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MOISTURE DYNAMICS FOR A SLOPY SOIL UNDER MAIZE, BETWEEN 2006 AND 2008 AND ITS INFLUENCE ON SOIL EROSION

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Key words: *biometric measurements, soil loss, cover degree*

ABSTRACT

The research was carried out in Slanic catchment, Buzau county on agricultural lands used in two systems of use: fruit tree plantation in pasture system and arable land with different crops and slope categories (15%-20%). Soil moisture dynamics was monitored by taking soil samples in the growing season every fifteen days. The data from the measurements were corroborated with the values of the main soil hydro-physical indices which helped to determine soil water supply.

INTRODUCTION

This paper presents both biometric data and the antierosional protection degree given to soil under maize.

During the study period the following were monitored: dynamics of annual precipitations, the amount of surface flow (mm), soil loss (t/ha), cover degree and plant growth.

MATERIAL AND METHODS

There are 12 control parcels in the station (figure 1) sited in 2 arrays: the first comprises 6 parcels, each with a surface of 100 square metres (25 m x 4 m) and a slope of 20%; the second comprises 6 parcels, each with a surface of 40 square metres (10 m x 4 m) and a slope of 15%.

Fig. 1. Soil Erosion Control Station, Valea cu Drum catchment, Aldeni-Buzau

The data regarding maize plant growth (figure 2, 3) were given by randomly measuring plants in the control parcels, in growing stages, in two repetitions (upper and lower third of each parcel).

The influence of crop on soil erosion is highlighted by the amount of surface flow and the amount of soil washed off by torrential rains on control parcels, fitted with intake devices downstream.

Fig. 2. Parcel cultivated with maize at first growing stages, 2007

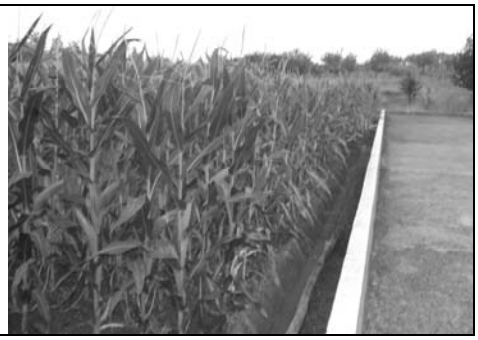

Fig. 3. Maize crop parcel V6, 2008

RESULTS AND DISCUSSIONS

The analysis of total average precipitation values in the study period highlight a decrease in 2007 by 40.5% compared to 2006 and by 68.6% in 2008 compared to 2006. The influence of soil moisture, given as water storage (mm), on plant growth for maize cultivated on parcels with different slopes (15% and 20%), was monitored each year during the study period.

In the 15% slope parcel (figure 4), the highest precipitation and water storage values were recorded in July on the 0-40 cm depth. In comparison to July, soil water storage decreased by 70.2%, but precipitations increased by 90.1 mm

In the 20% slope parcel (figure 5) the highest amount of soil water was recorded in August, 7.9 mm higher that the value recorded on the 15% slope parcel, but plant height was 21 cm smaller.

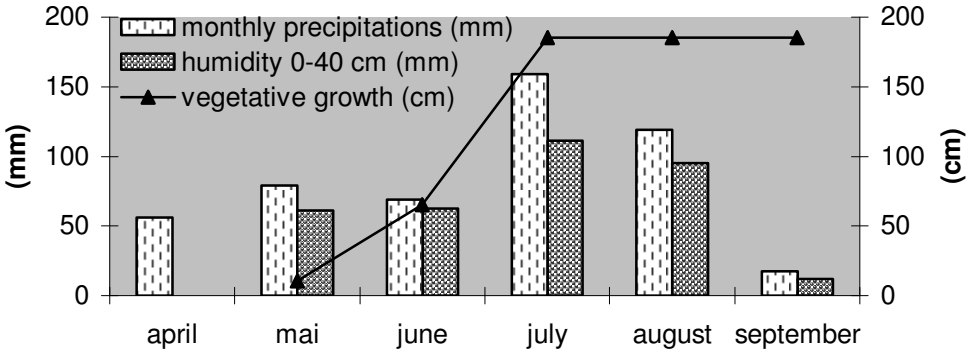

Fig. 4. Dynamics of monthly precipitations, soil moisture and plant growth on 15% slope parcels in 2006

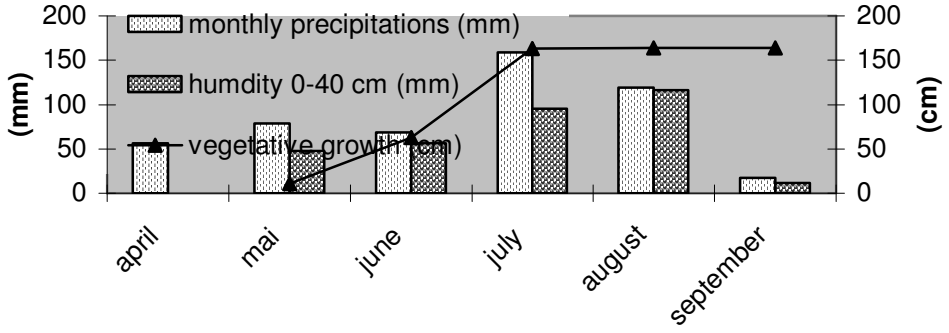

Fig. 5. Dynamics of monthly precipitations, soil moisture and plant growth on 20% slope parcels in 2006

In the 15% slope parcel (figure 6) the highest soil moisture was recorded in August when there was the largest rainfall. In comparison with the previous year, soil moisture is 19.7 mm lower in August and 75.4 lower in July. The recorded decrease influenced plant growth in such a way that plant height was of 125.1 cm in August.

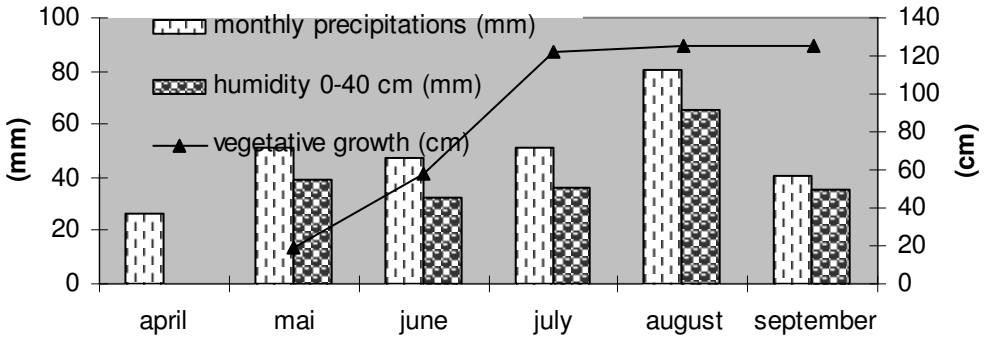

Fig. 6. Dynamics of mean monthly precipitations, soil moisture in the first 40 cm and maize plant growth on 15% slope parcels in 2007

In the 20% slope parcel (figure 7) plant height was approximately uniform in July, August and September and by 16.8 cm smaller than that of plants in the 15% slope parcel, even if soil moisture was almost the same.

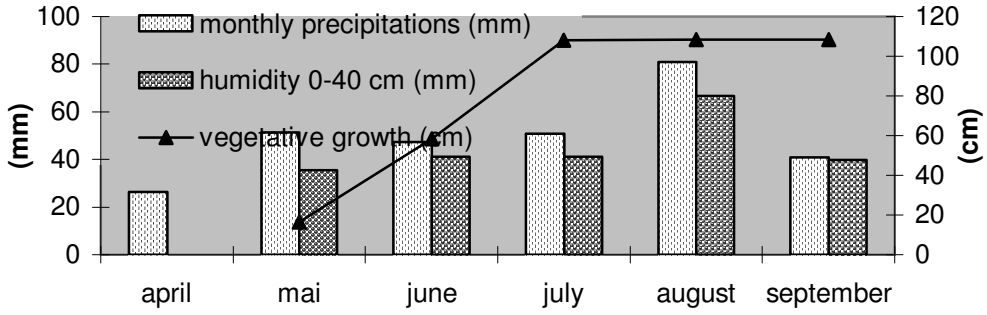

Fig. 7. Dynamics of mean monthly precipitations, soil moisture in the first 40 cm and maize plant growth on 20% slope parcels in 2007

In 2008 maize was sown in the parcel V6, following winter wheat and it began to emerge on May 14th.

In the 15% slope parcel (figure 8) the lowest soil moisture value was recorded in May, when there was the largest amount of water from precipitations. August was very scarce in moisture because there was only 1.4 mm water from precipitation. Despite that the maximum maize plant height was of 223 cm.

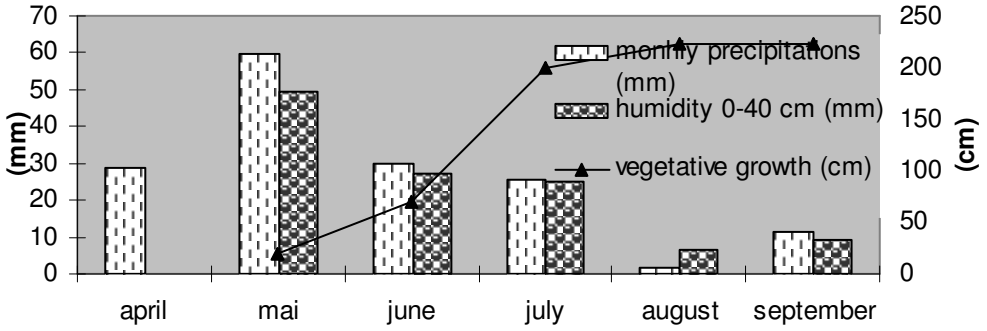

Fig. 8. Dynamics of mean monthly precipitations, soil moisture in the first 40 cm and maize plant growth on 15% slope parcels in 2008

The same goes for the 20% slope parcel (figure 9) with a 45 cm difference in plant height.

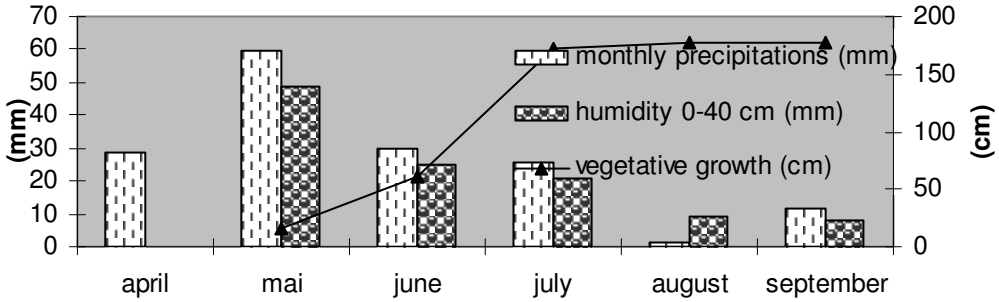

Fig. 9. Dynamics of mean monthly precipitations, soil moisture in the first 40 cm and maize plant growth on 20% slope parcels in 2008

CONCLUSIONS

1. The difference in height between the plants cultivated on 15% slope and 20% slope parcels was of 21.3 cm.
2. Under total precipitations of approximately 300 mm in the growing season, recorded in 2007, the water storage in the first 40 cm of soil wasn't over 70 mm.
3. The amount of water stored in soil in the beginning of the growing season has a decisive role on the evolution of corn plants, even if August and September are dry.

4. Between 2006 and 2008 on the parcels cultivated with corn, water loss was much lower than water amount stored in soil.

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