ENHANCEMENT OF MANGOSTEEN WATER RELATIONS

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Introduction

one of the most factors determining the establishment and productivity of crop plants is water deficit, which might elicit several morphological, physiological and biochemical modifications (Hsiao, 1973). Transplants of different crops often subjected after transplanting to period of dehydration. Particularly under field conditions (Aloni et al. 1991). It is quite often that under conditions of high evaporative demand and shortage of rain or supplementary irrigation to observe symptoms of wilting and growth retardation following transplanting. The recovery of seedlings from the transplanting shock depends largely upon the prevailing conditions and the ability of the crop to resume growth under such conditions. Mangosteen is well known that has a slow rate of growth and has a very long juvenile growth phase. Not much work regarding this promising crop. The present study investigated the effects of hydrogel, abcisic acid (ABA) and methanol foliar application in enhancing the growth and water relations of mangosteen seedlings under water deficit conditions.

Materials and Methods

Uniform seedlings of mangosteen were selected and transplanted in clay pots containing 25 kg of soil mixture. The experiment was performed in a randomised complete block design with four replications. The plants were irrigated to the pot capacity for 15 days after which they were divided into two groups. Control plants were irrigated to the pot capacity throughout the experimental period. Stress treatment applied by withholding irrigation for 10 days. Part of the stressed plants received daily spray with ABA or methanol until run-off and the third part remained without spraying. Another group of plants received 100 g of hydrogel at the course of transplanting and the beginning of the treatment received no irrigation for 10 days. Gas exchange data, elongation of leaf and vegetative growth were recorded throughout the experimental period which last 3 months later at a 7-day interval.

Results and Discussion

The data obtained showed that water deficit resulted in decrease in stomatal conductance, photosynthetic rate and leaf water potential of all stressed plants regardless of the treatment applied. This decrease was found as early as day 3 after water was withheld from the plant. After 7 days of drought no effect could be detected in leaf area, plant height, leaf number, or plant fresh weight between all stressed treatments. Similar findings were reported (Mohd Razi et al.1994, Mohd Razi and Awang, 1992). However, when the drought period prolonged as in day 10, leaf elongation rate, formation of new leaves, plant fresh weight was shown to be affected as compared with that of control. These data indicated that the early effect of stress appeared to be in stomatal conductance and photosynthetic rate which in turn affect the amount of assimilate production required for growth and development of the leaves. After re-watering plants recovered their gas exchange components at slow rate. ABA treated plants showed low stomatal conductance values but at did not accompanied with similar reduction in photosynthetic rate as compared with that of methanol or hydrogel treated plants. These results were in agreement with (Bradford and Hsiao, 1982; Razi and Davies 1997). Death of seedlings was observed in water stress and hydrogel treated plants, while those received ABA application no death was observed among the seedlings. The stressed plants leaves initially showed symptoms of leaf tip firing creeping inwards towards the midrib and the leaf drop. At the end of drought cycle 3 all water stressed plants except that treated with ABA and to some extent methanol treated plants shed their leaves as a consequence there were high significant differences between control and stress plants in fresh weight, dry weight and effective plant leaf area. This was probably due to tissue dehydration. However, ABA treatments promoted the water relation of the plants, similar results were obtained by Rashke (1975).

Conclusions

The findings presented in this study revealed that mangosteen trees were very sensitive to water deficit. The growth and development of mangosteen seedlings were severely affected. Using ABA as a foliar spray at a rate of 50ppm proof to reduce the mortality rate under the conditions of this experiment and ameliorate the internal water status of the plants grown under water deficit conditions.

Contact author for references cited in the text.

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