irrigation and drainage

7.1 Irrigation

The most limiting factor to all year round food production in the tropics is lack of water in the dry season. This problem is most severe in the arid and semi-arid regions. This problem can be reduced are by conserving as much water in the soil as possible, and irrigation. The irrigation water used must be free of salts, especially those containing sodium.

Irrigation is a method by which water is artificially applied to an area. The methods and manner of application of water include;

- Check basin
- Flooding
- Drip
- Furrow
- Sprinkler
- Border strip
- Center pivot

Conserving soil moisture during the dry season by the use of suitable agronomic practices is most appropriate since irrigation entails high financial investments.

7.2 Drainage

A significant drainage problem is present, when water levels are too high and/or proper leaching of the soils cannot take place. However, some agricultural practices required some form of control of the water table. Drainage involves provision of channels, such as open ditches or drain tile, so that excess water can be removed by surface or internal flow. This also involves losing water by percolation. Drainage becomes a problem also when land use adjustment is not feasible, for example switching to rice crops and range lands

It is necessary to determine a cost effective type of drainage method and system. The main objective of drainage is to lower the moisture content of the upper layers of the soil so that oxygen can be available to the crop roots and carbon dioxide can diffuse from the roots.

Two types of drainage systems are used:

i. Surface drainage (e.g., open ditches)

ii. Subsurface drainage system, (e.g., mole drainage, clay tile)

8.0 Salinity and alkalinity management

Saline and alkaline soils are commonly found in the arid regions. Their use for agricultural purposes requires irrigation water, consequently the management of these soils are extremely important.

For effective management of these soils, the following must be considered:

i. The quality of water, especially in relation to its salt content must be properly examined.

ii. Water high in sodium salts can bring about harmful effects.

iii. Knowledge of the quality of irrigation water is a requisite for good management of saline soils.

Three types of general management practices have been employed, namely

a) Eradication – underdrainage, leaching or flushing.

b) Conversion – conversion of some of the salts to less injurious forms

c) Control – involves keeping the salt so well distributed throughout the soil that there is no toxic concentration within the root zone.

9.0 Nutrient management

9.1 Macronutrients

Management practices should include improving soil conditions that support good plant growth through adequate availability of macronutrients.

- Proper liming
- Adequate fertilizer application and placement
- Proper soil organic matter maintenance

9.2 Micronutrients

Although the characteristics of each micronutrient are quite specific, some generalizations with respect to management practices are possible.

- Soil acidity change – This can be corrected by liming and by appropriate fertilizer addition, since toxicities of iron and manganese are likely to occur in acid soils.

- Soil moisture – Drainage and moisture control can influence micronutrient solubility in soils. Improving the drainage of acid soils can encourage the formation of the oxidized forms of iron and manganese.

Fertilizer applications – Application of some commercial fertilizers is a common management practice to overcome micronutrient deficiencies.