Scouting for insect pests, diseases and weeds of target crops

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African bollworm on pod

African bollworm on pod and damage

Leaf folder in pod and folded leaves

Blue Butterfly larvae on flowers and young pods

White scales on the stem

Maruca damage on flowers

Blister beetles

Pigeon pea flowering

Cow bugs –a sucking bug

Mealybugs

On leaves

On stems

On flowers

Death due to infestation

Clavigralla nymphs

Riptortus spp

Pod bugs

Nezara spp

Pod fly adult

Aphids

Pod fly maggots

Leaf webber

Pod fly pupae

Thrips on florets

Pod borer damage

Maruca damage

Healthy grain

Pod bug damage

Pod fly damage

Outline

- Importance of field scouting
- Definition and objectives
- Effect of biotic and abiotic factors
- Sampling pattern
- Sampling techniques and tools
- Limiting factors
- Time to scout

Introduction

What is scouting/surveillance/monitoring

- Regular visits to a crop field to make visual observations within the farm (growth and development, plant health, any happenings outside the expected) and estimate/measure pest levels

Objectives for scouting (two)

- Short term: to determine the need for control, assess the effectiveness of actions taken
- Long term: to collect information/data that is used to make future predictions and decisions

Introduction

- Scouting is key in a pest management programme
- It relies heavily on the ability to identify pest problems / or situations out of the ordinary which could be taking place in the field 'Hence the necessity of visual observation'
- Reminder: groups of pests that infest crops include fungi, bacteria, viruses, phytoplasmas, insects, mites, parasitic plants, weeds and animals (man included)

BUT

General Impact of Pests – Injury to plants

- Consumption of plant parts
- Chemical toxins, elicitors, and signals
- Physical damage
- Loss of harvest quality
- Cosmetic damage
- Vectoring of pathogens
- Direct contamination

Abiotic factors cause similar effects (altering growth and development of plants)

- Environment (climate/weather changes, temp, RH%, rainfall,)
- Nutrient deficiency (N, P, K, Mg, Ca, B, Mn, Fe, Cu, S,
- Cultural practices(plant debris left on soil, tillage methods, cropping systems,)
- Soil conditions (pH, moisture, OM content,)

Resultant effects of biotic and abiotic factors on plants

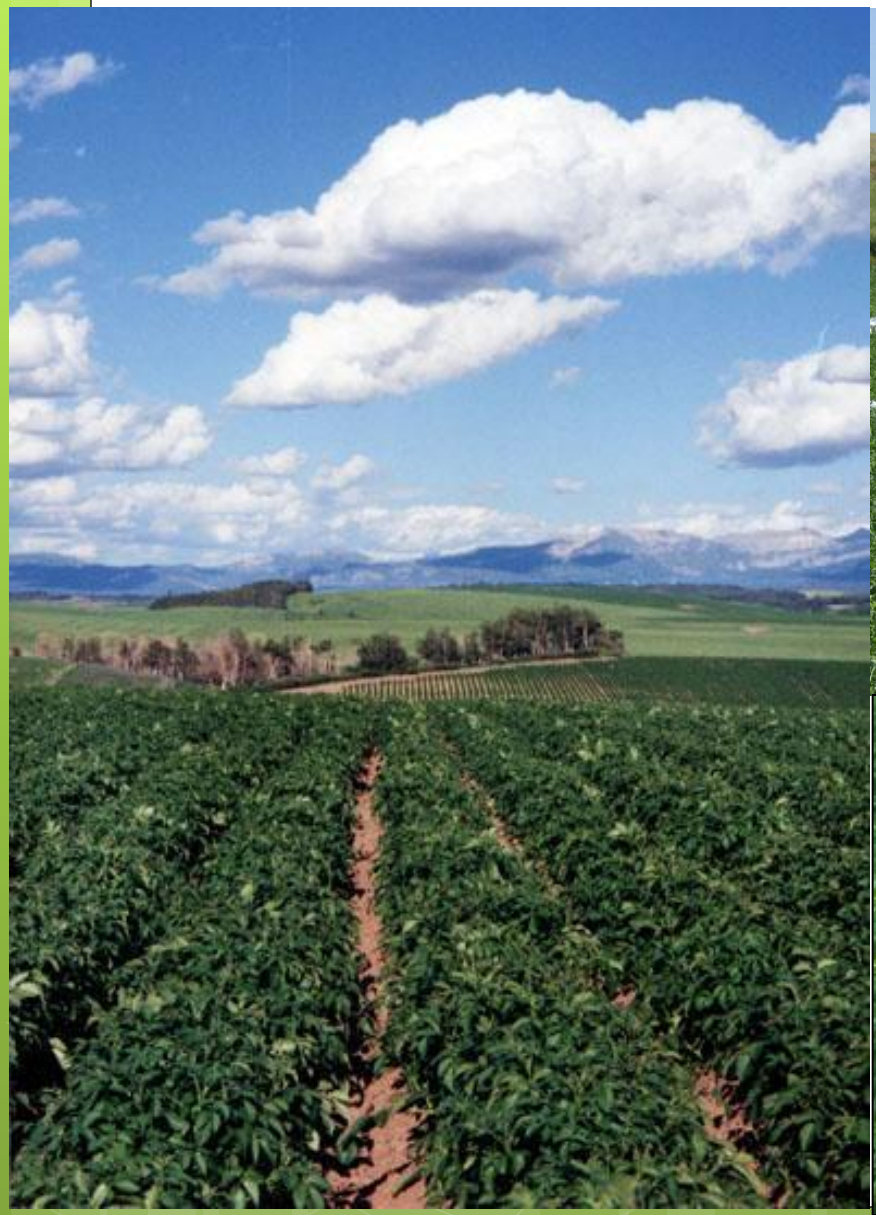
- Colour change
- Change in form and shape
- Growth disturbance
- Premature drop of leaves or fruits
- Appearance of premature ripening
- Localized death of tissue (necrosis, lesions, spots)
- Rots and eventual death

Scouting is meant to help

- Prevent serious plant health problems
- Determine the cause of the problem
- Determine where the problem occurs
- Decide on the most economic al control option
- Provide evidence for the effectiveness of pest management programme followed

Scouting :What is it?

- It involves walking through the field stopping at pre-determined locations and making observations (visual)/sampling
  - To identify yield limiting problems (pests and the damage being caused (accurate)
  - Recording vital information in the field
  - Analyzing the cause of the symptoms and/or damage
  - Making informed decisions for pest management decisions based on the data collected



Scouting :What is it?

Involves looking for physical evidence of :

- damage of insect feeding, symptoms/signs of disease , effect of weeds on crop; e.g Exit holes, frass, webbing, lesions, necrosis, galls, spots, weak crop,
- Or presence of visible insects, fungi/pathogens, weeds
- Or general damages such as oozes of gum, bacteria
- Or other growths on crop/ trees (galling)

How is it done? Techniques

- In the field map out problematic areas and purpose to take samples from those positions but scouting only in the problem areas may give the wrong impression of infestation/infection
- Look at the field and move in a certain pattern to represent the whole farm and stop in the locations for visual observation
- If field is long and narrow: a Zig zag pattern is preferred
- If field is square /rectangular: can use diagnols or ‘M’/’W’/’U’ shapes
- Can also use transect or stepwise movement to pick representative samples

Remember: Scouting techniques vary with the pests involved/ stage of development AND Early detection of problem is key

At the locations

- Make counts/estimates to determine infestation rate, pest and degree of infestation/severity
- Make notes on crop and environmental information
- Collect samples for identification

Sampling techniques

- Shake and beat method on white sheet or container that would enable one to observe and count
- Knock down (spray plant and collect all insects that fall
- Bait station e.g germinate grain and place them in soil to attract larvae (grubs, wireworms) and beetles,
- Mites : brush off from leaves
- Make observations of symptoms and pick samples , preserve and take to lab for identification
- For weeds count the numbers per given area ($0.5m^2$ or $1m^2$) and identify species

Sampling tools

- Sweep nets
- Traps (various)-sticky, coloured, light, pheromone
- Khaki paper bags
- Plastic polythene tubes

Sweep net sampling for insects
Photo credit: Norman E. Rees

Yellow and blue traps for adult flying insects

Pheromone trap for trapping adult insects, specific to insect and sex

Pheromone trap in a pigeon pea crop

Sample Data Sheet											
Date	**Field #**	**Time**		**Crop**			**Growth Stage**				
Weather/field observations:											
Plant #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total**
Pest 1 *[Name]*											
Larvae											
Adults											
Parasite/Predator *[Beneficial Insect Name]*											
Parasite/Predator *[Beneficial Insect Name]*											
Parasite/Predator *[Beneficial Insect Name]*											
Notes:											
Plant #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total**
Pest 2 [Name]											
Larvae											
Adults											
Parasite/Predator *[Beneficial Insect Name]*											
Parasite/Predator *[Beneficial Insect Name]*											
Parasite/Predator *[Beneficial Insect Name]*											
Notes:											

Record keeping sample data sheet

Influencing factors

- Timing when the sampling is done
- pest involved and its development
- Weather changes
- cultural practices

How often should it be done?

- For most pests and diseases it is weekly to provide early warning of problem and allow for making decisions for action
- For most pests it is weekly and season long because various pests attack at different times during the growing period
- Also gives a field record that can be used for early warning of pest problems

Management decisions are based on scouting results

- Pests present
- Pest numbers/population observed
- Is the population increasing or not?
- The damage taking place
- Is it acceptable or not?
- Effect of abiotic factors (weather patterns) on the pests
- Presence of the natural enemies and the effect/impact on the pest population

Choices of management to be made are:

1.Take no action

Take action only when crop is threatened

2. Reduce crop susceptibility

3. Reduce the abundance of the pest/disease

4. Combine reduction of crop susceptibility and reduction of the pest population /inoculum

Examples of insects

- Aphids: weekly field checks after planting, check hot spots along the margins, use traps(yellow water traps to determine flight activity
- Thrips : weekly field checks to observe population dynamics, sample 5 plants/ leaves or flowers and bag to count the numbers
- Whiteflies: weekly checks, use sticky traps , inspect leaves underneath and estimate nymph numbers

Diseases

- Blight/virus diseases

Weekly checks in the field, mark 5-10 randomly selected plants per location and estimate the disease progression. Use a scale (1-9) based on the percent area of leaf/plant affected to estimate and record the disease or the increase in infection within the field (severity)

- RKNs can also be done on a monthly basis in random spots within the problematic and non problematic areas and record the numbers
- but can also uproot plants (destructive sampling) and carry to lab and process the roots to count the numbers

Weeds

- Every two weeks or pre- determined time periods, using a quadrat of known measurements. One is able to count the number of weeds in the area and the species within identified , the plants can be dried and preserved for identification if unknown

- The quadrats are thrown in random locations to get representative samples for the field

THANK YOU