Scouting for insect pests, diseases and weeds of target crops

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African bollworm on pod

African bollworm on pod and damage

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Leaf folder in pod and folded leaves

Blue Butterfly larvae on flowers and young pods

White scales on the stem

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Maruca damage on flowers

Blister beetles

Pigeon pea flowering

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Cow bugs –a sucking bug

Mealybugs

On leaves

On stems

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On flowers

Death due to infestation

Clavigralla nymphs

Riptortus spp

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Pod bugs

Nezara spp

Pod fly adult

Aphids

Pod fly maggots

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Leaf webber

Pod fly pupae

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Thrips on florets

Maruca damage

Pod borer damage

Healthy grain

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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

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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

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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

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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

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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,)

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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

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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

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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

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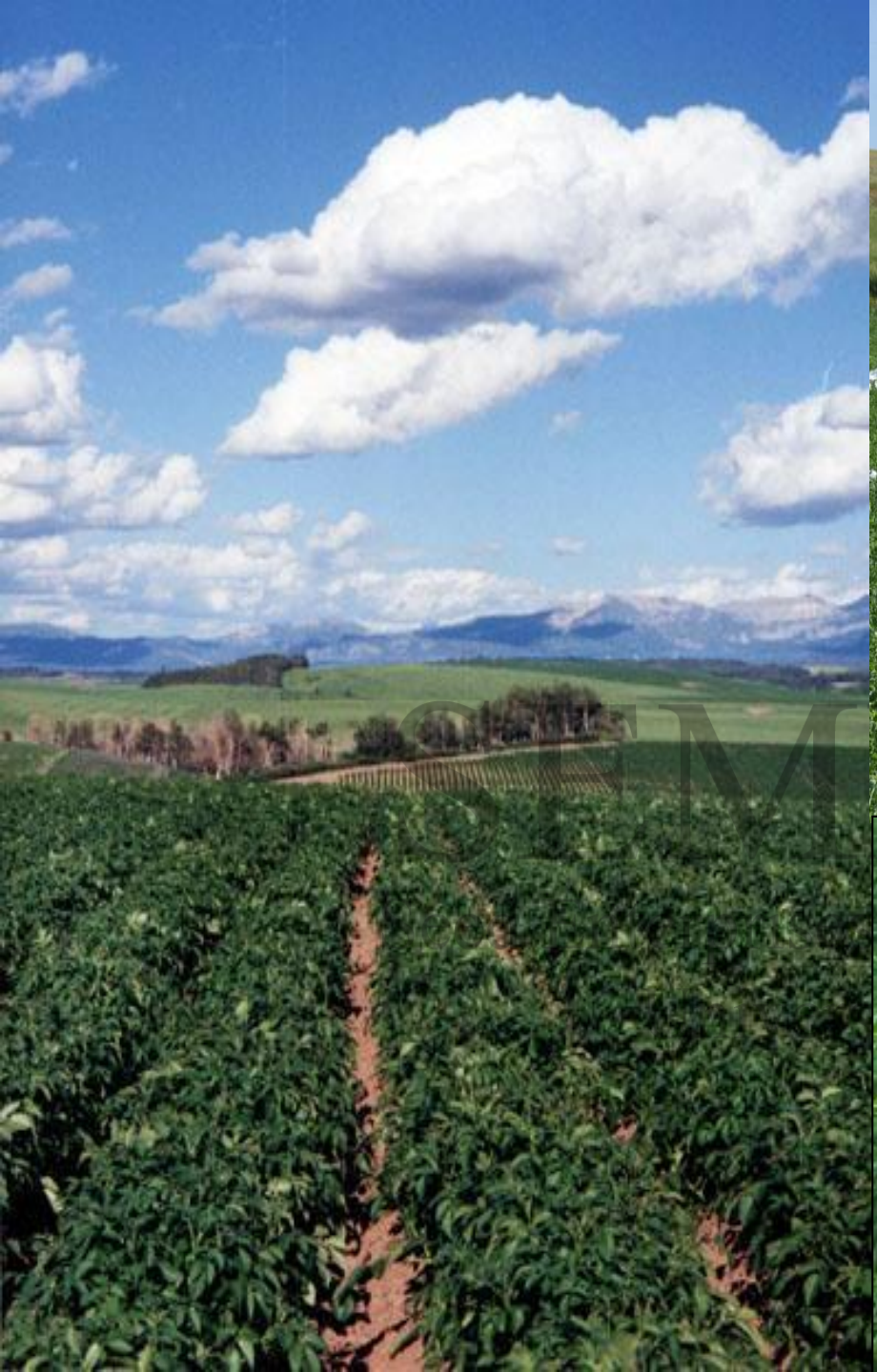

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Scouting :What is it?

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)

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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

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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

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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

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Sampling tools

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

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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

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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

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Influencing factors

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

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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

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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

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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

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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

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- 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

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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

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