

DIAGNOSIS

DISEASES, INSECTS, AND OTHER PESTS

May, 1984

Insect and disease problems are so numerous and varied that these guidelines for diagnosis can only provide a very general outline for the type of observations that may be helpful. More specific diagnostic aids (by crop and by ecological zone) must also be used. Often it will be necessary to refer particular problems to specialists.

1. RECOGNITION OF DAMAGE FROM DISEASES, INSECTS, AND OTHER PESTS

(This will require special materials, such as the CIMMYT pocket guides to wheat and maize diseases, diagnostic guides used in Maize Training for insect and other damage, etc. The diagnosis concerns both field and storage losses.)

2. ENVIRONMENTAL CONDITIONS RELATED TO INCIDENCE

Researchers should review what is known about the environmental conditions that influence the incidence of the important diseases or insects that occur in the research area. In addition, they should review secondary data and take field observations. Finally, conversations with farmers may also provide clues regarding causality of pest or disease problems.

Questions and Observations

- Review secondary data on rainfall, humidity, temperature.
- Examine area for alternate hosts for diseases.
- Examine area for alternate food sources for insects and other pests.
- Ask about farmer's experience regarding severity of disease or insect attack by season, year, field.

3. LOSS ASSESSMENT

- Try to determine the degree of yield loss due to the insect(s) or disease(s) identified.
- Try to determine the frequency with which these losses occur; is it every year, every third year, etc.?

(We will need to develop more precise questions on this)

4. MANAGEMENT FACTORS

The management of the crop may influence the occurrence of various diseases and insects. The exact relationships will depend on the disease or insect in question, and the following list is only a reminder of various areas of crop management which may be important.

Questions and Observations

a) Seed

The source of the seed may be an important factor in the transmission of disease. Seed storage itself may be a serious problem. Local varieties may have different susceptibilities to disease or insect attack.

- Is farmer's choice of variety affected by susceptibility to particular diseases or insects?
- How is seed stored? What kind of damage occurs during storage - insects, rodents, fungus?
- Are common diseases in the area transmitted by seed? What is farmer's source of seed?

b) Rotations

Incidence of disease or insects may be influenced by rotation patterns. Diseases and insects may build up in fields continuously under the same crop; rotations with other crops may help break this pattern. Dry fallows may serve to control nematodes. Termite attack may be more severe in fields with less organic matter.

- What is the rotation pattern? Is the crop preceded by the same crop, different one, weedy fallow, clean fallow, dry fallow, etc.?
- How does the fallow or rotation pattern affect the amount of organic matter in the soil?

c) Land preparation

The burning of crop residues and weeds sometimes helps control certain insects or diseases. Burying residues may have an effect as well. Ploughing may bury or expose insects. Reduced tillage usually results in a mulch cover. At times this cover may discourage insects, at other times it may be a source of increased incidence.

- Are crop residues and/or weeds burned before planting?
- Are residues or weeds plowed under before planting?
- Is minimum or zero tillage practiced? What is the type and amount of mulch or trash that is left on the field?

d) Planting

Time of planting is very important with respect to disease and insect attack. Often late planted crops are more susceptible to attack,

but in other cases late planting may be better.

- How variable is the time of planting, and how does planting date affect disease or insect incidence?
- How often is there insect, bird or rodent attack at planting time? How often does this occasion a replanting.

e) Spacing

Plant spacing can affect disease and insect problems. In certain instances densely sown crops are more susceptible to attack. In other cases diseases may be less common in densely sown fields and insect predators may be more efficient in these cases as well.

- What is the effective density of the crop? How does spacing interact with disease or pest incidence?
- Is intercropping practiced? How much diversity is there in the field?

f) Crop nutrition

Sometimes crops suffering from moisture or nutrient stress may be more susceptible to diseases, insects, or other pests. At other times, attacks are more frequent in healthier plants (although the attacks may not necessarily offset the yield advantage of well-nourished plants).

In some cases disease incidence is related to soil pH, which may in turn be influenced by type of fertilizer.

- Is there evidence that low moisture or fertility may be making the crop more/less susceptible to insect or disease attack?
- Is there any evidence that the pH may be a contributing factor to disease problems?

g) Moisture

Both humidity and soil moisture conditions have important roles in the spread of many diseases. Poor drainage can increase the incidence of certain diseases. Irrigation practices (time of day, number of irrigations, timing) can also be important. The crop canopy can help conserve soil moisture and may be a factor as well.

- Are there any drainage problems in the field?
- What are irrigation practices? When in the crop cycle, what time of day is irrigation done, amount of water applied?
- Does the crop canopy serve to increase soil moisture?

5. FARMER'S CONTROL METHODS

It is essential that researchers understand the various methods that farmers use for controlling diseases, insects and other pests.

Questions and Observations

- Does the farmer make conscious management decisions (choice of variety, time of planting, rotations, etc.) in order to control diseases or insects?
- Is there any rouging or selection of affected plants or seed?
- What chemical control methods are used for insects or diseases in

the field? What products are used, amounts, timing? What is the source of the chemicals?

- What methods are used to discourage other pests (bird scaring, animal traps, etc.)?
- What storage practices are used to discourage insect and other pest damage?