New York State Integrated Pest Management Program

IPM and Water Quality: Minimizing Pesticide Risk

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As this growing season approaches, many farmers are considering ways to maximize profitability and protect water quality. To help prevent or reduce the availability, release and transport of pesticides into water sources these farmers are using a variety of Integrated Pest Management (IPM) techniques.

IPM builds on an understanding of crop production and the biology of weeds, diseases, and insects, collectively known as pests. IPM encourages use of compatible crop production and crop protection tactics to keep pest populations below those causing economic injury while protecting against hazards to humans and the environment. These tactics include cultural, mechanical, biological, and chemical control options. Effective use of IPM techniques can affect water quality by minimizing or eliminating the need for chemical pest control. Use of IPM contributes to optimal crop health and improved net-profitability of crop production. Healthy crops, in addition to producing more harvestable product, use fertilizer more efficiently leaving less residual (especially nitrate) in the soil profile after harvest, are more competitive with weeds and less dependent on herbicides for weed control, and return more organic matter to the soil.

Eight examples of how IPM practices can help protect water quality by minimizing pesticide use follow.

Eight Pest Management Activities for Water Quality Protection:

Strive for Agronomic Success:

IPM is part of a sound crop management program. Careful planning helps protect water quality by identifying long and short term production practices which contribute to crop performance and help avoid pest problems. Many crop production practices such as proper site selection, seed bed preparation, nutrient balance and pH, planting depth, and other activities can greatly affect risk of pest damage, and are important factors in optimizing crop health and growing season success.

Hybrid and Variety Selection:

Crop varieties selected for their yield potential, adaptation to local conditions, and disease resistance help optimize net profit. These attributes also influence, among other factors, crop health affecting nutrient use efficiency, competitiveness with weeds and tolerance of insect pest damage. These factors contribute to water quality protection by minimizing the need for pesticide use and reducing the risk of unused nutrients, especially nitrates, being left in the soil profile.

Date of Planting:

Date of planting can influence several key field crop pest problems such as weed management in new alfalfa seedings. To minimize weed competition and eliminate herbicide use, alfalfa can be successfully established using small grains and small grain/field pea combinations as companion crops. Recent studies by Cornell University Department of Soil Crops and Atmospheric Science (SCAS) agronomists Drs. Russ Hahn and Jerry Cherney have shown that planting alfalfa seedings with companion crops are moderately successful for weed control in New York if planted prior to May 1, but generally unsuccessful after May 1. (See Cornell Recommends for Integrated Field Crop Management).

Crop Rotation:

Crop rotation has a number of agronomic benefits including yield advantages associated with the “rotation effect”. In New York a 10 - 20% yield advantage is often realized. Crop rotations provide opportunities for managing broadleaf

and grass perrenial and annual weeds and disrupt the life cycles of a number of important disease and insect pests. For example. Continuous corn fields may be at risk from corn rootworm (CRW) damage if last summers average number of CRW beetles per plant were greater than 1 western CRW beetle or 2 northern CRW beetles or if CRW induced lodging was observed. Those fields scheduled for corn again this year after late planted corn the previous year are at high risk from CRW. Rotation out of high risk fields eliminates the need for using a corn rootworm insecticide. If the field must be replanted to corn, consider recent information from studies by Cornell Department of Entomology researcher Dr. Paula Davis indicating corn rootworm impacts are potentially greater for corn grown for silage than for grain. (See What's Cropping Up, SCAS, Cornell University, February 1994).

Crop Monitoring:

Monitoring fields regularly for pests helps you to evaluate crop conditions and detect problems early. Timely field visits provide information to better meet real crop needs, avoid unnecessary crop losses and help eliminate unnecessary pesticide use. Crop monitoring, for example, can provide information to refine weed control programs, identify needs for disease resistant hybrids, or detect activities of a significant insect pest. Keeping records of field visit information also helps optimize management decisions by documenting problems for future reference.

Pesticide Application:

Crop monitoring provides information to tailor pest management based on actual need, thus enhancing environmental and economic benefits and enabling judicious pest control. Where monitoring detects pest problems which warrant pesticide use water quality is protected by adhering to safe pesticide use procedures including: proper mixing, handling, calibration, application, storage, and disposal practices. Recommended practices include selecting pesticides that are registered for the specific pest(s); strictly following pesticide label instructions including personal safety and environmental precautions; preventing spills while mixing and loading; avoiding backsiphoning while filling sprayers; calibrating pesticide application equipment before use; mixing only that amount of pesticide needed; never rinsing pesticide application equipment near wellheads, ditches, streams or other water sources; and triple rinsing or pressure rinsing pesticide containers before disposal or recycling. If you cannot find the information you need consult your cooperative extension office, pesticide retailer, or product manufacturer.

Banding of Herbicides and Cultivation:

A weed control program that bands herbicide over the row at planting with subsequent timely cultivation(s) can effectively manage weeds in row crops and reduce the per acre use of preemergence herbicides by 60% and almost totally eliminate the need for postemergence herbicides.

Soil : Pesticide Interactions:

When deciding on pesticides, consider efficacy, appropriateness, and the potential risk of materials leaching or running-off fields. Some important soil properties which affect pesticide movement are texture, permeability and organic matter. A number of pesticide chemical properties also affect potential risk of leaching or surface runoff. Among the most important are pesticide degradation rates, soil adsorption, water solubility, and volatility. Using these factors, the USDA Natural Resources Conservation Service (former Soil Conservation Service (SCS) has developed a guide which evaluates the potential risk a specific pesticide may pose to ground or surface waters if used on a given soil. This locally adapted information is available through most county NRCS or Cooperative Extension offices. Keep in mind that application rate and many additional factors can affect pesticide movement including field slope, soil moisture, weather conditions, and others.

Water quality protection is every farmer's responsibility. Some ways IPM methods can help protect water quality have been presented. To learn more about these methods and IPM contact your local Cooperative Extension office. Additional sources of Water Quality Protection information: Pesticide Management for Water Quality: Principles and Practices, Cornell Cooperative Extension, SCAS, Extension Series No. 1; 50 Ways Farmers can Protect Their Groundwater, CES, Univ. of IL, (217) 333-4780; Alliance for a Clean Rural Environment (ACRE) (800) 545-5410; Farm-A-Syst: Farmstead Assessment System, CE, Univ. of WI, (608) 262-0024.