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Modification of heat- and water balance components of maize damaged by hail

A. Anda

Veszprem University Keszthely Hungary

E-mail: anda-aeorgikon.hu / Phone: 36-83-545-149

Influence of simulated mechanical injury on some heat and water balance components of maize was investigated at Keszthely, Hungary in the seasons between 1998 and 2002. In June 1998 observations were carried out after a natural hailstorm, while later on hail mechanical damage was simulated by hitting the leaves parallel with the leaf veins with a piece of wood from which nails protruded in a 2×2 cm pattern. Some of the plants were grown in lysimeter growing chambers ("Ad libitum" watering level). In addition to evapotranspiration, measurement was also made on the canopy temperature in the midday hours each day after the damage. In some cases after canopy closure, the extinction coefficient determinations were also included in the data collected on the plant architecture. At the end of the vegetation period the extent of the damage was also characterised as yield loss in the stand exposed to simulated hail injury.

The leaf lacerating did not influence the yearly sum of evapotranspiration. The effect of leaf laceration on the water loss of injured plants has changed from day to day. The modification in evapotranspiration and plant temperature after natural and artificial hail injury were similar in nature. On the days immediately following the damage the raised plant temperature, or “feverish” state caused by the wounds indicated a reduction in evapotranspiration leading to less efficient plant cooling. Later on changes in evapotranspiration always depended on the actual weather (radiation, wind and humidity). Consequently, changes in the evapotranspiration due to hail can only be analysed against the background of the weather during the vegetation period.

All the same the leaf laceration did not decrease the size of assimilatory surface of treated plants, the leaf angles changed significantly, what was reflected as the modification in extinction coefficient of injured plant.

The laceration of the leaves provided a good simulation of hail injury not only visually,

but also as regards trends in the physiological processes of the plants. The extent of yield loss was always less than 10 %, in agreement with data in the literature on the effect of simulated hail injury.