THE ROLE OF CROP INSURANCE IN SOIL PEST MANAGEMENT PROGRAMS

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Economic, environmental, and product availability factors are currently encouraging growers to determine specific needs for fertilizers and agricultural chemicals before applications of these products are being made. These same factors apply to the detection of soil pests such as nematode and wireworm before deciding if soil treatments for control are necessary. In other words, detection for these soil pests becomes a logical pre-requisite to the application of certain chemicals in the soil. In the case of root-knot nematode (RKN), this involves determining whether the pest is present in the field, and if so, in which portions it exists. For wireworm, the sampling involves determining the number of wireworm per square foot, and arriving at an appropriate chemical treatment according to the population density.

This approach to pest management is in sharp contrast to the "shotgun" approach that has been used in some potato-growing areas of the Northwest. In the past, a common practice of potato growers has been to fumigate for root-knot nematode if the pest is known to exist in the general area of their farming operation. One potato buyer actually encourages this blanket fumigation as a means of guaranteeing nematode-free tubers for his processing plants. Washington State University, however, recommends a detection program first, with fumigation where necessary. There are, of course, certain advantages to a management program of blanket fumigation for root-knot nematode, and these would include:

1. RKN control for that crop can be anticipated.
2. Potential beneficial effect on certain types of weeds, if present.
3. A possible "growth factor" benefit from fumigation. This growth factor benefit has been observed from time to time over the past 10 or 15 years, but definite data quantifying it appear to be lacking.

Conversely, there are several definite disadvantages to the use of fumigation as insurance against loss from root-knot nematode:

1. The fumigation cost is often unnecessary.
2. Waste: possible alternative uses for these petroleum derivatives may exist now or may be developed.
3. This mass annihilation approach kills beneficial organisms, which represents a cost factor of unknown dimension where the nematode are absent. Therefore, a grower logically asks himself the question: When predators are killed by fumigation, what is the true cost of chemical treatment?
4. There is a possibility of a shortage of fumigant, and detection will accordingly help allocate existing supplies as needed.
5. Planting may be delayed.
6. Air pollution of an incremental type exists.
7. Severe governmental restrictions may follow current promiscuous use of soil fumigants.

It is well known that fumigants need to vaporize in the soil in order to function properly, and much of this vapor, in turn, enters the atmosphere. This is a slow movement from the soil into the air, and as such, it is properly called "incremental" pollution, as opposed to a rapid movement whereby the presence in the air would be noticeable in the field at the time. However, since these are petroleum derivatives, and the EPA is going to considerable expense throughout the nation in order to reduce entry of another petroleum derivative -- gasoline vapors -- into the atmosphere, it behooves us in agriculture to consider this factor, also. In this connection, Figure 1 is a schematic drawing of existing pollution control devices built into automobiles to reduce gasoline vapor losses into the atmosphere. Briefly, this includes a sealed fuel cap and a carbon cannister that has

a large amount of surface area, with a vapor line connecting the gas tank and the carbon cannister. Then, as the temperature of the gasoline increases, escaping vapors are absorbed into the carbon cannister. In turn, when the automobile is driven, these absorbed vapors are pulled into the carburator.

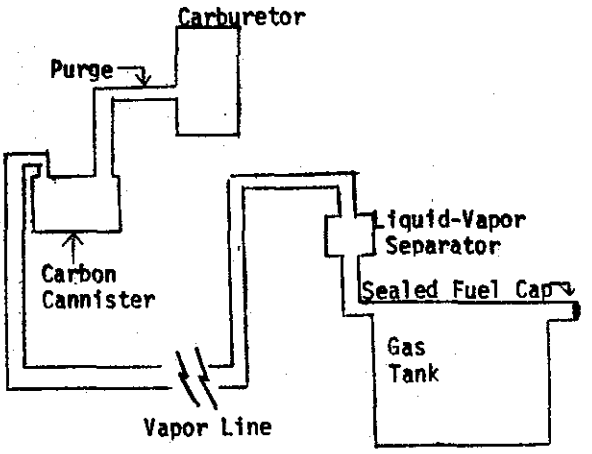

Fig. 1

In contrast to the use of blanket fumigation against RKN damage, the use of detection procedures has the following advantages:

1. Fields with nematode are identified.
2. Infested areas within the field are located. The Figure 2 map shows a field that had nematode only in certain parts, and it was therefore possible to fumigate selectively so as to avoid fumigating areas not infested.
3. Where nematode are absent, the grower's cost of production is reduced, a valuable commodity is conserved, air pollution is reduced, and any beneficial organisms present in the soil are spared.
4. By fumigating only where necessary, agriculture helps project a favorable or positive public image by avoiding charges of irresponsible behavior.

There are, of course, several possible disadvantages to the use of a detection technique for root-knot nematode. These would include:

1. If nematode are present, the grower has the cost of detection, plus the fumigation cost.
2. The time factor involved. At the present time, on a bio-assay approach sampling must be completed by December or early January.
3. A possibility of erroneous results does exist. These may develop because small infested areas are not included in the sample, or because biological reactions are not always controllable.

With respect to the detection of wireworm, our procedure is essentially as outlined by the USDA Pest Management Division. The size of the field under study determines the number of sampling holes needed for statistically reliable data. The soil is sieved in the field and the number of wireworm per square foot are then determined according to the field size and number of samples in that field. On the basis of wireworm population, a recommendation is prepared that reflects their density. The range of soil chemical treatments may vary from no treatment, to banding only in the case of a light density, broadcast plus banding, soil fumigation with high populations, and finally, with extremely high populations, to not growing potatoes there that year.

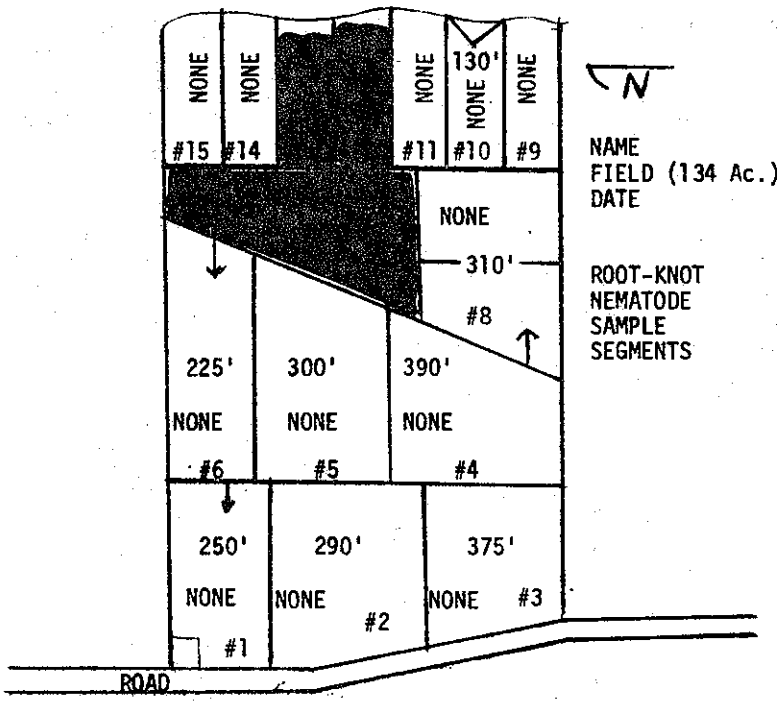

Fig. 2

Our root-knot nematode bio-assay detection procedure, as outlined by WSU, has been practiced for the past 6 years by Agrimanagement, operating in Central Washington. During this period of time we have not had any episodes wherein fields, or portions of fields, with negative detection results had root-knot nematode damaged tubers. In view of this history, a legitimate "million dollar" question is -- does the slight but acknowledged chance of an error justify blanket fumigation as the insurance program for root-knot nematode control? For reasons already outlined, and in view of our detection history to date, the answer appears to be that fumigation without detection or without knowing that nematode are present in a particular field is not justified. However, it is possible that small areas in a field may go unsampled, or for some biological reason the nematode may not produce galls on the host indicator plant in the greenhouse. The classic role of casualty insurance to spread risk appeared appropriate to this situation and we have developed with an insurance underwriter a crop insurance program to "back up" both our root-knot nematode and wireworm detection procedures. This crop insurance program:

1. Encourages use of detection procedures.
2. Permits reliance on detection results.
3. Avoids major loss if detection results are erroneous.
4. Protects both the grower and the contract potato buyer.
5. Represents a positive approach to the public as a desirable alternative to blanket chemical treatment as insurance against loss.

Briefly, the mechanics of this crop insurance program when used for field areas with negative detection results for root-knot nematode and wireworm are:

1. Agrimanagement detection for the pest in question.
2. Fields, or portions of fields, are eligible for insurance if a chemical treatment is not recommended by Agrimanagement. In this connection, the Figure 3 map indicates (darkened areas) segments that were found to be infested with RKN. Our recommendation was to fumigate the South tier next to the road and the 3 to 4 segments along the East side which includes the infested segment in the middle tier. Hence, the North

tier and most of the center tier were not fumigated. This approach proved to be satisfactory, as the grower went ahead on this basis and had no nematode injury in any of the field.

3. The insurance may be purchased by both the grower and the contract buyer.
4. The insurance program is approved by the State Insurance Commissioner for the states of Oregon, Idaho, and Washington.
5. Insurance is optional after detection results are known.
6. Insurance purchased must include all eligible field areas for that grower.
7. Insurance is purchased from any one of a number of local insurance agents -- Not from Agrimanagement.
8. The insurance underwriter is Northwest Crop Hail Management of Spokane.
9. The grower or buyer is obligated to immediately notify the underwriter if any RKN tuber damage is found.

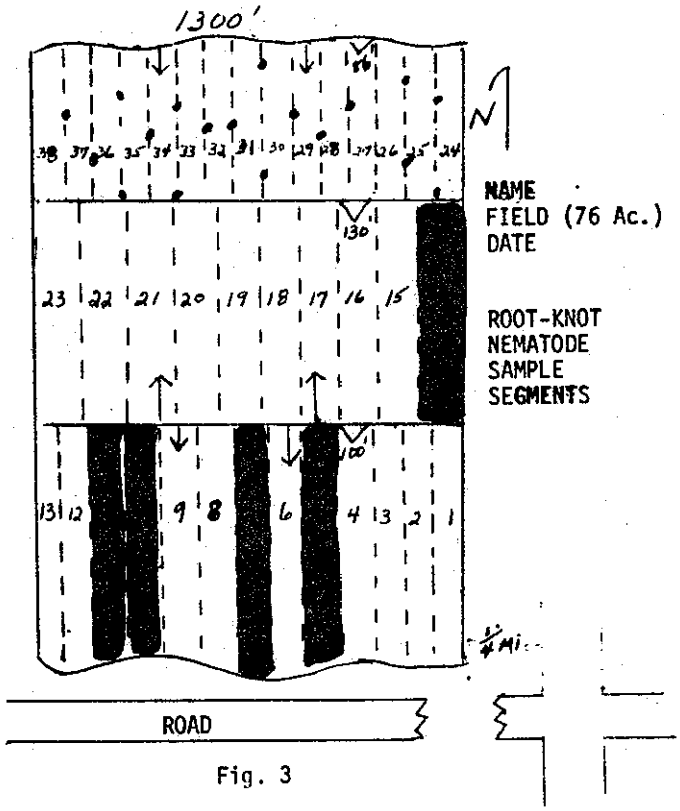

Fig. 3

The cost of the insurance will vary somewhat from area to area because hail insurance is also provided, along with the basic coverage. For the state of Washington, the cost is approximately $2.00 per $100 of insurance for either root-knot nematode or wireworm coverage. If both are purchased, the total cost would be approximately $3.00 per $100 of insurance obtained, hence a saving to the purchaser.

In summary, this approach to soil pest management involves:

1. Detection -- locate the pest in question.
2. If the pest exists at an economic level within a given field area, chemical treatment is then recommended and that field area is then not eligible for the crop insurance program.
3. If the pest exists at a non-economic level, that field area <u>is</u> eligible for crop insurance by the grower and contract buyer. Insurance is optional, but if purchased, must include all eligible fields for a particular grower.