CONTROL OF WIREWORMS ON POTATOES WITH SOIL FUMIGANTS OR INSECTICIDE BAND TREATMENTS

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Results of spring fumigation with ethylene dibromide, Telone®, and Vidden-D® (=D-D®) for control of wireworms on potatoes have been reported earlier. (Onsager, 1964). These fumigants at rates of 3 gal. of 83% solution, 20 gal., and 25 gal. per acre, respectively, reduced cullage from 13 percent in untreated plots to only a trace in treated plots, a reduction of at least 96 percent or more, in all cases. These treatments had been applied on April 12, 1963, for control of the Pacific Coast wireworm near George, Washington.

To test the effect of fall fumigation, the same 3 chemicals were applied at the same respective rates on August 17-18, 1964 for control of the same wireworm near Royal City, Washington. These plots were planted to potatoes on March 19, 1965 and harvested on August 5, 1965. Again, all 3 treatments gave economic control, reducing cullage from 31 percent in the untreated plots to 0.4-3.4 percent in treated plots, a reduction of 89-99 percent.

The relatively high cost of soil fumigation, especially with Telone, Vidden-D, or D-D, might be well justified if a variety of susceptible soil pests are present. Since the 1963 and 1965 results are in agreement, I now believe that these fumigants, if applied at maximum recommended rates to Columbia Basin soils for control of nematodes or symphylans, will provide wireworm control as well. These remarks do not in any way imply that fumigants, especially the relatively cheap ethylene dibromide treatment, should be ruled out as a control agent when only wireworms are a problem. Infestations of as many as 1.5-2 wireworms per square foot have been observed in the Columbia Basin. Under such an infestation, it might be wise to consider a well-planned, thorough job of fumigation as a method of positive control.

As is the case with any short-lived soil pesticide, certain conditions must be met if fumigants are to give maximum effect. Requirements for successful soil fumigation include: (1) the absence of large quantities of undecomposed crop residue; (2) proper soil temperature; (3) soil that is neither so wet that diffusion of the fumigant is impeded nor so dry that the fumigant diffuses unhindered into the atmosphere; (4) placement of the fumigant at the proper depth and interval; (5) packing the surface to prevent rapid diffusion of the fumigant into the atmosphere; and (6) soil that is friable and in good tilth to the depth that fumigants must diffuse in order to reach the target pest. It is not my intent to imply that these factors are insurmountable obstacles. Instead, I am only emphasizing that failure to satisfy any 1 of the 6 requirements will, in all probability, result in

less effective control. For best results, follow Extension Service recommendations and instructions on the fumigant label.

From the standpoint of convenience there is no competition for the insecticide band application at planting time for control of wireworms in potatoes. While some insecticides (for example, diazinon) are registered for use in this manner, the USDA is not recommending this type of treatment for wireworm control. We nevertheless realize that many potato growers have used this method, apparently with a high rate of success. I would, therefore, like to discuss the results of my experiments with sidedress applications.

In general, experimental sidedress applications have shown much promise. The reduction in cullage has averaged 87.5 percent in 2 tests with 3 effective insecticides. In comparison, in 2 tests involving broadcast treatments with the same 3 insecticides as well as spring and fall fumigation with 3 effective fumigants, cullage has been reduced an average of 95.5 percent. At first glance, this appears to be a small, even insignificant, difference, but examination of other facts will change the perspective a bit.

The relationship between density of wireworms and damage to potatoes, as reported by Gibson (1939), is shown in figure 1. It is obvious that a relatively low population of wireworms can cause extensive damage. With low wireworm populations, the average percent damage increases rapidly with a small increase in the number of wireworms. In other words, the survivors of a control measure, even though they are few in number, are capable of causing damage far out of proportion to their relative population level. Naturally, the more severe the initial infestation is, the more important it becomes to obtain control as near as possible to 100 percent. When initial infestations approach or exceed about 0.5 wireworms per square foot, it is particularly important that control measures be as effective as possible. The decision to strive for maximum control or to be satisfied with something less can be made only by the individual grower after he accurately assesses his own particular situation.

Another factor to be emphasized is that my experimental sidedresses were post-planting treatments, applied in May or June to potatoes that had been planted in March or April, respectively. The relative effectiveness of band treatment at planting time versus post-planting sidedressing has not yet been established. Therefore, one should not expect the results to be equivalent. The insecticides now recommended for wireworm control are not registered for post-planting application. Their use as post-planting applications is not legal and would greatly enhance the danger of illegal residues. My experiments are always done in small plots. When illegal residues are discovered, the potatoes are dug and destroyed.

The only insecticide that is now recommended in Washington as a

post-planting side dress treatment is Di-Syston®, applied at 2.5-3 lb. per acre for control of aphids. Unfortunately, Di-Syston has not given economic control of wireworms in potatoes. In 2 different experiments with sidedressed Di-Syston, reductions in wireworm damage averaged only 43 and 64 percent. In both experiments, cullage was over 10 percent.

Since the Di-Syston sidedress treatment has been used extensively in Washington as part of the recommended aphid control program, it might be well to examine more closely its influence on wireworms. We have already discussed the high damage potential of low wireworm populations.

We have emphasized the necessity of reducing infestations to the lowest possible level. Di-Syston, if applied as recommended for aphid control, could therefore play a crucial role in attaining economic control of wireworms under situations where a preplanting broadcast application of a different insecticide had, for some reason, been less effective than expected. This information does not imply that Di-Syston alone should be regarded as a primary wireworm control agent. It merely points out that Di-Syston, if applied as recommended for aphid control, will help "mop up" wireworms that happen to survive a preplanting control measure.

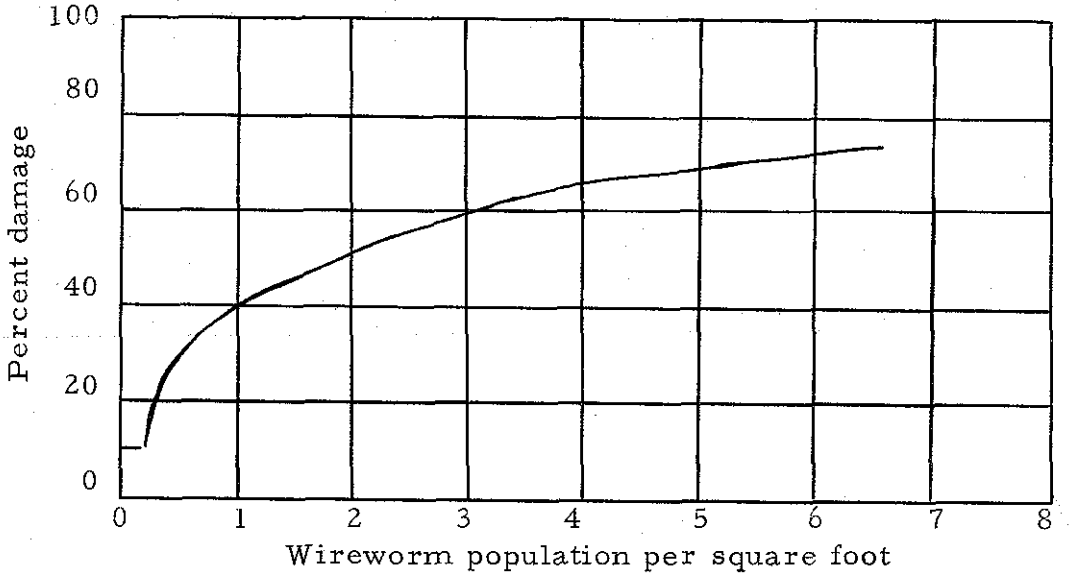

Figure 1.--The relation of field populations of wireworms to potato damage (after Gibson, 1939).

References Cited

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