

EFFECTS OF WATER DEFICIT ON α -TOCOPHEROL,
ASCORBIC ACID AND CAROTENOID CONTENT

in *Zea mays*

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FACULTY SCIENCE DAN TEKNOLOGI
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**EFFECTS OF WATER DEFICIT ON THE α -TOCOPHEROL, ASCORBIC
ACID AND CAROTENOID CONTENT IN *Zea mays***

By

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the requirements for the award of the degree of
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PROJEK PENYELIDIKAN I DAN II**

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk:
Effects of Water Deficit on α -Tocopherol, Ascorbic Acid and Carotenoid Content in
Zea mays oleh Siti Zuliha Binti Hassan, No. Matrik: UK 11766
telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini
dikemukakan kepada Jabatan Sains Biologi sebagai memenuhi sebahagian daripada
keperluan memperoleh Ijazah Sarjana Muda Sains (Sains Biologi), Fakulti Sains dan
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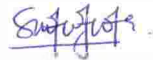
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DECLARATION

I hereby declare that this project report entitled **Effects of Water Deficit on α -Tocopherol, Ascorbic Acid and Carotenoid Content in *Zea mays*** is the result of my own research except as cited in the references.

Signature : 
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Date : 11/05/08

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ABSTRACT

Tolerability of *Zea mays* to water stress was observed through non-enzymatic antioxidants concentration produced in order to continue sustainable of its species. The aim of this experiment was to study the effects of different water volumes on the non-enzymatic antioxidants α -tocopherol, ascorbic acid and carotenoid production in maize. *Zea mays* were treated with 0, 20, 40, 60, 80 and 100 ml of water for 11 days of treatment period. α -Tocopherol, ascorbic acid and carotenoid contents were assessed at 0, 1, 2, 3, 5, 7 and 11 days of treatment periods. No significant differences ($p>0.05$) were observed in α -tocopherol concentrations between treated and untreated plants up to 3 days of treatment with plants treated under 0 ml of water produced to maximum level of α -tocopherol. Longer treatment periods significantly ($p<0.05$) lowered the α -tocopherol concentrations, especially in plants treated with 80 and 60 ml of water. Ascorbic acid concentrations increased significantly ($p<0.05$) in all plants up to 1 day of treatment especially in plant treated with 40 ml of water. Ascorbic acid production in untreated plants significantly ($p<0.05$) increased up to 5 days of treatment and decreased significantly ($p<0.05$) at the later stages of treatment. The ascorbic acid concentration in all treated plants decreased significantly ($p<0.05$) afterward except for plants treated with 20ml of water. Water stress significantly ($p<0.05$) induced the carotenoid concentrations in maize up to 2 days of treatment. The maximum production of carotenoid was observed in plant treated with 80 ml of water. However, no significant differences ($p>0.05$) was observed in other treatments compared to control. Results indicated that water stress managed to induce oxidative stress in *Zea mays* due to enhance production of antioxidants especially at earlier stages of experiment and reduced afterward.

ABSTRAK

Kerintangan *Zea mays* terhadap tegasan air dikesan melalui kepekatan antioksidan bukan enzim yang dihasilkan bagi memastikan kesinambungan spesies ini. Tujuan eksperimen ini adalah untuk mengkaji kesan isipadu air yang berbeza terhadap penghasilan antioksidan bukan enzim iaitu α -tokoferol, asid askorbik dan karotenoid dalam jagung. *Zea mays* yang dirawat dengan 0, 20, 40, 60, 80 dan 100 ml air selama 11 hari. Tiada perbezaan bererti ($p > 0.05$) diperhatikan dalam kepekatan α -tokoferol pada pokok yang dirawat dan yang tidak dirawat sehingga 3 hari rawatan, pokok yang dirawat dengan 0 ml air menghasilkan α -tokoferol sehingga paras maksimum. Peningkatan masa rawatan pengurangan kepekatan α -tokoferol secara signifikan ($p < 0.05$) terutama pada pokok yang dirawat dengan 80 ml dan 60 ml air. Kepekatan asid askorbik meningkat secara signifikan ($p < 0.05$) dalam semua pokok sehingga 1 hari rawatan terutama pada pokok yang dirawat dengan 40 ml air. Penghasilan asid askorbik pada pokok yang tidak dirawat meningkat secara signifikan ($p < 0.05$) sehingga 5 hari rawatan dan menurun pada peringkat yang seterusnya, kecuali pokok yang dirawat dengan 20 ml air. Tegasan air merangsang kepekatan karotenoid secara signifikan ($p < 0.05$) dalam jagung sehingga 2 hari rawatan. Penghasilan karotenoid yang maksimum diperhatikan dalam pokok yang dirawat dengan 80 ml air. Waiiau bagaimanapun, tiada perbezaan bererti ($p > 0.05$) diperhatikan pada pokok rawatan lain berbanding kawalan. Keputusan menunjukkan bahawa tegasan air berupaya mencetuskan tegasan oksidatif dalam pokok jagung dengan meningkatkan penghasilan antioksidan pada peringkat awal eksperimen dan seterusnya semakin berkurang.