

Integrated Pest Management in North Dakota

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What is IPM?

IPM stands for Integrated Pest Management. The definition of IPM from the National IPM Network is

"IPM is a sustainable approach to managing pests by combining biological, cultural, physical and chemical tools in a way that minimizes economic, health and environmental risks."

Integrated Pest Management (IPM) affects North Dakota's largest industry, agriculture. One of the primary missions of IPM is to help growers produce profitable crops using environmentally and economically sound approaches. These IPM tools contribute to a system that produces high-quality, safe, and affordable foods and other agriculturally related products. For many growers, IPM helps balance pest management with profitable crop production and environmental protection. IPM also reaches beyond agriculture to include pest management in landscape and home settings.

Strategies of IPM:

How can IPM help produce a profitable crop?

IPM is designed to help growers protect their crops while minimizing the input costs.

Pest management alternatives

IPM incorporates several pest management strategies to maintain crop profitability, minimize pest selection pressures, and minimize environmental impacts. Once a pest exceeds the economic threshold or reaches a threatening level, it is necessary to determine the best way to prevent unacceptable yield losses. Economic thresholds integrate the crop value and management costs with biological information on the relationship between pest injury and yield. The cost, safety, benefits, and risks of employing various management strategies are weighed and evaluated.

Cultural (agronomic practices)

- **Selecting plant resistant varieties** (Example: Growing resistant varieties of wheat for reducing severity of wheat stem sawfly.)
- **Crop rotation** (Example: Levels of *Sclerotinia sclerotiorum*, white mold, are reduced by crop rotation to non-susceptible hosts; common hosts of *Sclerotinia* in North Dakota are dry beans, sunflowers, soybeans, and canola.)
- **Cultivation, tillage practices** (Example: Cultivating row crops reduces herbicide applications.)
- **Variation of planting or harvesting dates** (Example: Delayed planting of sunflowers until late May or early June reduces sunflower stem weevil and sunflower beetle densities.)
- **Plant spacing** (Example: Narrower row spacing favors development of plant diseases due to environmental conditions within the crop canopy. More moisture on plant surfaces and higher relative humidity favors conditions for infection, such as with white mold in soybeans.)
- **Fertilization level** (Example: A crop with balanced fertility levels has greater capacity to resist disease organisms and a greater capacity to compete with weeds.)
- **Sanitation** (Example: Cleaning out storage areas or grain bins helps prevent infestations of stored grain insect pests.)
- **Planting pest-free seed** (Example: Planting disease-free seed or using seed treatments with a fungicide will help protect germinating seed and seedlings from seedling blight.)

- **Planting trap crops** (Example: A trap crop consists of a field margin planted to an early maturing sunflower that surrounds the remaining sunflower field area. The margins flower earlier than the remaining field interiors and attract the red sunflower seed weevil first. As a result, the trap crop concentrates the weevils in a smaller area reducing the cost of insecticide and time required for control.)

Mechanical

- **Cultivation** (Example: Clean tillage between field rotations decreases the establishment of new weeds, especially perennials.)
- **Hand weeding** (Example: Removing weeds by hand is only practical for use by the home gardener, organic grower or researcher, although sugar beet growers will often hire labor for hand weeding.)
- **Exclusion using screens or barriers** (Example: Banding trees with Tanglefoot to control cankerworms.)
- **Trapping, suction devices, collecting machines** (Example: Walk-through fly trap removes horn flies from range cattle; apple maggot trap in home orchard.)

Physical

- **Heat** (Example: Burning surface residues, soil pasteurization.)
- **Cold** (Example: Cold storage of potatoes to prevent storage rot.)

Biological

- **Augmentation of natural enemies** (Example: Simple sugar solutions can be used as artificial honeydew to promote aggregation of adult lady beetles in aphid infested crops.)
- **Introduction of parasites or predators** (Example: Releasing biocontrol agents (*Aphthona* flea beetles) to control noxious weeds (leafy spurge)).
- **Propagation of diseases of pests** (Example: Bacterial agents (*Bacillus thuringiensis*) for natural control of insect pests like Colorado potato beetle or European corn borer.)

Chemical

- **Herbicides, Insecticides, Fungicides**
- **Miticides, Nematicides, Rodenticides, Avicides** (blackbirds)
- **Biological pesticides** (for example, insect molting inhibitors)
- **Defoliants**
- **Desiccants**

Steps of IPM

Scouting or monitoring

The purpose of scouting is to detect the presence, concentration, and type of pests. Scouting involves a regular and methodical procedure to quantify field information needed to make sound pest management decisions. Field observations are used to make immediate IPM decisions as well as record part of the field's history for making rational decisions in the future.

Identification

Properly identifying pests is an important aspect of scouting. Natural enemies that help keep pests in check are also present in fields, so it is important to recognize these friends. For example, certain insects, such as Syrphid flies, may be abundant in a field but do not cause crop damage. Knowledge of specific insects, weeds, or diseases in a field is important for IPM decision-making. Pest levels can vary greatly from one field to another. Each individual field should be scouted thoroughly without bias even though the fields may appear similar.

Pest situation assessment

In the third step, scouts analyze information obtained from scouting and pest identification and determine the need for pest

control. One question is whether or not the damage potential is more costly than the control cost. The economic threshold plays an important role in IPM decisions and is defined as when there are enough pests present to warrant treating the crop. Keep in mind that economic thresholds are developed for average conditions. In unusual situations, such as drought stress, thresholds may have to be altered. Furthermore, economic thresholds may not be available for certain pests, so assessment may have to be based on general guidelines about the pest population.

Implementation

Once the management strategy (or strategies) has been selected, it should be employed in a timely manner. Cultivation or using herbicides on weeds, for example, must be done at the proper stages of development of the weed and the crop for greatest impact. IPM integrates several different pest management strategies when feasible.

Evaluation

Did IPM work? Compare the pest activity before and after implementation of IPM strategies. Review what went wrong and what went right. Was the pest properly identified? Was the field sampling unbiased? Was the choice of control based on sound judgment or outside pressure? What changes to the system would make it better?

IPM benefits

New products and innovative methods

New IPM products and methods are developed and extended to producers to maximize yields. In North Dakota, potato growers use a forecasting model to make accurate predictions of early and late blight development for specific potato production areas. The North Dakota Agricultural Weather Network (NDAWN) has been expanded to include 50 sites from different areas of the state for collecting weather data. This information is also used to calculate growing degree day units for estimating crop development and pest emergence.

Reduced crop loss through improved timing and efficiency of IPM strategies

For farmers this means producing high-quality, affordable products. For society, it means maintaining safe and ecologically sound environments. One of the IPM success stories in North Dakota is the orange wheat blossom midge. Calculating growing degree days and determining economic thresholds during field monitoring has resulted in successful prediction, detection and economic control of this pest.

Judicious use of pesticides — decreasing environmental impacts

As researchers develop environmental friendly ways to manage pests, IPM practitioners have helped North Dakota growers reduce unnecessary pesticide use. In 1996, for example, 2 million acres of wheat were at high risk to wheat midge damage based on past population history and the high number of overwintering midge cocoons. However, only 40 percent were treated because of extensive field monitoring and proper use of economic thresholds during the growing season. Dry bean producers have also adopted the practice of banded spraying fungicides to achieve white mold control, a practice that allows fungicide use to be cut in half from that required for broadcast application.

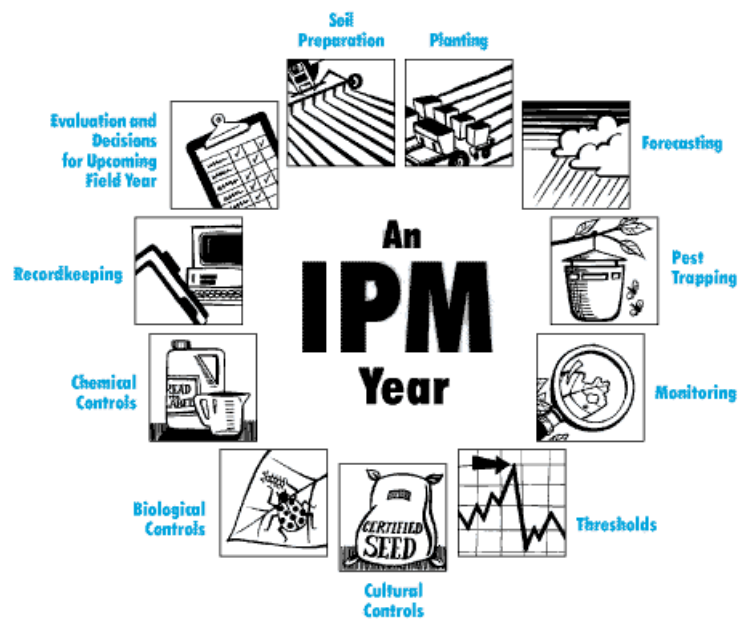
Increased partnership

IPM Programs are being incorporated by growers, crop consultants, and industry into crop production systems of North Dakota, and have increased collaboration between private and public stakeholders.

Please contact your local county extension office of the North Dakota State University Extension Service for further information on IPM. County extension offices can help you directly or refer you to area / state extension specialists. Trained crop consultants or professionals may also help provide pest information, pest identification, and IPM recommendations.

Integrated Pest Management

Maximizing productivity . . . minimizing pesticide use



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