**The PAMS Approach to IPM:**

The Practice of Integrated Pest Management (IPM) The PAMS Approach

Adoption of integrated pest management (IPM) systems normally occurs along a continuum from largely
reliant on prophylactic control measures and pesticides to multiple-strategy biologically intensive
approaches, and is not usually an either/or situation. It is important to note that the practice of IPM is site-specific in nature, with individual tactics determined by the particular crop/pest/environment
scenario.

Where appropriate, each site should have in place a management strategy for **Prevention,
Avoidance, Monitoring, and Suppression** of pest populations (the **PAMS** approach). In order to
qualify as IPM practitioners, growers should be utilizing tactics in at least three of the four PAMS
components. The rationale for requiring only three of the four strategies is that success in prevention
strategies will often make either avoidance or suppression strategies unnecessary.

**Prevention** is the practice of keeping a pest population from infesting a field or site, and should be the
first line of defense. It includes such tactics as using pest-free seeds and transplants, preventing weeds
from reproducing, irrigation scheduling to avoid situations conducive to disease development, cleaning
tillage and harvesting equipment between fields or operations, using field sanitation procedures, and
eliminating alternate hosts or sites for insect pests and disease organisms.

**Avoidance** may be practiced when pest populations exist in a field or site but the impact of the pest on
the crop can be avoided through some cultural practice. Examples of avoidance tactics include crop
rotation such that the crop of choice is not a host for the pest, choosing cultivars with genetic resistance to pests, using trap crops or pheromone traps, choosing cultivars with maturity dates that may allow harvest before pest populations develop, fertilization programs to promote rapid crop development, and simply not planting certain areas of fields where pest populations are likely to cause crop failure. Some tactics for prevention and avoidance strategies may overlap in most systems.

**Monitoring** and proper identification of pests through surveys or scouting programs, including trapping,
weather monitoring and soil testing where appropriate, should be performed as the basis for suppression activities. Records should be kept of pest incidence and distribution for each field or site. Such records form the basis for crop rotation selection, economic thresholds, and suppressive actions.

**Suppression** of pest populations may become necessary to avoid economic loss if prevention and
avoidance tactics are not successful. Suppressive tactics may include cultural practices such as narrow
row spacing or optimized in-row plant populations, alternative tillage approaches such as no-till or strip-
till systems, cover crops or mulches, or using crops with allelopathic potential in the rotation. Physical
suppression tactics may include cultivation or mowing for weed control, baited or pheromone traps for
certain insects, and temperature management or exclusion devices for insect and disease management.
Biological controls, including mating disruption for insects, should be considered as alternatives to
conventional pesticides, especially where long-term control of an especially troublesome pest species can be obtained. Where naturally occurring biological controls exist, effort should be made to conserve these valuable tools. Chemical pesticides are important in IPM programs, and some use will remain necessary.
However, pesticides should be applied as a last resort in suppression systems using the following sound
management approach: (1) The cost:benefit should be confirmed prior to use (using economic thresholds where available); (2) Pesticides should be selected based on least negative effects on environment and human health in addition to efficacy and economics; (3) Where economically and technically feasible, precision agriculture or other appropriate new technology should be utilized to limit pesticide use to areas where pests actually exist or are reasonably expected; (4) Sprayers or other application devices should be calibrated prior to use and occasionally during the use season; (5) Chemicals with the same mode of action should not be used continuously on the same field in order to avoid resistance development; and (6) Vegetative buffers should be used to minimize chemical movement to surface water.

Adopted from Coble, Harold. 1998. Integrated Pest Management Measurement Systems Workshop. A New Tool for Measuring the Resilience of IPM Systems --
The PAMS Diversity Index. [web page](http://www.aftresearch.org/research/resource/publications/wp/sp98-1/ipmpams.htm)

**A Framework for Practicing IPM:**

Integrated pest management is a process, defined by each particular situation. One way to understand IPM is to consider the following general framework which can be applied with modifications to most specific situations:

**Preparation:**

Be aware of the potential problems and opportunities in your fields. What pests can you expect, what practices can you take to avoid them, and when and how should you watch for them? What control tactics are available if, despite your best efforts, pests attack the crop. What are the beneficial species that will help you out? What are the strengths and limitations of your operation (labor, equipment, markets, $) ?

**Prevention:**

Use practices that contribute to crop protection for the long term. These include:

* Biological controls; Preserve biological diversity.
* Crop rotation; breaks pest life cycles, often improves tilth and fertility.
* Host plant resistance; Use varieties that are resistant to common pest species.
* Sanitation; Remove or destroy debris and other sources of pest infestation.
* Site selection; Plant only on sites suited to the crop needs

**Monitor the Crop; "Scouting":**

Collect valuable information in time to use it in making good decisions. Which of the expected pests are in *your* field? Know both "what" and "how many" by properly sampling the field. Use recommended scouting techniques to *accurately and efficiently* collect this information.

**Analysis:**

Scouting indicates what pests you have, and how many of each. Now you must decide whether these pests should be controlled.

Compare the sample count of pests you find on the crop to the "economic threshold" or "action threshold" to determine if action is necessary. The economic threshold is the pest count at which the benefit of taking action is greater than the cost of taken action.

Crops can tolerate a certain number of pests before economic loss is incurred because all control actions have costs as well as benefits. Determine whether the benefits derived from control justify the costs incurred.

**Management options:**

If action is called for, choose those that optimize cost and effect while minimizing adverse effects. Examples of different control options:

* Cultural: eg. Crop rotation to avoid corn rootworm damage
* Mechanical eg. Cultivation of corn weeds
* Biological eg. Release of parasitic wasps for fly control
* Genetic eg. Plant disease-resistant alfalfa varieties
* Chemical eg. Herbicides, insecticides, fungicide

**Implementation:**

If a control is justified, do so properly and at the right time. For instance, weed cultivation is often most effective before weed seedlings are even visible above the soil surface. Releases of biological control agents must be in the proper place, at the proper time. "If a job is worth doing, it is worth doing right."

**Re-evaluation:**

*Short term.* Was the management decision correct and did the action have desired results? How much has the situation changed from last week/yesterday? New judgments are required.

*Long term.* What worked well during the season, and what did not? Is the alfalfa stand healthy enough to keep in another year? Should the corn field be rotated out? Is a soil insecticide necessary?