are also cannibalistic in nature. Pheromone trapping is the most effective tool to monitor the male moths during cropping season to determine their presence on fields.

Figure 1. Corn Earworm Pheromone Trap

Leafhoppers are important pests on many crops including a hemp. Particularly, beet leafhopper *Circulifer tenellus* L., is a serious pest of hemp. This pest vectors the *beet curly top virus* pathogen and causing economic loss (Shrestha, 2022). Other leafhopper species (e.g., *Ceratagallia*, *Colladonus* and *Empoasca*) may have potential to cause the damage but it has not yet determined. Similarly, lygus bugs and thrips are important pests in several other crops such as strawberry, roses, apple. However, it is still unknown whether they can cause damage to crop. Therefore, monitoring of these pests is crucial during cropping season. All these insects can be easily monitored by using yellow sticky cards.

Figure 2. Yellow sticky trap

The goal of my BES internship was to monitor hemp insect pests using pheromone and yellow sticky traps on commercial hemp farms in Southern Oregon. This information can be helpful on

developing pest management program. Besides, pest monitoring, I also worked on pollen and pathogen monitoring projects.

Materials and Methods

The methods for insect sampling, identification and monitoring of the corn earworm have different variations. Each method is designed to scout for certain insects within hemp crops.

Heliothis Pheromone Trap is used to collect corn earworm moths in hemp fields. I had total 12 monitoring sites. At each site, we installed a *Heliothis* trap during early summer, 2022. Traps were located at field border using 6 ft Steel T-post for farm fencing and a metal post driver (Fig. 1). I used binder clip to hold the pheromone lure to the metal wire in the opening of the trap. Each week, I collected insects at the top of the trap and placed them into a Ziplock bag. After collecting insects, I brought them to the lab and placed it into the freezer to stop insects from moving. Late, I identified moths using microscope for data collection. I changed the pheromone lure every two weeks.

For other insects such as leafhopper species, lygus bugs and thrips, I used yellow sticky traps. Traps were located at the edge of the field border (Fig. 2) and changed at weekly interval. All insects were identified under a microscope.

Data Analysis

I used to excel sheet to arrange the data and created population dynamic curve of studied insect pests, including corn earworm, leafhopper species, lygus bugs and thrips.

Results

Corn earworm moths

Heliothis traps were found effective to catch male moths on traps. There was high variation on moth catch during the season. The moth counts were low in June and July. The count spiked during late July to early August, coinciding with moderate hemp flowering stage (Fig. 3).

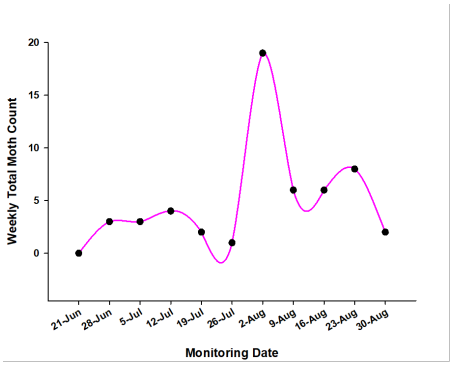

Figure 3. Corn Earworm Population Dynamic on Southern Oregon Hemp Farms.

Leafhopper species

I collected several leafhopper species and only able to identify four species including *Circulifer tenellus*, *Ceratagallia*, *Colladonus* and *Empoasca*. There are several samples were unidentified. Among the four identified species, Empoasca had a continuous presence throughout the season, but reached peak Jul 26 during the monitoring time (Fig. 4).

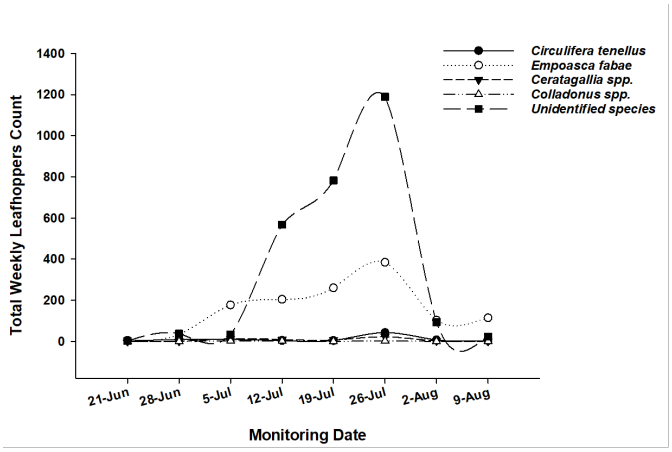

Figure 4. Leaf Hopper Species Population Dynamic on Southern Oregon Hemp Farms.

Lygus bugs and Thrips

Lygus bugs had strong presence during monitoring seasons. As plant reach to flower, there was uptick on numbers (Fig. 5). Thrips were abundant on traps throughout the seasons, but highest numbers were observed during mid-Jul (Fig. 5).

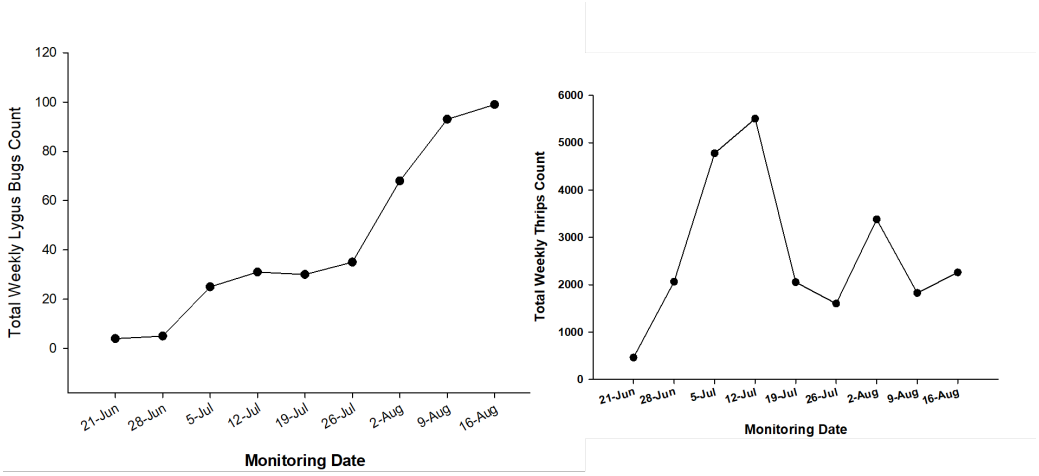

Figure 5. Lygus bugs and thrips Population Dynamic on Southern Oregon Hemp Farms.

References

Britt, K. E., Kuhar, T. P., Cranshaw, W., McCullough, C. T., Taylor, S. V., Arends, B. R., ... & Schreiner, M. (2021). Pest management needs and limitations for corn earworm (Lepidoptera: Noctuidae), an emergent key pest of hemp in the United States. *Journal of Integrated Pest Management*, 12(1), 34.

Drug Enforcement Administration. (2020). United States Department of Justice , Diversion Control Division. *Implementation of the Agriculture Improvement Act of 2018*. 21 CFR parts 1308 and 1312. [Docket No. DEA-500]. RIN 1117- AB53. Retrieved from: https://www.deadiversion.usdoj.gov/fed_regs/rules/2020/fr0821.htm

Shrestha, G. (2022). Crop Production/Hemp Monitoring for the Beet Leafhopper Adults Help Halt Spread of Plant Virus. Oregon State University. Retrieved from: https://extension.oregonstate.edu/crop-production/hemp/monitoring-beet-leafhopper-adults-helps-halt-spread-plant-virus