



Lesson Plan:

Crop Scouting and Field Diagnostics

Courses: Plant Science / Agronomy / Introduction to Agriculture	Grade Level: 9-12
Lesson Length: 60 minutes, plus optional outdoor field extension	Topic: Systematic crop scouting and preliminary field diagnosis

Essential Question

How can a crop scout use field patterns, plant symptoms, and physical evidence to identify possible crop problems and communicate useful next steps?

National AFNR Standards Alignment

Applicable AFNR Connections

- Plant Systems PS.01.01. Determine the influence of environmental factors on plant growth.
- Plant Systems PS.02.02. Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.
- Plant Systems PS.03.02. Develop and implement a management plan for plant production.
- Career Ready Practices CRP.04.01. Communicate using strategies that ensure clarity, logic, purpose, and professionalism in formal and informal settings.

Learning Intention

We are learning to gather field evidence, make a preliminary identification, and communicate an appropriate next step.

Success Criteria- I can:

- Record crop stage, field pattern, affected plant parts, and visible evidence.
- Use multiple traits to identify or classify a possible problem.
- Distinguish an observation from possible cause and confirmed diagnosis.
- Explain an alternative cause and what I would check next.
- Communicate my findings clearly in a scouting report.

Materials Needed

- Fresh or preserved weed specimens and labeled weed-identification cards
- Insect specimens, models, clear photo cards; hand lenses and collection containers
- Disease specimen or photo cards showing signs and symptoms.
- Healthy and nutrient-stressed plant samples or photo cards
- Crop scouting report, clipboards, pencils, field map, and station answer keys
- Flags or markers, measuring tape, ruler, resealable sample bags, labels, and permanent marker



- Optional: shovel or trowel, sweep net, white tray, camera or tablet, disposable gloves, safety glasses, and field guides

Safety and stewardship: Use only teacher-approved specimens. Do not taste plants, handle unknown organisms with bare hands, or recommend crop protection or fertilizer applications. Follow school, label, field-entry, and biosecurity requirements; clean footwear and tools between sites where appropriate.

Vocabulary

Crop Scouting	Field Pattern	Symptom
Host Plant	Weed	Pest
Disease Triangle	Chlorosis	Necrosis
Deficiency	Beneficial Insect	Stunting

Lesson Sequence at a Glance

Time	Lesson Component	Purpose / Teacher Focus
5 min	Bell Ringer	Separate evidence from assumptions using a mystery-plant prompt.
10 min	Direct Instruction	Introduce a repeatable scouting routine
8 min	Guided Practice	Model how to document one crop-health concern.
28 min	Four Scouting Stations	Practice weed, insect, disease, and nutrient-deficiency identification.
6 min	Team Field Report	Synthesize evidence and communicate a preliminary finding.
3 min	Closure / Exit Ticket	Name the evidence needed before making a recommendation.

Bell Ringer (5 Minutes)

Display a healthy plant and an affected plant or two contrasting photographs. Ask students to create two lists:

- What can you observe without guessing?
- What additional information would you need before identifying the cause?

Briefly discuss why yellowing, holes, spots, wilting, or stunting can have multiple probable causes.

Direct Instruction (10 Minutes)

A Repeatable Scouting Routine

1. Prepare before entering the field: learn what is planted, intended crop use, variety or hybrid, fertilizer plan, recent weather, field history, and available soil-test information.
2. Observe the whole field first. Note crop stage and patterns such as field edge, low area, row-related, random, scattered, or widespread.



3. Inspect representative plants. Compare affected and healthy plants, including leaves, stems, growing points, and roots when appropriate.
4. Look for evidence. Record weed traits, insects or feeding injury, disease signs and symptoms, and the location of discoloration or tissue death on the plant.
5. Document precisely. Record location, stage, number or proportion affected, severity, photographs, and sample details.
6. Develop probable causes and verify. Use credible identification resources and seek expert or laboratory confirmation when evidence is incomplete.
7. Communicate positively. Start with healthy observations, explain the concern and evidence, and identify a safe next step rather than overclaiming a diagnosis.

Diagnostic reminder: A visual symptom alone does not prove the cause. Similar symptoms can result from pests, disease, nutrients, soil conditions, weather, herbicide injury, or mechanical damage.

Guided Practice (8 Minutes)

Model a short scout report using one unknown sample or photograph.

Scout-Report Field	Model Prompt
Crop and stage	What crop is present, and what growth stage can be supported by visible evidence?
Pattern and location	Where is the issue in the field and on the plant?
Evidence	What colors, shapes, margins, feeding patterns, insects, signs, or root conditions are visible?
Preliminary identification	What are two probable causes? Which evidence supports or weakens each?
Next step	What should be checked, sampled, monitored, or confirmed?

Interactive Activity / Laboratory (28 Minutes)

Crop Scout Circuit

Divide students into teams. Teams spend about six minutes at each station and use the final four minutes to review their reports. At every station, students must record evidence before selecting an identification.

Station 1: Weed Identification

Look for: Use whole plants, seedlings, or photo cards. Students examine leaf arrangement, leaf shape, margins, veins, cotyledons, stems, hairs, ligules or auricles when visible, and root type.

Student practice: Sort specimens into grass, sedge, or broadleaf; identify teacher-selected specimens with a key; map density as isolated, patchy, or widespread; decide whether the weed appears primarily cosmetic or competitive and explain the evidence.

Caution: Avoid handling unknown plants bare-handed. Do not rely on flower color alone; use several traits.

Station 2: Insect Identification

Look for: Use specimens, models, feeding-injury samples, or photo cards. Students observe number of legs, wings, antennae, mouthpart clues, body shape, life stage, location on the plant, and damage pattern.



Student practice: Classify each organism as possible pest, beneficial, or uncertain; pair the organism with the most likely feeding evidence; practice a count or sample using a teacher-specified area, plant number, sweep, or tray.

Caution: The presence of an insect does not automatically establish economic injury. Record abundance and crop injury separately.

Station 3: Disease Identification

Look for: Use plant samples or photo cards. Students compare healthy and affected tissue and look for lesion shape, color, margins, distribution, wilting, rot, fungal growth, spores, or fruiting structures.

Student practice: Separate signs from symptoms; match evidence to teacher-selected disease cards; use the disease triangle to identify host, pathogen, and favorable-environment information that is known or missing; select the best sample to submit for confirmation.

Caution: Do not place wet tissue in a sealed bag for extended storage. Label samples and keep affected and healthy comparison tissue when directed.

Station 4: Nutrient-Deficiency Identification

Look for: Use healthy and stressed plants or photo cards. Students note whether symptoms begin on older or younger leaves, whether discoloration is uniform, interveinal, marginal, striped, or V-shaped, and whether stunting or tissue death is present.

Student practice: Use a symptom key to select a preliminary match; compare the visual hypothesis with field pattern, soil conditions, fertilizer history, roots, and crop stage; propose soil or tissue sampling as a confirmation step.

Caution: Color alone is not confirmation. Weather, roots, pH, compaction, disease, or injury can resemble a nutrient deficiency.

Student Scouting Report

Record	Student Entry
Planting date	
Seed variety	
Field / station and date	
Crop and growth stage	
Overall field or sample pattern	
Exact plant part affected	
Evidence observed	
Identification or classification	
Confidence: high / medium / low	
Alternative explanation	



Recommended confirmation or monitoring step	
Positive observation to share first	

Team Field Report (6 Minutes)

Each team chooses one station finding and gives a 60-second report using this order:

8. Start with one positive observation about the crop or sample.
9. Describe the pattern and specific evidence.
10. State the preliminary identification and confidence level.
11. Name one reasonable alternative cause.
12. Recommend next steps.

Individual Student Opportunity: Provide an additional station, or multiple stations, that students complete independently and without the assistance of their teams. This could be an extension on the same day or next day to demonstrate individual student mastery of scouting knowledge.

Assessment

- Teacher observation of safe tool use, teamwork, and evidence-based reasoning.
- Completed station scouting reports and identification-key use.
- Accuracy in separating observation, preliminary identification, and confirmed diagnosis.
- Team field report that includes evidence and an appropriate next step.

Exit Ticket

- List one characteristic useful for weed identification.
- Name one piece of evidence that helps connect an insect to crop injury.
- Explain the difference between a disease sign and a disease symptom.
- State why a visual nutrient-deficiency symptom should be confirmed with additional evidence.

Enrichment Activities

- Require students to create a dichotomous key for a small set of weeds or insects.
- Have students design a sampling plan that captures field-edge and interior observations.
- Ask students to compare two disorders with similar symptoms and list distinguishing evidence.

Closure (3 Minutes)

Revisit the essential question:

How can a crop scout use field patterns, plant symptoms, and physical evidence to identify possible crop problems and communicate useful next steps?

Potential Extension Activities

- Scout a school land lab, supervised agriculture experience crop, or cooperating farm with permission. Submit a field map, photographs, completed report, and reflection.
- Career Exploration: Interview an agronomist or crop specialist about preparation before a field visit, commonly used tools, sample submission, and communication with growers.



- Sales Practice: Role-play sharing results with a grower. Begin with positives, explain the evidence clearly, ask questions about field history, and recommend confirmation before discussing management options.

Teacher Preparation Notes

- Select identification examples that match local crops and seasonal timing. Use teacher-verified specimens or credible reference cards.
- Prepare at least one healthy comparison sample for disease and nutrient stations.
- Number all specimens and create a separate answer key with evidence-based identification traits.
- Ask about the crop, crop use, hybrid or variety, fertilizer plan, soil-test results, field history, and recent conditions before a field visit.
- Avoid presenting application rates, product choices, or treatment thresholds unless the lesson is led by a qualified instructor using current local guidance and the applicable product label.
- For an outdoor version, establish boundaries, emergency procedures, hydration and weather plans, and expectations for respectful access to the field.

Teacher Reference: Suggested Local Specimen Categories

Choose species and disorders appropriate to the region and season. The categories below are suggestions rather than a required list. Local university and cooperative extension resources would be recommended to select appropriate station materials.

Category	Possible Station Materials
Weeds	One grass, one sedge, two broadleaves, and one seedling-stage example.
Insects	One chewing feeder, one piercing-sucking feeder, one beneficial organism, and one immature life stage.
Diseases	One foliar lesion, one root or crown disorder, one wilt or blight symptom, and one sample with a visible sign when safely available.
Nutrients	Healthy comparison plus examples of older-leaf, younger-leaf, interveinal, marginal, striped, or generalized discoloration patterns.

References & Supporting Resources

- **Penn State Extension.** Agronomic Crops. Provides articles, videos, and additional resource materials related to agronomic crops. www.extension.psu.edu/forage-and-food-crops/agronomic-crops
- **South Dakota State University Extension.** *Field Scouting Basics*. Provides guidance on field scouting for weed, insect, and disease management and emphasizes field history, crop conditions, recordkeeping, pest pressure, and soil and plant nutrient conditions. SDSU Field Scouting Basics [extension....dstate.edu]



This GROWMARK lesson incorporates established crop-scouting and field-diagnostic concepts. The instructional sequence, student activities, scouting stations, reporting exercises, questions, and classroom/field application have been developed for the GROWMARK lesson plan library.