Field Scouting

Field scouting is the regular examination of fields in a prescribed fashion to measure pest levels. To properly scout for pests, you must know where they live, what they look like, and how to find and count them. This information is provided in the sections on specific pests. A combination of basic scouting procedures and a good knowledge of pest biology allows you to collect the information required to make sound pest management decisions. When scouting, you can also assess whether your management strategies are working, or in themselves, causing problems.

Why Scout Fields

Field scouting is an economically and environmentally sound prerequisite to pest management decision-making. No good is achieved by treating a pest where damage is insignificant. On the other hand, treatment when the damage is too far along is economically and environmentally irresponsible. A farmer can only collect the information needed to make timely management decisions by regular scouting. Regular scouting also prevents unnecessary treatments and reduces the uncertainty associated with pest management.

Scouting Frequency

Scouting should be done weekly during the growing season and even daily when infestations approach economic levels or weather conditions favor rapid development of specific pests. With some plant diseases, daily scouting is necessary when it is warm and humid. With weeds, competition is normally most critical during the seedling stage, but this can vary with the species.

What to Look for

When scouting you should note all the pests and beneficial insects that you find. You want to detect problems that will affect this year's crop and future crops so you can make short- and long-term pest management decisions. For example, you want to detect a high population of grasshoppers so you can take action, but you also want to detect a low level of cleavers so you can keep the field in a cereal rotation to clean-up the problem.

Assess the overall appearance of the field, then examine specific plants including seed heads, stems, leaves and roots. Cut them open and check for signs of damage by insects and diseases.

Besides the pests themselves, you should watch for typical damage symptoms that are caused by pests and pesticides. These symptoms are not exclusive to pests and control products but may be caused by environmental and soil factors. The following symptoms are commonly associated with pests and pesticide damage. Use them in recording your observations.

Field symptoms

spotty growth	**yellowing**
browning	**loss of vigor**
stunted growth	**thin stand**
differences due to topography	**kinked**
lodged	**poor germination**

Leaf symptoms

unusual color	cupped
loss of leaves	rolled leaves
crinkled	feathered
chewing signs	spotted
stripped	blotched

Flower and fruiting symptoms

wilted	deformed
improper arrangement	missing
branched	delayed development
clipped	aborted

Stem symptoms

twisted	kinked
broken	elongated
shortened	cracked
spotted	swollen
abnormal tillers	punctured
rotten	

Root symptoms

inhibited	tunnelled
rotten	swollen
chewed	

The Tools Needed for Scouting

The following items should be assembled in a carrying case for field use:

- clipboard
- sampling frame (0.25 square metres)
- record sheets
- alcohol
- tweezers
- clear plastic bags
- 10X hand lens
- paper bags
- hand trowel
- sweep net
- pocket knife
- sieve
- vials
- labels for identification
- resource material
- flagging tape

Use these tools to collect samples, and to record, examine, and preserve them for reference or identification. You will find all these items are essential when you are on your hands and knees with a pest in your hand and nowhere to put it.

Sampling square

A sampling square can be made from 1/4" iron rod bent to form three sides of a square. It is used to mark out a specific area of a crop for sampling. The rod should be sprayed a bright color and marked with flagging tape so it is easy to find if placed or dropped in a crop. Generally, 0.25 m^2 is used as a sampling area. To make a three-sided 0.25 square metre sampling square a 150 cm length of wire is required. The square is only three-sided so it can be slipped into a standing crop parallel to the ground rather than dropped down through the canopy.

Number of samples

Follow the sampling procedure described in the pest specific write-ups that follow. In situations where the exact sampling procedure is not provided use the following rule of thumb:

In fields of less than 100 acres, check a minimum of five locations.

In fields of greater than 100 acres, check a minimum of 10 locations.

Scouting Patterns

Scouting gives a representative, objective assessment of the pest situation in a whole field, not just in the edge, centre, high or low areas. The shape of the field, its ease of access, and the nature of the pest's typical distribution pattern all play a part in deciding how to scout a field. Other field variables such as organic matter or soil structure may affect the weed species in different parts of a field.

There are several possible scouting patterns that can be used when scouting fields. These options are based on various pest distribution types and field configurations.

In some instances, it may be necessary to combine two or more patterns. This is especially true when the field is very uniform, little is known about the pest, or a control decision is being contemplated but you are not totally confident in a sampling program. A thorough sampling allows a producer to make a sound decision, and perhaps save money.

For example, wild oats are generally throughout a field while flea beetles, or grasshoppers are most prevalent along field margins. With flea beetles and grasshoppers, the scouting pattern can change depending on the time of year. Which scouting pattern you select may also be influenced by where you enter the field and where you leave it.

Pattern I

When scouting for pests that are uniformly distributed throughout the field, the sampling sites should be evenly distributed across the field excluding obvious influencing factors such as field edges, hills and solonetzic areas. These patterns typically look like an X, Y, W or Z. Pests that fit this pattern include stinkweed, wild oats, leaf diseases, aphids, diamond-back moth, bertha armyworm, root maggots, alfalfa weevil, corn borer, and lygus bugs.

Pattern II

When pests are unevenly distributed such as with pests associated with specific areas that are high, low, wet, dry, solonetzic or high in organic matter, the sampling should be concentrated in those areas. Pests that fit this pattern included redbacked and pale western cutworm, thistle, quackgrass, root rot and tansy.

Pattern III

When pests are at edges of field, sample for those pests by walking in the field edges, fence lines or ditches. Pests that fit this pattern include flea beetles, grasshopper, red turnip beetle, scentless chamomile, tansy and Canada thistle.

Basic Information to Aid in Scouting

A scout should be familiar with stages of the crop and weeds and should be able to assess what percentage of leaf material is infected by disease or consumed by insects. The following charts provide this reference material.

The Feekes and Zadoks scales define the growth stages of a relatively uniform cereal crop. Completion of these growth stages by the cereal crop will be influenced greatly by soil temperature, moisture, air temperature and day length. For example, stages 2-5 in the Feekes scale may take 5 or 6 weeks, whereas stages 6-10 may be completed in 2-3 weeks.

To establish the growth stage of a cereal crop using either of these scales, collect a random sample of plants and determine the level of growth attained by the majority of the plants. Under good growing conditions, examination of up to 10 randomly selected plants may be appropriate. Larger samples may be needed for determining the growth stage when germination is uneven and soil moisture levels are low.

Precise timing of the application of an agrochemical, be it a fungicide, growth regulator, herbicide or supplemental nutrient, is of vital importance in maximizing the desired effect on the target crop. An application based upon physiological growth stage, and not farming practices based on calendar days, will ensure the best result from the agrochemical.

Weed Scouting

The goal of weed scouting is to assess the infestation level of known pest weeds and detect new weeds that may be at very low levels so action can be taken to control or prevent them from becoming an economic concern. In some cases, early detection of a weed can make eradication possible.

Begin scouting as soon as weeds appear in the field and continue until freeze-up. Record stages of growth of both broad-leaved and grassy weeds and the numbers per square metre of each weed.

Frequently, all scouting patterns must be used since weed habitat can be very species specific. Each field usually requires a pattern for a uniform sample and samples in low areas and field margins or ditches to assess immediate or future risk from problem weeds left uncontrolled.
Detailed counts of the numbers of weeds per square metre provide the ideal record of a weed problem. If this is not possible, the following rating system may be useful:

Group I - Wild oats, stinkweed, wild buckwheat, lamb's-quarters, redroot pigweed, hemp-nettle, smartweed, rape, wild mustard, Russian thistle, tartary buckwheat, cow cockle, shepherd's-purse, kochia.

Light	Medium	Heavy
1-10 plants/m2	10-30 plants/m2	30 or over plants/m2

Group II - Chickweed, green foxtail, corn spurry.

Light	Medium	Heavy
1-20 plants/m2	20-70 plants/m2	70 or over plants/m2

Group III - Canada thistle, sow-thistle, dandelion

Light	Medium	Heavy
1-2 plants/m2	2-10 plants/m2	10 or over plants/m2

These definitions can be used to help standardize ratings. With experience, infestations can be visually estimated. These groupings are based on the competitive characteristics and life cycles of these weeds.

Insect Scouting

The objective of scouting for insects is to identify the insects present in your fields, determine which ones are or may become a problem, and assess numbers and damage so a decision on action can be made. This means

sampling for insects and examining plants. Often both insects and diseases can be assessed at the same time. This may vary depending on whether you are sampling just when seedlings are emerging or when the plants are 10 cm tall. Cutworms in the first case would be very small and difficult to find but large and easy to find in the second case. For details about specific sampling techniques for pest insects, refer to the section on insect species.

Foliage damage

Very mobile insects such as grasshoppers are counted by estimating the number per square metre. Less mobile insects, such as armyworms and webworms, are shaken from the plants onto the ground and counted. This provides an accurate quantitative assessment of insects per 50 cm X 50 cm of crop. (Multiply by 4 to determine pests/square metre).

For insects such as lygus bugs and beneficial insects, calculate the insect numbers per sweep with a sweep net as the sampling technique. Since many insects are very mobile or small and difficult to see, the sweeping technique is very useful.

A sweep is made by swinging the net at arm's length through the crop canopy so the top of the net is at crop height. If there is little canopy or the crop is short, sweep close to the ground. One sweep can be either a 90 or 180 degree pass through the crop. Take two steps forward between sweeps so the sweeping activity does not influence the catch in your next sweep.

At the end of the sweep, swing the net quickly back and forth through the air to force the insects to the bottom of the net. Quickly grab the bag about 15 to 20 cm from the bottom to confine the insects and prevent escape.

Always take a consistent number of sweeps per sample. Count the insects in the net as you let them escape, or empty them into a plastic bag or bottle. The counting system you adopt will depend on how well and quickly you can identify the insects in your net, the number of species present and the total number of specimens.

Individual leaves, especially the top ones, should be examined for presence of insects and assessment of damage in addition to sweeping. The following illustration will help you to estimate leaf damage. With insects such as thrips, the damage is done to the leaf sheath and flag leaf. Examine the entire leaf and the sheath for the insect and its scrapping damage. Disturb the leaves as little as possible to prevent insects from falling off the leaves.

Seed head and pod damage

When crops are in seed, always examine the surface of the head or pod for sign of feeding or puncture by insects. Open seed pods to examine seeds. Insects such as the lygus bug only leave signs of damage on the seeds. With canola or alfalfa, you may find seeds shriveled when a pod is opened. This is frequently caused by lygus bug.

Stem damage

Look for puncture marks on the stem surface, then split the stem from top to bottom. Examine the inside of the stem for insects such as wheat stem maggot or wheat stem sawfly. Also examine the stem right at the root crown for signs of insects such as Hessian fly pupae.

Root damage

Always dig up the roots, clean away the soil and look for insects such as cutworms and maggots. If there are signs of damage, but no insects are present, sieve the soil around the plants to find the causative agent. How carefully you must examine the soil will depend on the size of the insect. In some cases, you may have to thinly spread the soil on a black plastic garbage bag to find the pest.

Disease Scouting

Whenever scouting, be aware that symptoms of plant disease problems may be caused by weather, fertilizers, deficiencies, herbicides and soil problems. In many cases, the cause of the symptom is not obvious. Very close

examination and a laboratory culture or analysis are required to confirm the causal agent. Basic examination techniques and details for specific diseases are given in the section on specific plant diseases.

Root sampling

If there are no obvious symptoms on plants, examine plants randomly and look for lesions or rots on roots and stems. Always check plants that appear unhealthy. It is often necessary to wash the roots with water to examine them properly. If the roots are well developed, cut into them to examine the roots for internal infections.

Leaf sampling

Examine all leaves and sheaths on each plant for lesions and determine the amount of leaf infection. Leaf diseases cause most damage during the seedling and flowering stages of plant growth.

Stem and head sampling

Carefully examine the stems, heads and pods of plants for signs of fungal material or lesions. The stems, pods and heads should be split or taken apart and examined for discoloration caused by fungi and bacteria.