



Assessment of water stress on two varieties of maize during its different development stage in Guinean climate zone of Benin Republic



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SOMMARY: This work aimed at assessing water stress on two varieties of maize during its phenophase in Guinean climate zone of Benin Republic. For this purpose, two maize varieties seeds were considered «EDOUGOTIN» and «QPM» and planted on 25th August in pot experiment. Experiment is carried out in a screen-house at the Research Station of International Institute of Tropical Agriculture (IITA/Benin) in Abomey-Calavi. Pots were filled with 10kg of the soil each and were arranged in completely randomized design as a 4×5×3 factorial experiment. Water stress at four phenological stage was applied on two varieties. Each of the treatments experienced a 10 days' dry spell at their respective phenological stages but the No water stress experienced a total of 0 day. Significant difference was observed in growth parameters among the treatments ($p < 0.05$). It was discovered that water stress was not affected parameters of the two varieties in the same way during different phenology stage. The most sensitive stage of maize to water stress are reproductive and grain filling stage.

Keys words: Water stress, maize, development stage, Benin

INTRODUCTION: In Benin maize takes up to 30% of the harvesting, it is the third crop in terms of quantity produced, up to 11.2% of total agricultural production by volume. Indeed, 79.56% of the produced maize is market oriented, against only 20.44% for the household self-consumption (Yabi *et al.*, 2012). Unfortunately, in recent years with climate change, occasional drought stress affects approximately 40% of Africa's maize-growing areas and yield losses of 10-25% were measured. Approximately 25% of the maize suffers frequent drought, with harvest losses of up to 50% (VIB, 2017). Most cereals as maize are not irrigated but depending on rainfall. (Warner *et al.*, 2015). To face this challenge, which affect gradually the agriculture of Benin Republic and the income of farmers, this study was initiated to investigate the effect of water stress at different phenological growth stage on the growth of maize varieties.

METHODS:

Experimental design and treatment: The pots were filled with 10 kg of the soil each and were arranged in completely randomized design as a 4×5×3 factorial experiment. Each of the treatments experienced a 10days dry spell at their respective phenological stage but for the no stress experienced a total of 0 day. The quantity of water supplied was calculated on the basis described in FAO irrigation and drainage paper 56 (FAO, 2006). Evapotranspiration data for a period of thirty years

Site: IITA-Benin in screen-house

Maize varieties: QPM and EDOUGOTIN

Planting day: August 25, 2019

Soil analysis: Before planting, soil is collected from field at 0-20 cm soil depths at IITA and analysed. Détermination of availability P, Total N, K, Ca; Mg; soil pH; Organic carbon; Extractable P; exchangeable bases; NO₃⁻; NH₄⁺ concentrations; Bulk density; soil water content at wilting point, field capacity and saturation point.

Agronomy data collection and measurement : crop growth data, crop root data, leaf area measurement.

RESULTS: Significant difference was observed in growth parameters among the treatments ($p < 0.05$). It was discovered that water stress was not affected parameters of the two varieties in the same way during different phenology stage. The most sensitive stage of maize to water stress are reproductive and grain filling stage.

Data analysis

The data collected were subjected to analysis of variance (ANOVA) using GENSTAT 4th Edition, 2017. Significantly, different means were separated using the least significant difference (LSD) test at 5 % level of probability.