Unit VI: Plant Health

Lesson 2: Pest Control

The last lesson summarized types of insects, mites, animals, and diseases that threaten greenhouse-grown plants. To ensure healthy crop production and a profitable yield, the greenhouse owner must understand how to control these pests. This lesson describes several methods of plant protection.

Pest Control Basics

The <u>purposes</u> of a pest control program are to prevent entrance of pests inside the greenhouse, reduce or eliminate pest populations, protect plants from pests already present, and increase plants' resistance to pests. The basic methods of control are biological, chemical, cultural, and mechanical, as discussed below.

Biological Pest Management

The principle of <u>biological pest management</u> is to use living organisms that are natural predators of pests. For examples, ladybugs prey on aphids. The bacterium *Bacillus thuringinensis* kills harmful worms, and trap plants lure pests away from cultivated crops. Biological controls tend to take longer than the other methods and they do not completely eliminate greenhouse pests.

Chemical Pest Management

<u>Chemical management</u> can be used to protect and treat plants and to destroy pests. Herbicides kill weeds that hinder growth. Chemicals are effective, but several pests have developed resistance to some brands. Also, many types of pesticides are under review by governmental agencies, such as the Environmental Protection Agency (EPA). Because the promulgation of pesticide regulations can occur unnoticed, the greenhouse owner must keep apprised of which chemicals may be used and how those pesticides affect living organisms. An EPA web site (<www.epa.gov/pesticides/label>) displays interactive labels of various pesticides that identify their ingredients and/or risk factors. Types of pesticides designed to eliminate specific pests are listed in Table 1. Please note that each of these chemical controls can be deadly and must be used with extreme caution.

Table 6.1	- Pesticides	for S	pecific	Pests

Type of Pesticide	Pests Treated
Acaricide	Spiders, ticks
Aviacides	Birds
Bactericide	Bacteria
Fungicide	Fungi
Insecticides	Insects
Miticides	Mites, ticks
Molluscides	Snails, slugs
Nematicides	Nematodes

Cultural Pest Management

The <u>cultural management</u> approach applies techniques used in the greenhouse to ensure a high-quality growing environment. This involves mulching and pruning plants, pasteurizing growing media, and purchasing quality seeds. Selecting pathogen-resistant plant varieties and planting at suitable times also help control pest attacks. Cultural practices that affect plant growth and potential exposure to pests include fertilization, irrigation, and aeration.

Mechanical Pest Management

Pests can be prevented, removed, and destroyed by <u>mechanical (physical) management</u>. Helpful activities include weeding and mulching, handpicking large bugs from plants, screening out insects, and hanging flytraps. Maintaining sanitation throughout the greenhouse deters pests. Propagation benches, tools, and the floor must be cleaned frequently. All employees must ensure that they do not contaminate crops by stepping on benches.

Integrated Pest Management

As its name implies, integrated pest management (IPM) is a comprehensive strategy that combines features of biological, chemical, cultural, and mechanical pest management programs. The goals of IPM focus on reducing the following: the number and impact of pests (but not necessarily to eradicate all of them); economic loss due to pests; reliance on pesticides; and safety hazards to humans, animals, plants, and the environment. Operating from an ecological perspective, IPM seeks natural solutions to pest management. IPM strategies develop from careful decision making and planning. Fundamental to IPM is a thorough understanding of pertinent biological information about pests in the greenhouse. This includes knowing the pests' life cycle, behavior, mouth types, and other characteristics. Next, the greenhouse owner must identify the types of pests that injure greenhouse crops and know how to recognize symptoms of plant injury. Then the owner establishes a certain level of damage that is considered unacceptable. This threshold signals when IPM strategies are implemented. At this point, a series of important issues are resolved, as illustrated in Table 6.2.

Table 6.2 - IPM Decision-Making Process

Responses to Unacceptable Levels of Pest			
Damage			
1. Start preventative strategies.			
2. Scout plants for symptoms or presence of pests.			
3. Determine if pests are present.			
4. Identify pests and scope of damage.			
5. Treat plants.			
6. Evaluate effectiveness of treatment.			
7. Evaluate management strategies.			

Pest control is achieved through early detection and application of safe eradication measures. Greenhouse owners need to constantly monitor and evaluate the efficiency of IPM by keeping accurate records that track the following:

- Range of daily temperatures
- Amount of pests on plants and their current developmental stage
- Status of plant growth and root health
- pH and soluble salt level of the growing medium

IPM incorporates strategies known as "*best* management practices" (BMPs). The purpose of BMPs is to incorporate scientific techniques and real-world experience to maintain cost-efficient operations and ensure high-quality crops. BMPs are environmentally friendly approaches to pest management. Examples of BMP practices that promote IPM goals are listed in Table 6.3.

Table 6.3 - Best Management Practices That ControlPests

Best Management Practices		
Testing growing media		
Determining correct time and application of		
fertilizers		
Ensuring proper drainage		
Managing irrigation systems		
Using controlled-release fertilizers		
Using natural (biological) pest controls		
Using cultural pest controls		

Summary

Protecting greenhouse crops from destructive pests results in commercial success for the greenhouse owner. Biological, chemical, cultural, and mechanical management methods have distinct features for controlling pests. The integrated pest management strategy incorporates aspects of all of these approaches and is ecologically sensitive to the growing environment.

Credits

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