The relationships between relative yield decrease (1 - Ya/Ym) and relative evapotranspiration deficit for the total growing period are shown in the figure below.

This figure shows the relationships between relative yield decrease (1 - Ya/Ym) and relative evapotranspiration deficit for the individual growth periods.

Frequency and depth of irrigation and rain has a pronounced effect on grain yield. Maize appears relatively tolerant to water deficits during the vegetative (1) and ripening (4) periods. Greatest decrease in grain yields is caused by water deficits during the flowering period (2) including tasselling and silking and pollination, due mainly to a reduction in grain number per cob. This effect is less pronounced when in the preceding vegetative period (1) the plant has suffered water deficits. Severe water deficits during the flowering period (2), particularly at the time of silking and pollination, may result in little or no grain yield due to silk drying. Water deficits during the yield formation period (3) may lead to reduced yield due to a reduction in grain size. Water deficit during the ripening period (4) has little effect on grain yield.

The effect of limited water on maize grain yield is considerable and careful control of frequency and depth of irrigation is required to optimize yields under conditions of water shortage. Where water supply is limited it may therefore be advantageous to meet, as far as possible, full water requirements (ETm) so as to achieve near maximum yield from a limited acreage rather than to spread the limited water over a larger acreage.

Maize flourishes on well-drained soils and waterlogging should be avoided, particularly during the flowering (2) and yield formation (3) periods. Waterlogging during flowering (2) can reduce grain yields by 50 percent or more.When evaporative conditions correspond to ETm of 5 to 6 mm/day, soil water depletion up to about 55 percent of available soil water (Sa) has a small effect on yield (p = 0.55). To enhance rapid and deep root growth a somewhat greater depletion during early growth periods can be advantageous. Depletion of 80 percent or more may be allowed during the ripening period.

Although in deep soils the roots may reach a depth of 2 m, the highly branched system is located in the upper 0.8 to 1 m and about 80 percent of the soil water uptake occurs from this depth. Normally 100 percent of the water is taken up from the first 1 to 1.7 m soil depth (D = 1 to 1.7 m). Depth and rate of root growth is, however, greatly affected by rainfall pattern and irrigation practices adopted. In addition to soil water and nutrient status, root development is strongly influenced by textural and structural stratification, salts and water table.To obtain a good stand and rapid root development, the root zone should, where feasible, be wetted at or soon after sowing. Taking into account the level of ETm, to meet full water requirements, the water depletion level is about 40 percent in the establishment period (0), between 55 and 65 percent during periods 1, 2 and 3, and up to 80 percent during the

ripening period (4).Where rainfall is low and irrigation water supply is restricted, irrigation scheduling should be based on avoiding water deficits during the flowering period (2) followed by yield formation period (3). When a severe water deficit during the flowering period (2) is unavoidable, water may be saved by reducing supply during the vegetative period (1) as well as during the yield formation period (3) without incurring additional yield losses.Under conditions of marginal rainfall and limited irrigation water supply, the number of possible irrigation applications may vary between 2 and 5. A suggested timing of these irrigation applications is given below. To obtain a good stand and proper root development, the potential root zone should be wet either from rainfall or irrigation prior or soon after sowing.

Under irrigation a good commercial grain yield is 6 to 9 ton/ha (10 to 13 percent moisture). The water utilization efficiency for harvested yield (Ey) for grain varies then between 0.8 and 1.6 kg/m3. ������ ������Thissectionpresents information on water relations and water management of sorghum and provides links to other sources of information.Sorghum (Sorghum bicolor) appears to have been domesticated in Ethiopia about 5000 years ago. Present world production is about 58 million tons grain from 42.6 million ha. (FAOSTAT, 2001).