PP863 (Revised)

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IPM BASICS

Integrated Pest Management in North Dakota Agriculture

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What is IPM?

Integrated pest management (IPM) is an integral part of North Dakota's agriculture. IPM is a program to manage pests that combines a number of strategies to reduce pest risks while protecting the environment, wildlife and people. The goal of IPM in agriculture is to produce safe, abundant and affordable food, feed and fiber. The target pests generally are weeds, insects, and disease-causing organisms such as fungi, bacteria, viruses and nematodes.

IPM Strategies

IPM incorporates several pest management strategies to maintain crop profitability, minimize pest populations, and minimize environmental and health impacts. Approaches are aimed at preventing the pest from occurring in an area, using avoidance techniques to minimize the chance of pest development, monitoring for pests in the field, identifying pests properly, assessing pest populations and determining economic threshold levels, and using pest management strategies to mitigate economic crop loss. The following strategies may be used in various combinations to accomplish these goals:

Cultural Strategies

- **Using good crop rotations** between cereal and broadleaf crops, because these different crops often have dissimilar pests and crop rotation breaks the life cycle of pests. For example, planting a nonhost crop such as wheat or barley after soybean can significantly reduce egg levels of soybean cyst nematodes.
- **Choosing planting dates that may minimize risk** of certain pests, such as later fall plantings of winter wheat, to reduce the risk of wheat streak mosaic virus.
- **Using sanitation techniques** to remove debris from the field or removing cull piles of diseased potatoes that may harbor diseases or insect pests.
- **Planting pest-free seed**, such as certified seed that is free of seed-borne diseases and weed seed.
- **Planting trap crops**, such as a field margin of a susceptible variety or host crop that concentrates a pest in the trap area. This can result in treating a smaller area with a pesticide. For example, a susceptible chemically preferred variety of hard red spring wheat can be planted around the field edges for wheat stem sawfly.
- **Adjusting harvest date** to minimize crop damage, such as harvesting early to minimize damage from alfalfa weevil.

Host Plant Resistance

- **Selecting varieties with resistance** to various pests, such as resistant varieties of hard red spring wheat for leaf rust.

Mechanical Strategies

- **Cultivation** may be used to reduce weed pressure.
- **Hand weeding** may be used to reduce weed populations or individual weeds.
- **Screens or physical barriers** often are used in home gardening and landscaping but seldom in commercial agriculture.
- **Tillage practices** may be used to bury or expose pests or pest-infested residue.

Physical Strategies

- **Heat**, such as burning of residues or soil pasteurization.
- **Cold and dry storage** prevents the development of mold and insects.

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Biological Strategies

- **Beneficial insects or pathogens** that are naturally found in fields should be conserved.
- **Parasitoids or predators** may be introduced to control noxious weeds; for example, biocontrol of leafy spurge with flea beetles.
- **Natural disease agents**, such as *Beauvaria bassiana,* may be released for natural control of certain insect pests.

Genetically Modified Traits (GMO)

- ***Bt*** *(Bacillus thuringiensis)* traits used in corn hybrids for control of European corn borers and corn rootworms.

Chemical Strategies

- Herbicides, insecticides, fungicides
- Miticides, nematicides, rodenticides, defoliants
- Desiccants
- Biopesticides (naturally derived plant products, such as neem)
- Rotation of chemistries within a class of pesticides to prevent development of pesticide resistance

IPM Benefits

- Reduced crop loss and improved crop quality
- Judicious use of pesticides in combination with non-chemical strategies, which results in improved protection of environment and health
- Reduced pest resistance
- Increased partnerships among growers, commodity groups, universities, consultants, industry and agencies to improve pest management
- Implementation of improved strategies and products through research

NDSU IPM Website address:

www.ag.ndsu.edu/ndipm

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IPM Steps

IPM programs are successful when a number of steps are followed throughout the year. These practices help in planning, preparation, implementation and evaluation of the IPM approach.

Planning and Preparation: Pest problems may be reduced by field selection (rotation), soil testing, crop and variety selection, use of good-quality seed and choice of planting date.

Field Scouting: Crop scouts regularly monitor fields in several locations to determine pest identification, incidence and severity.


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Pest trapping: Use of insect traps to determine presence and occurrence of certain pests, such as pheromone traps for bertha armyworm in canola.

Determining thresholds: Scouting is used to assess pest population densities and the need for action to prevent yield losses.

Pest forecasting models: May assist in determining the potential risk of a particular pest and when action may be needed.

Website examples:

Small Grain Disease Forecasting
www.ag.ndsu.nodak.edu/cropdisease

Potato Late Blight Forecasting
https://ndawn.ndsu.nodak.edu/potato-late-blight.html

Canola Sclerotinia Risk Forecasting
www.ag.ndsu.edu/sclerotinia/riskmap.html

Wheat Midge Risk Map
www.ag.ndsu.edu/extensionentomology/field-crops-insect-pests/nd-wheat-midge-risk-maps

Implementation: Determining the best IPM strategies includes using the right ones for the current pest problems. Planning ahead is important because some pests must be managed prior to the growing season or at planting. If chemical treatments are needed as a last resort, they must be applied in a timely fashion and according to label recommendations.

Record-keeping and Evaluation: Records of practices used should be kept and evaluations of practices should be made prior to the next growing season.

USDA
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