Principles of Integrated Pest Management

An IPM system is designed around six basic components:

1. **Acceptable pest levels:** The emphasis is on *control*, not *eradication*. IPM holds that wiping out an entire pest population is often impossible, and the attempt can be expensive and environmentally unsafe. IPM programs first work to establish acceptable pest levels, called action thresholds, and apply controls if those thresholds are crossed. These thresholds are pest and site specific, meaning that it may be acceptable at one site to have a weed such as white clover, but at another site it may not be acceptable. By allowing a pest population to survive at a reasonable threshold, selection pressure is reduced. This stops the pest gaining resistance to chemicals produced by the plant or applied to the crops. If many of the pests are killed then any that have resistance to the chemical will form the genetic basis of the future, more resistant, population. By not killing all the pests there are some un-resistant pests left that will dilute any resistant genes that appear.
2. **Preventive cultural practices:** Selecting varieties best for local growing conditions, and maintaining healthy crops, is the first line of defense, together with plant quarantine and 'cultural techniques' such as crop sanitation (*e.g.* removal of diseased plants to prevent spread of infection).
3. **Monitoring:** Regular observation is the cornerstone of IPM. Observation is broken into two steps, first; inspection and second; identification.[6] Visual inspection, insect and spore traps, and other measurement methods and monitoring tools are used to monitor pest levels. Accurate pest identification is critical to a successful IPM program. Record-keeping is essential, as is a thorough knowledge of the behavior and reproductive cycles of target pests. Since insects are cold-blooded, their physical development is dependent on the temperature of their environment. Many insects have had their development cycles modeled in terms of degree days. Monitor the degree days of an environment to determine when is the optimal time for a specific insect's outbreak.
4. **Mechanical controls:** Should a pest reach an unacceptable level, mechanical methods are the first options to consider. They include simple hand-picking, erecting insect barriers, using traps, vacuuming, and tillage to disrupt breeding.
5. **Biological controls:** Natural biological processes and materials can provide control, with minimal environmental impact, and often at low cost. The main focus here is on promoting beneficial insects that eat target pests. Biological insecticides, derived from naturally occurring microorganisms (*e.g.*: *Bt*, entomopathogenic fungi and entomopathogenic nematodes), also fit in this category.
6. **Responsible Pesticide Use:** Synthetic pesticides are generally only used as required and often only at specific times in a pests life cycle. Many of the newer pesticide groups are derived from plants or naturally occurring substances (*e.g.*: nicotine, pyrethrum and insect juvenile hormone analogues), but the toxophore or active component may be altered to provide increased biological activity or stability. Further 'biology-based' or 'ecological' techniques are under evaluation.

An IPM regime can be quite simple or sophisticated. Historically, the main focus of IPM programs was on agricultural insect pests.[7] Although originally developed for agricultural pest management, IPM programs are now developed to encompass diseases, weeds, and other pests that interfere with the management objectives of sites such as residential and commercial structures, lawn and turf areas, and home and community gardens.