Potato Progress

Research and Extension for Washington's Potato Industry
Published by Washington State Potato Commission **www.potatoes.com**

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Volume V, Number 12 *July 26, 2005*

Washington Potato Pest Management Field Day
Wednesday, August 3, 2005 – Eltopia Vicinity

Learn about the pests that are clobbering your fields and how to strike back!

Agriculture Development Group, Inc, in cooperation with the Washington State Potato Commission, and several crop protection companies, is hosting the Washington Potato Pest Management Field Day to review the latest research results and agrichemical registrations in potatoes. This is the most comprehensive potato pest management field day in Washington. Location: 2621 Ringold Road, Eltopia. This agenda will change.

9:30 Introductions and Overview

- **Potato Viruses – New Ones and Old Ones**
- **Vegetation Management in Potatoes**
  New herbicides, new desiccants
- **Beet Leafhopper and BLTVA – Learn about just how bad it this year. (Bad or Really Bad?)**

12:30: Hosted Lunch – Whole Hog Bar-B-Que Come Have Lunch on Alan Schreiber

- **Potato Tuberworm – How Big of Problem Will It Be And What To Do About It.**
- **Mite Management on Potatoes**
  Oberon is registered; is there life after Comite?
- **The Latest Research, Latest New Registrations for Potato Insects.**
  - Assail
  - Rimon
  - Cruiser
  - Avaunt

For Directions Call 509-266-4348

How Deep are Wireworms in the Spring?

David Horton, USDA-ARS, Wapato, WA

Inconsistent success in controlling wireworms in potatoes using soil treatments applied in spring before planting has led to questions about wireworm distribution in the soil profile in late winter and spring. Specifically, if wireworms are deep in the soil profile in late winter and early spring, and move towards the soil surface only as soil temperatures warm, it is possible that soil treatments applied before planting may be ineffective against some percentage of the population, just because that percentage is below a certain depth in the soil. Studies done many years ago in Walla Walla indicated that distribution of Pacific coast wireworm in the soil changes substantially over the course of the growing season. Wireworms move down the profile beginning in late summer or early autumn, and move back towards the surface beginning sometime in late winter or early spring. It is assumed that these movements are driven by soil temperature and possibly soil moisture.

In March-May of 2004, I did a baiting trial in a wireworm-infested field destined to be planted to potatoes. The studies showed that counts of Pacific coast wireworm in baits increased steadily between early April and mid-May, with the peak count occurring well after potatoes had been planted, and as soil temperatures at 1 foot approached 60 F. These results led me to wonder whether the peak counts were due to wireworms finally reaching the baiting depth (6-8 inches below the soil surface) from the lower depths at which they had overwintered. If so, it suggests that movement up the soil profile in spring occurs over a relatively long time, ending well after potatoes have been planted.

In March-May 2005, I conducted weekly sampling studies to actually estimate the distribution of the Pacific coast wireworm at 3 depths in the soil profile: 0-1 foot, 1-2 foot, and 2-3 foot below the soil surface. I sampled using a 6 inch diameter auger, rear-mounted to a tractor. The auger was lowered to the desired depth through an 8 inch diameter circle cut in the center of a section of plywood. Thus, as the auger was raised from the soil, the excavated soil fell onto the plywood, where it could be examined for the presence of wireworms. Loose soil falling back into the hole as the auger was raised was added to the sample, by scooping the loose material out by hand. The method is relatively time efficient: a single hole could be sampled (at three 1-foot increments) in about 10 minutes.

Table 1 summarizes the field characteristics and sampling protocols. Briefly, the study was done at the ARS experimental farm near Moxee in a field that had been in potatoes the previous year. Samples were taken with the auger at weekly intervals between March 23 and May 13. On each sampling date, 30-40 holes were dug, and the soil was excavated as described above, in 1 foot increments. Soil temperature was monitored continuously at 6 and 12 inches beneath the soil surface for the duration of the study; soil moisture readings were taken at 6 and 12 inches on each date that wireworms were sampled.

Figure 1 shows soil temperature at 6 inches (solid line) and 12 inches (dashed line), and the dates that samples were taken (arrows). Temperatures at 1 foot remained fairly steadily in the upper 40's and low 50's until mid- to late-April, reaching 60 F the final week of April. Temperatures at 6 inches fluctuated substantially more than those at 12 inches, particularly in late April and May when rain showers caused large drops in temperatures. Soil moisture (data not shown) fluctuated between 9-11 % water (by weight) over the duration of the study; the rain showers in April and May prevented the top 6 inches from drying completely.

Table 2 summarizes depth of wireworms in the soil over the duration of the study; I combined the March 15 and March 23 samples, and the March 31 and April 7 samples, because of difficulties finding wireworms on those earliest sampling dates. Total numbers collected (right-most column in Table) varied between 37 and 51 per 30 or 60 holes dug. Soil

temperatures at 12 inches increased steadily from 47 to 63 F between the March and May samples.

Although the majority of wireworms collected were obtained within the top two feet (76-100%, depending upon date), a relatively large percentage (up to 24%) of wireworms were at the 2-3 foot depth until the final sample date on May 13; by this last date, substantial numbers of fairly large volunteer potatoes were visible in the field. Even as late as April 28, when soil temperature was 70 F at 6 inches and 59 F at 12 inches, almost a quarter of wireworms collected were obtained at the 2-3 foot depth. Averaging all sample dates but the last date indicated that about 17% of wireworms collected during the study were obtained at the deepest 1-foot increment.

In summary, the 2004 baiting study and the 2005 depth study indicated either indirectly (2004) or directly (2005) that a significant proportion of the Pacific coast wireworm population was distributed fairly deeply in the soil until temperatures at the 12 inch level approached 60 F. At the study site, these soil temperatures were not seen until early May. For growers, these results suggest that some percentage of the wireworm population in spring is likely to be fairly deep in the soil profile at the time that chemicals are applied against soil pests in preparation for planting.

I thank Merilee Bayer, Deb Broers, Kathie Johnson, and Tamera Lewis for assistance in sampling. I also am grateful to our farm manager, Jerry Gefre, for operating the auger. Research reported here was partially supported by the Washington State Potato Commission and the Washington State Commission on Pesticide Registration.

Table 1. Field history and sampling protocols for depth study (2005)

Field characteristics

- Previous crop (2004) was potatoes
- Soil type is sandy-loam
- Field was ripped to 18-24 inches previous fall
- Field was tilled to 6 inches in late February

Sampling protocols

- Weekly sampling between March 23 and May 13
- 6 inch diameter auger was used to excavate the soil
- 30-40 holes were dug per sample date
- Soil was excavated in 1 foot increments (0-1, 1-2, 2-3 feet below surface)
- Soil temperature was monitored at 6 inches and 12 inches
- Soil moisture was monitored at 6 inches and 12 inches

Figure 1. Soil temperatures at 6 inches (solid line) and 12 inches (dashed line), and sampling dates (arrows)

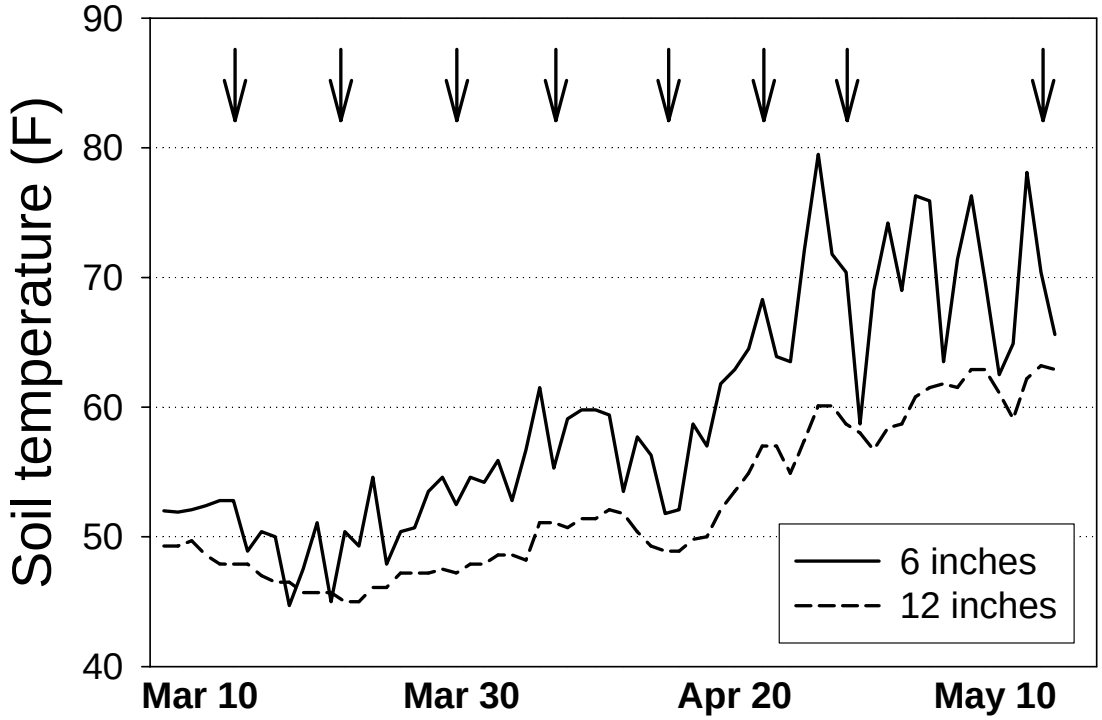

Table 2. Sampling date, soil temperature at 6 and 12 inches, numbers of wireworms collected (in 30-40 holes per date [April 15 – May 13] or 60 holes per 2 dates [March samples]) at each of 3 depths, and total number of wireworms collected.

Date	Soil temp. 6 in	Soil temp. 12 in	Number wireworms 0-1 foot (%)	Number wireworms 1-2 foot (%)	Number wireworms 2-3 foot (%)	Total
March 15 and 23	52	47	15 (41%)	13 (35%)	9 (24%)	37
March 31 and Apr 7	54	49	28 (64%)	12 (27%)	4 (9%)	44
April 15	52	49	21 (50%)	13 (31%)	8 (19%)	42
April 22	68	57	29 (60%)	15 (31%)	4 (8%)	48
April 28	70	59	27 (53%)	12 (24%)	12 (24%)	51
May 13	66	63	35 (88%)	5 (12%)	0 (0%)	40