COLORADO POTATO BEETLE RESEARCH IN OREGON

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Colorado Potato Beetle (CPB) is a significant pest of potatoes but it also causes significant damage to other Solanaceous crops such as tomatoes or eggplants. Besides its unbelievable feeding capability (see Figure 1), CPB has a high fecundity rate and the ability to develop resistance to almost every chemical commercially available. In potatoes, populations can build quickly and defoliation occur rapidly causing significant yield loss if left uncontrolled.


Figure 1

The beetles overwinter in the soil as adults, with the majority aggregating in areas adjacent to fields where they have spent the previous summer. In the Pacific Northwest, the emergence of the majority of these beetles is synchronized with potatoes emergence. Although this insect can fly, the next field may just be a walk away from the overwintering sites. Once in a new field, first adults feed and then mating begins. The feeding and reproduction continues until diapause is induced by the short-day photoperiod.

Unmanned Aerial Vehicle and CPB

An unmanned aerial vehicle (UAV), commonly known as a "drone" is an aircraft without a human pilot aboard that uses as research premise that high frequency UAV visits utilizing high quality imagery can deliver critical, actionable crop intelligence at a level of cost and efficiency that will open the agriculture market to large scale deployment of UAV. In 2014, a project concentrated on the ability of UAV-based sensors to detect CPB infestations; compare crop yield between a UAV-based threat response, and a standard prescription methodology; and the development of algorithms to reduce data and response latency. Some promising results showed the capability of high quality imaging can potentially detect insect and/or damage presence (Figure 2).

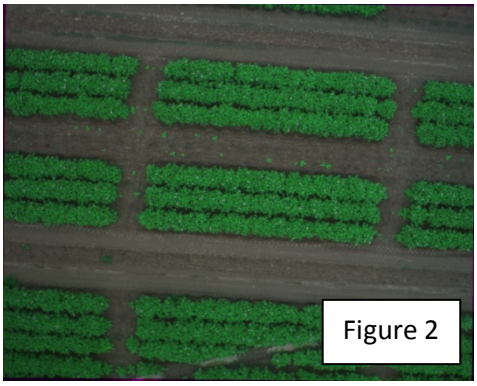
Figure 2

Chemical Control and Insecticide Resistance

Hundreds of compounds have been tested against the CPB and insecticides still remain the foundation of the CPB control on commercial potato farms. Over 30 active ingredients are registered for use against this pest in the U.S. but the efficiency varies from region to region. Insecticide resistance has been historically problematic from the Northeastern United States. In that region, resistance problems reached critical levels in the early 1990s. So far, no resistance problems have occurred in the Pacific Northwest (PNW) but vigilance is needed. As far as we know, there is one isolated case where chemicals failed to control CPB but further investigation is needed. The PNW area produces more than 55% of the potato production in the U.S. producing the highest yields in the world. Exact reasons for the apparently more severe resistance problems in the Northeastern U.S. remain unknown. The CPB evolutionary group that we are part of speculates the evolutivity nature of this pest. The favorable climate moderated by the Atlantic Ocean allows high beetle survival and multiple generations per year; this is further enhanced by the fact that grower use of late maturing varieties, irrigation, high rates of synthetic fertilizers, and not killing vines until late in the season; also, grower practices emphasize chemical control over crop rotations and other non-chemical pest management, thus creating strong selection pressure on beetle populations. Isolation of Northeastern potato fields may also favor local selection for insecticide resistance. In the western U.S., it is imperative that a judicious use of chemicals is followed in order to preserve active ingredients for further use.

Since 2005, several chemicals (Table 1) have been tested at the Irrigated Agricultural Entomology Program at the Hermiston Agricultural Research and Extension Center in Hermiston, OR. Experimental plots are 4 rows wide x 30' feet long; 34" row spacing (25,000 plants/a); Randomized Complete Block (RCB) with four replications per treatment. Normal commercial production practices are followed throughout the season (e.g. fertilization, herbicide, fungicide, etc). Information related to performance of some commercial products and its viability will be presented.

Table 1. Chemical products tested against the Colorado Potato Beetles in the Columbia Basin, OSU-HAREC-IAEP.

Group	Active ingredient	Trade name
6	abamectin	Agri-mek
28	chlorantraniliprole	Coragen
22	indoxacarb	Avaunt
15	novaluron	Rimon
5	spinetoram	Radiant
5	spinosad	Blackhawk
21a	tolfenpyrad	Torac
4A	imidacloprid	Tops MZ Gaucho
4A	imidacloprid	Admire Pro
4A	thiamethoxam	CruiserMaxx
4A	thiamethoxam	Platinum
4A	clothianidin	Belay

Blue, ground or aerial treatment; yellow, seed treatments; green, in furrow applications.