

**PLANT POPULATION AND GENOTYPE EFFECTS ON
WATER USE EFFICIENCY GROWTH AND DEVELOPMENT
OF CORN IN. THE SEMI - ARID AREA OF MOROCCO**

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INTRODUCTION

Chaouia and Abda are two plains of the semi-arid areas of Morocco. The average rainfall per year is below 400 mm. The wet period is usually December through February. During March and April, rainfall is scarce and spring crops are usually exposed to high temperatures and soil moisture deficits during the reproductive period.

The main crops cultivated in these regions are barley (*Hordeum vulgare* L.), wheat (*Triticum aestivum* L.), (*Zea maize* L.) and some legumes.. Cors is grown in these areas because it is considered by the farmers as a good crop preceding wheat. Also this crop is used for food and feed.

The cultural practices used to grow corn are still traditional ; i.e. use of animal power, no fertilizers, no herbicides or insecticides, and use unimproved varieties. Consequently, the yields obtained are usually low. To insure a good stand and hence some yield, farmers often over-plant and then plants are harvested or thinned at tasseling to reduce the competition for water during the reproductive period if the year is dry. However, plant densities used are different from one farmer to another.

The objective of this study was to determine the effect of plant population on growth, development and water relations of corn, to retermine if thinning of plants at tasseling affects soil moisture during the reproductive period, and to determine if early hybrids can improve the probability for obtaining yield during dry years.

CONCLUSION

We divided the plants, life cycle into three periods :

Period 1 : from planting to the 6th leaf stage.

Period 2 : from the 6th leaf stage to tasseling.

Period 3 : from tasseling to physiological maturity.

During the first period, most water used was by evaporation because plants were very small. The second period corresponded to the period of most vegetative active growth. During this period dry matter accumulation and leaf area/plant increased rapidly. Leaf area index and matter/plant were somewhat increased and decreased as plant population increased, respectively. The third period was the most affected by water stress. During this period evapotranspiration, leaf water potential and leaf transpiration decreased and leaf diffusive resistance increased rapidly, especially at the end of the grain fill period. Moreover, this stress was accentuated by an increase in plant population. Leaves senesced earlier in the case of the highest plant population. However, the reduction of plant population by using a low seeding or by thinning plant at tasseling somewhat decreased this stress. Thinning improved the yields but the low seeding rate did not. Treatment d2 (40,000 plants/ha) can be considered as an optimal plant population.

The earliest hybrids escaped drought because of their short life cycles. These hybrids accumulated more dry matter in the kernels than in the other parts of the plants. One of them (H4) used less water than the relatively late hybrids. However, the early hybrids produced less total dry matter ; consequently, their water use efficiency indices were not different than those of the later hybrids. These early varieties (especially H4) may be better yielding during dry years.