

Disease Assessment

Critical information in the assessment of disease is the amount of disease that is present. This can be measured as the proportion of a plant community that is diseased (disease incidence) or as the proportion of plant area that is affected (disease severity). Often, disease has to exceed a certain threshold before it reduces the yield of a crop, but it is usually difficult to accurately estimate the yield reduction caused by a specific disease. For example, many diseases occur on senescing tissue that would not have contributed to the yield anyway. Easier diseases to assess are those that kill whole trees in orchards or plantations, and those that destroy the actual harvested product, such as fruit or grain.

Measurement of disease/pathogens is fundamental to crop loss studies, disease prediction, and development of disease management strategies.

Objectives for Disease Measurement:

1. To relate epidemic development to climate
2. To assess cultivar susceptibility
3. To evaluate chemical efficacy
4. To relate pathogen development to physiological and biochemical responses to infection
5. To determine disease to amount of yield loss
6. To determine disease to crop growth
7. To assess regional/national/global significance of disease

Disease measurement methods

Direct

- Descriptive keys
- Standard area diagrams
- Percentage scale vs ratings

Indirect

- Spores
- Incidence/severity relationship

Remote (also indirect)

- Infra-red reflectance
- Visual reflectance

Yield loss: The yield loss is the difference between attainable yield and actual yield.

Incidence: The incidence of the disease i.e. the number or proportion of plant units that are diseased (i.e. the number or proportion of plants, leaves, stems and fruit that show any symptoms) in relation to the total number of units examined.

$$\text{Disease incidence} = \frac{\text{No. of infected plants}}{\text{Total no. of plant assessed}} \times 100$$

If: Number of infected plants = 20, Total number of plant assessed =50

Then, Disease incidence = **40%**

Disease Severity:

The proportion of area or amount of plant tissue that is diseased and is usually expressed as a percentage or proportion of plant area or fruit volume destroyed by a pathogen.

$$\text{Disease severity or Infection index} = \frac{\text{Sum of all disease rating}}{\text{Total no. of rating x Maximum disease grade}} \times 100$$

Severity scale

0: No disease on leaf and pods

1: Small brown spot covering <1% leaf area (pin point spots on pod)

3: Brown sunken spots 1-10% leaf area (< 1% pod area)

5: Brown spots 11-25% leaf area (1-10% pod areas)

7: Circular brown sunken spots 26-50% leaf area (11-25% pod area)

9: Circular to irregular >51% leaf area (>26% pod area)

Disease grade	Total rating	No. of ratings
0	5	0
1	5	5
3	8	24
5	4	20
7	8	56
9	4	36
	34	141

Sum of all ratings = 141; Total ratings = 34; Max. disease grade = 9

Disease Severity = { 141/ 34 x 9 } X 100 = **46%**