

WHY SAMPLE FOR WIREWORMS ^{1/}

by

H. Harold Toba and John E. Turner
 Yakima Agricultural Research Laboratory
 Agricultural Research Service, USDA
 Yakima, Washington 98902

Wireworms are the larvae of click beetles, family Elateridae. Although no crop is known to be entirely free from wireworm attack, potato is one crop that is particularly susceptible. Wireworms generally do not affect the yield of tubers, but they do affect the quality because of the injury they do by feeding. We all realize that wireworms can cause serious damage to growing tubers. The problem is how to cope with them. When insects damage aerial parts of plants, they can be seen, and treatment can be applied, thereby preventing damage. However, soil insects such as wireworms cannot be seen, and if they are present, damage to the tubers is not detected until it is too late.

The best way to reduce damage is to take preventive measures by treating the field before or at time of planting. The difficulty is that the type of treatment which should be applied depends on the population of wireworms present in the field, and this determination is itself a problem because of the life history and behavior of the wireworms. For example, the economic species of wireworms in Washington have very long life cycles, all average 2 to 3 years. Also, wireworms inhabit the soil at a depth of 24 inches or more, particularly during the winter. Moreover, the degree of injury to tubers is correlated with the population of wireworms. Due to this inherent behavior of wireworms, no treatment can be expected to produce 100% mortality; and if the density of wireworms surviving a treatment is above the economic injury level, then economic damage can be expected. Thus, for effective control of wireworms, the higher the population the more severe the treatment should be.

Growers have been known to apply insecticides for wireworm control as an "insurance" without knowing the size of the wireworm population in the field. If the population is too high to be controlled by the treatment used, he could then suffer economic loss despite the treatment. Thus, it is a gamble rather than insurance to treat for wireworms without knowing the population.

By sampling for wireworms, the population in a given field can be estimated based on the number of wireworms found in the required number of soil samples. The following equipment is used for sampling: 1) a standard size posthold digger (5-1/2 - in. dia.), 2) a bucket for collecting and transferring the soil sample to a shaker, and 3) a shaker for sifting the soil (Fig. 1). (A screen finer than the 10 mesh advised may be used for the bottom screen of the shaker, but it might be difficult to sift wet soil or soil with high organic matter.)

Sampling can be done at any time of the year, and the soil samples should be at least 18 inches deep. However, it would be advisable not to sample during winter or until the soil temperature at 6-in. depth is at least 40° F because the wireworms may be located deeper than 18 inches. The samples should be taken throughout the field and not more than 5 in any one spot. The average person can examine about 60 samples in an 8-hr. period by using the equipment described. Wireworms are slender, segmented, and worm-like, and have shiny, tough-skinned and wiry appearance. They are about 3/4- in. long when mature and are of straw color of light brown.

^{1/} This paper reflects the results of research only. Mention of a pesticide in this paper does not constitute a recommendation of this product by the USDA.

First, determine the number of acres in the field; then refer to the chart to determine the number of samples required. For acreages not shown, use the next higher number. After obtaining the required number of soil samples, refer to the chart for the treatment to use for number of wireworms found.

Suggested Treatments for the Number of Wireworms Found

Acres in Field	10	20	40	80	120	160
No. Samples	30	43	60	85	105	120
No. wireworms for Broadcast	1	1-2	1-2	1-4	1-4	1-5
No. wireworms for Bcst + Band	2-10	3-14	3-20	5-28	5-34	6-40
No. wireworms for Fumig + Bcst or F + Bd	11-14	15-20	21-28	29-39	35-49	41-56
No. wireworms to plant alternate crop	15	21	29	40	50	57

The number of samples indicated on the chart for a given acreage is the minimum number required for that acreage. Thus, when no wireworms are found, there still may be a population present that could do economic damage, but we cannot say that with certainty from the number of samples taken. Precision can be increased by taking more samples to determine whether or not an economic infestation is present. Therefore, on the basis of the minimum number of samples, a band treatment may be safely applied if no wireworms are found; if even one wireworm is found, it will probably be more economical to use a broadcast treatment. When both broadcast and band treatments are suggested, use a different insecticide for each treatment. Also, fumigation can be used in place of broadcast and band treatments if other benefits can be derived from such a treatment, such as controlling nematodes or other organisms.

The treatments listed below are recommendations of the Cooperative Extension Service, Washington State University, for the control of wireworms on potatoes. The following granular insecticides are registered for broadcast treatments: diazinon (3-6 lb AI/acre), fonofos (4 lb), and parathion (4-6 lb). For band treatments, the following granular insecticides are registered at 2 lb AI/acre, at plant band: diazinon, fonofos, parathion, and phorate. For fumigation treatments, the following fumigants are registered: ethylene dibromide (3 gal/acre) and chlorinated C₃ hydrocarbons such as D-D[®] or VIDDEN D[®] (25 gal/acre), or TELONE[®] (20 gal/acre).

These insecticides do control wireworms, but they must be used properly to be effective. Furthermore, they are nonpersistent insecticides; thus, materials used in broadcast treatments should be incorporated in the soil immediately after application.

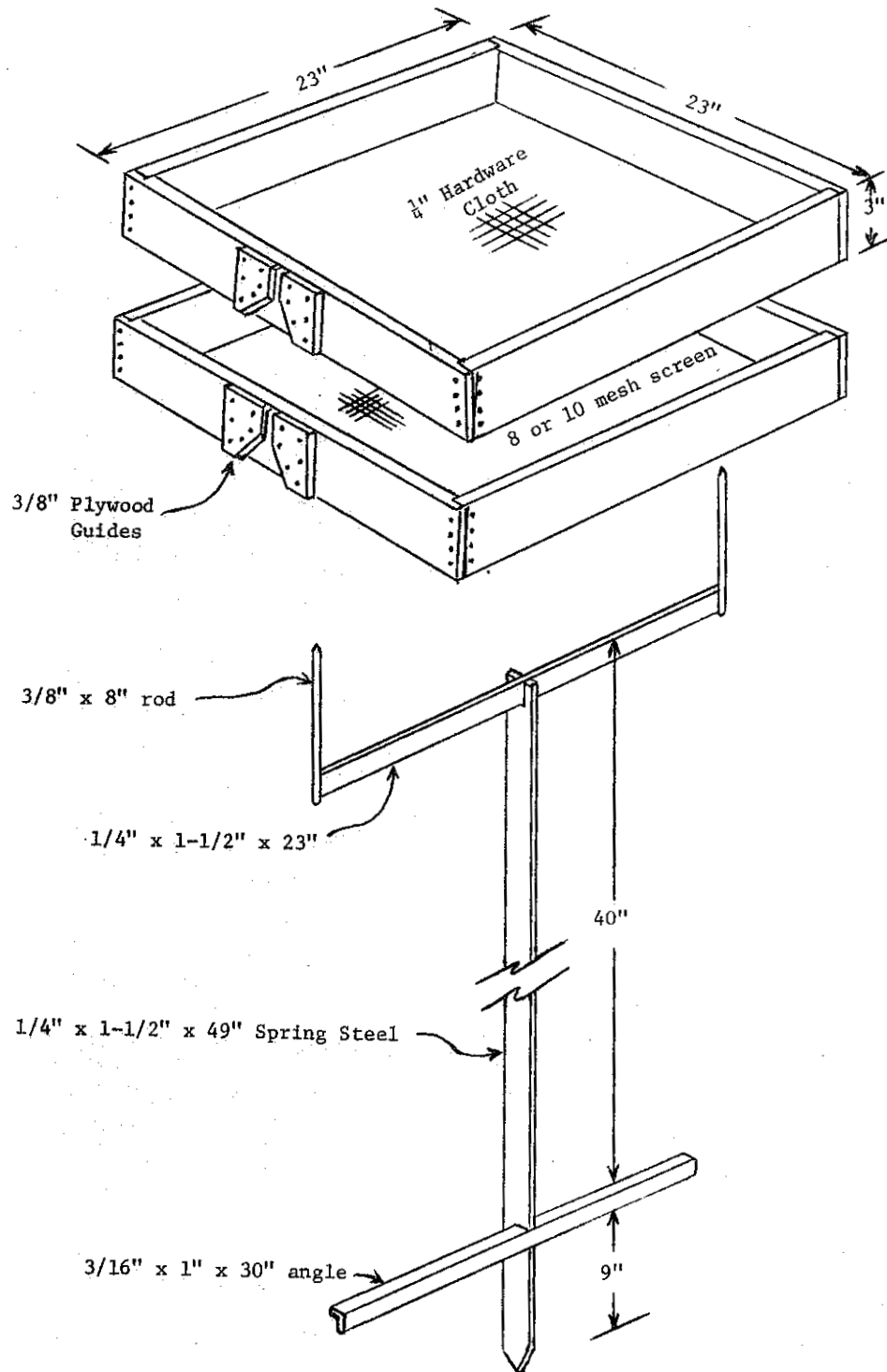


Figure 1. Portable Soil Sifter.