

The Nematicide Dilemma

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Six years ago, manufacturers voluntarily withdrew DBCP soil fumigants (Nemagon, Fumazone, and others) from commerce, and EPA eventually suspended nearly all of their uses, following publication of their adverse effects on human reproductive physiology and their probably potency as human carcinogens. Ethylene dibromide (EDB) replaced DBCP for many agricultural soil treatment uses. Like DBCP, it is relatively inexpensive, easily applied, and effective, and can be applied at planting time for many crops. Unfortunately, also like DBCP, it now has been suspended as a soil fumigant for crops.

In recent months, low concentrations of EDB (generally less than 15 ppb) have been found in ground water (underground water sources; those tested in Florida were 100-200 feet deep) in four states: Hawaii, California, Georgia, and Florida. Since EDB has been determined to be a potent carcinogen in laboratory animals, detection of even very low concentrations in drinking water sources has caused concern about its potential as a human health hazard.

In addition to the concern about EDB in ground water, detection of aldicarb (active ingredient in Temik) early this year led to suspension of nearly all field applications of Temik in Florida for the balance of 1983, to allow time for further study of its behavior in soil and ground water.

Factors which have contributed to the problems with DBCP, aldicarb, and EDB include innate characteristics of the chemicals which seem to be necessary for them to be effective as nematicides, compounded by apparently unnecessarily high rates and frequency of use and perhaps inappropriate use, and unrealistic toxicological concepts held by the general public and some of their public servants. Perhaps none of these can be completely corrected, but some compromises must be reached if agriculture is to retain nematicides for use in the field.

Because nematodes live in water (whether free in the soil or in or on plant tissues, they must be in a film of water to be active), nematicides must be soluble in water to reach their targets. Nematode movement in soil is neither predictable nor uniform, so it seems to be necessary to treat a substantial volume of soil to protect the plant root zone; this usually requires using somewhat more of a compound per acre than is needed to protect the same plants from insect pests. Therefore, in most nematicide applications, we are placing relatively

large quantities of water soluble compounds into the soil.

Overuse, intentional and innocent, of these materials has probably happened because they are so effective and economically profitable to use. Nevertheless, it may have contributed to their appearance at undesirable levels in the environment. Any time that we unnecessarily increase the amount of a pesticide in the environment, just because it offers a cheap way to control a pest, without careful thought; or we use more because a little bit is recommended but it is so cheap that we can afford to be sure, we increase the chance of the amount of that pesticide in the environment becoming unacceptable. It is poor economics, poor crop management, and jeopardizes the availability of the product for situations for which there is no better alternative.

It is unrealistic to maintain the concept that the legal tolerance for any compound should be "no detectable residue." The level of sensitivity of technology that the tolerance levels used guidelines during product development are suddenly made absolute, and the rules of the game are changed when the game is already in progress. Regulatory agencies need to develop the professional and political courage to establish tolerance levels that are specific and finite, based on the best objective data that can be obtained before its registration. If changes of established tolerance levels are to be made, they should be defensible on the basis of hard scientific evidence that higher or lower limits to the quantities of the compound can be safely tolerated in food, feed, or the environment.

The challenge to those who give advice about nematode management or use nematicides is how to achieve economically efficient relief from crop losses to nematodes with the least negative effect on the environment. We must not only be honestly concerned about the impact of pesticides we use on the world we live in, we must act accordingly, but the general public must know and understand that we are achieving the most benefit at the least environmental cost possible from the pesticides which we use. If we in agriculture project a careless and callous attitude toward pesticide use, you may count on seeing the products available to us topple in order like so many dominoes, and we will deserve it.

Trade names are mentioned with the understanding that no discrimination is intended and no endorsement by the Florida Cooperative Extension Service is implied.