Extension Pesticide Applicator Training Series #1: Pest Identification

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Pest identification is the first and most important step in any pest management situation. Integrated pest management depends on "field scouting," or monitoring pest populations and crop development. Accurate identification is critical since appropriate management methods may vary dramatically for each pest. Unfortunately, pest identification can be very difficult if you are not familiar with the weed, insect, or disease problems present within your area. In addition, many pests share similar traits, which makes identification extremely difficult. Specific pest identification is beyond the scope of this guide; instead, the objectives are to introduce how to identify pests and to provide references for further information.

SCOUTING METHODS

The tasks of field scouting include (1) making accurate identifications of pests and related crop injury present in the field, (2) determining the abundance of the pest populations, (3) recording crop growth stage and agronomic practices, and (4) carefully recording all field observations. These tasks require extensive hands-on experience before field scouting can be mastered. Specific scouting methods are dependent upon many factors, including size of the

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area, characteristics of the area (e.g., row crop, orchard), management goals, history of pest and disease issues within fields, and mobility of pests. Since surveying the entire area is typically not possible, pest populations are estimated by sampling from smaller areas. Field scouting can be accomplished in many ways, including entering a field from several different points and surveying into the center, or subdividing it into several small sections and making observations within each section. However, representative sampling of the whole field is important because pests tend to congregate in specific locations. If only one or two small sections are scouted, pests may not be detected until high levels of damage have already occurred. A field history of infestations is often helpful for scouting because some pests prefer specific areas and may infest these areas first. Sampling early in the season and concentrating sampling in areas where pests have historically been a problem is recommended as a way to detect pests before densities increase to damaging levels and spread.

Surveying for weeds and diseases can be done visually, while insect surveys frequently require special techniques. Most insects can fly or otherwise escape detection. Some monitoring methods depend on gathering insects in sweep nets or catching them in specially designed traps. Plants can also be checked closely, looking for feeding insects and signs of feeding activity. It is important to record the results for future reference. Many observations should be recorded when scouting, including the location in the field, identification of beneficial insects and pests present, density of pests, life cycle stage of pests, distribution of pests within the field, date of observation, and crop growth stage or site description.

SCOUTING AND IDENTIFYING INSECTS

Identification is critical to distinguish between insect pests and beneficial insects. Insect identification is based on morphological features, such as the structure of mouthparts, wings, legs, or antennae. Some special equipment is required for effective scouting: a sweep net, forceps, and an aspirator are needed for collecting samples; vials containing rubbing alcohol are used for killing and preserving collected specimens; and a magnifying lens will help with identification of specimens. The type of damage observed in the field and where the pest is located on the plant will also help determine which pests are present.

Many pests have chewing mouthparts and eat plant tissue. Caterpillars of many butterflies and moths as well as larval or adult stages of several beetles feed on leaves, fruit, roots, or other specific plant parts. Most plants are also hosts to one or more species of aphids, leafhoppers, or plant bugs. These insects have sucking mouthparts for puncturing plant tissues and sucking out sap. This causes damage to leaves, flowers, or fruit. Sucking insects can also cause crop losses by spreading diseases from infected plants to healthy plants. Typically, different pest species will attack a crop at a specific time of year or stage of plant growth or under specific environmental conditions. Information is available in printed or online guides to help identify insect pests affecting a specific crop.

SCOUTING AND IDENTIFYING PATHOGENS

Several types of microorganisms can cause a reduction in overall plant health, including fungi, bacteria, virus, and nematodes. Identifying these organisms in the field is usually very difficult, and specialized lab procedures for identification are often required. Tools needed to identify or collect a diseased sample include a sharp knife, a shovel, paper bags, a writing instrument, and a magnifying lens.

Diseases and disorders of plants occur when normal plant function is disrupted. For this reason, pathogens can easily be confused with environmental (non-organism related or abiotic) stresses. For example, wilt symptoms can occur due to water stress caused by drought or rot caused by pathogens. Although symptoms of a disease and an environmental stress are often indistinguishable, they can often be separated by the pattern in which they are distributed within the field. Environmental stresses are typically distributed evenly and in patterns, encompassing many plants over large sections of the field. Alternatively, biotic organisms occur in clusters, scattered in pockets throughout the field. Furthermore, these organisms typically infect a small number of plants within each cluster. In both instances, further examination of the entire plant is required.

Using a shovel, dig out both healthy and symptomatic plants with all possible roots attached. Examine the plant as a whole, noting differences between the two. Characteristic signs and symptoms of disease include knots, blackened areas or rot along the root system, discoloration in the inner stem tissue, stem lesions, leaf spots, cankers/blisters, and leaf malformation. Many different organisms can produce similar symptoms and signs. If the distribution or the symptom indicates the possibility of a disease, collect a sample and contact your local Extension agent (https://aces.nmsu.edu/county), and they will send it to a plant diagnostic lab for testing. Samples should be received by the lab within three days of collection; please refer to NMSU Guide H-158, *How to Collect and Send Specimens for Disease Diagnosis* (https://aces.nmsu.edu/pubs/_h/H158.pdf), for specifics on how to properly collect and send a sample. Remember, the lab's diagnosis of the disorder is only as good as the sample and the information submitted with it.

SCOUTING AND IDENTIFYING WEEDS

By definition, weeds are plants growing out of place. They compete with desirable plants for limited resources, such as water, nutrients, and sunlight, to reduce crop yield and quality. Due to this competition, weed species need to be identified and removed when they are young and have not had time to impact the crop.

Weeds are classified based on morphological features of the foliage, stems, and flowers; therefore, visual inspection of the plant is all that is required for identification. A small magnifying lens may help identify small features of some plants. Weeds can be classified as annual, biennial, or perennial plants. Annual plants will germinate, flower, set seed, and die within one year, while biennials take two years. Perennials can grow for several years, storing energy in perennial tissue. Proper identification is critical because management strategies differ dramatically for annuals, biennials, and perennials. For example, perennial weeds can tolerate many management techniques, such as mowing and cutting, that are effective on annual and biennial weeds.

While weeds can occur anywhere, infestations are common in areas that are frequently disturbed or where crop growth is suppressed. These are excellent places to begin scouting for weed populations. Weeds also tend to occur in patches and grow at various times of the season; therefore, several scouting trips through various locations in the field should be conducted. Identification of seedlings, while important, can be very difficult.

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