## INVESTIGATION OF GROWTH PROBLEMS

When plant symptoms indicate that growth and development of plants are less than optimal, such symptoms may be caused by stem or root problems. The “entire”plant should be checked when trying to determine the probable cause of a problem, if it is not immediately obvious.

It is also most important to know the previous history of the specific land (even of adjacent lands; for example, herbicides may drift from one land to another or diseases or insect pests may move to the new crop), because the problem may have originated in a former planting. Investigations into such points as the identity of the previous crop, whether it showed similar symptoms, what cultural practices (e.g. herbicides) were applied and what the climatic conditions were like shortly before the problem appeared, will frequently point to the cause of the problem.

Where the problem is limited to only one portion of the planting, one should consider poor drainage, soil differences, possible obstructions in the fertilizer applicator or other factors possibly attributable to cultural practices or conditions. Where the problem is general over the entire land, then the possibility of infected seed, past history and unfavourable weather conditions are more likely causes. The solution to the problem is not always obvious, but a thorough investigation should be carried out to provide possible explanations.

Should some action be decided upon, such as spraying for a suspected nutrient deficiency, an untreated control strip should be left to see whether or not the action taken solves the problem. This is most important in drawing correct conclusions, because problems may correct themselves in time with changes in environmental conditions.
The following points may be of assistance in finding solutions to the problem:

- **DISCOLOURATION OF FOLIAGE (USUALLY YELLOWING)**

  — **Young leaves**

| | | |
|---|---|---|
| Nutrient deficiencies | - | iron, manganese and zinc usually cause a yellow mottle between the leaf veins<br>sulphur causes more uniform yellowing of the entire leaf |
| Partial drowning | - | cause is root dieback due to lack of oxygen |
| Root or stem rots | - | especially in wet soils |
| Excessive fertilizer | - | over fertilization or placing the fertilizer too close to the seed or plant, causing root damage, especially with nitrogen, sometimes potassium |
| Herbicide damage | - | including drift from adjacent lands |
| Low temperatures | - | especially low soil temperatures, which restrict root activity |
| Pests | - | for example, red spider mites, other mites, aphids |
| Diseases | - | especially those affecting the foliage |

— **Mature leaves**

| | | |
|---|---|---|
| Nutrient deficiencies | - | magnesium, nitrogen, phosphorus and potash, which may later affect younger leaves as well |
| Toxicities | - | excess sodium, boron, chlorides |
| Herbicide damage | - | |
| Long periods of cloudy weather | - | |
| Brak or salinity problems | - | soil and/or irrigation water |
| Drought | - | |
| Nematodes | - | |
| Root and stem rots | - | |
| Foliage diseases | - | |
| Pests | - | for example mites, aphids |

- **MARKS ON THE LEAVES**

— **Young leaves, margins**

Drought

Excessively high temperature

Strong winds

Chemical spray damage

Root and stem rots

— **Mature leaves, margins**

Drought

High temperature

Strong winds

Build up of salts (brak) in the soil

Toxicities - especially boron, sodium, chlorides

— **Leaves, general**

Leaf diseases

Chemical spray damage

Sunscald - particularly after periods of cloudy weather

Nutrient deficiencies - e.g. copper

Sodium toxicity - especially from irrigation water

High or low temperatures

- **POOR GROWTH**

Drought
Partial drowning
High temperatures
Low temperatures
Wind
Alkaline or saline soil condition
Excessively acid soils
Toxicities
Nutrient deficiencies
Pests - especially nematodes
Diseases - especially root or stem rots

- **ABNORMAL GROWTH**

Nutrient deficiencies - especially molybdenum, boron and calcium
Herbicide damage - especially hormone herbicides
Diseases - especially viruses
Pests - especially mites, aphids

- **SUDDEN DEATH**

Severe brak or saline conditions
Excess fertilizer - especially nitrogen, sometimes potassium, concentrated in the root zone
Sudden, excessively high temperatures
Sudden, cold spells, especially frost
Lightning strike
Herbicide damage
Root and stem disease
Pests - especially root or stem damage, e.g. cutworms, wire worms