EFFECT OF EXCESS WATER ON α-TOCOPHEROL, ASCORBIC ACID AND CAROTENOID CONTENT OF *Zea mays*

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EFFECT OF EXCESS WATER ON α-TOCOPHEROL, ASCORBIC ACID AND CAROTENOID CONTENT OF *Zea mays*.

By
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JABATAN SAINS BIOLOGI
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PENGAKUAN DAN PENGESAHAN LAPORAN PITA I DAN II

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk: **EFFECT OF EXCESS WATER ON α-TOCOPHEROL, ASCORBIC ACID AND CAROTENOID CONTENT OF *Zea mays*** oleh **BIBI SYAHILA BINTI MOHAMAD SOHI** no. matrik: **UK11142** telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Biologi sebagai memenuhi sebahagian daripada keperluan memperolehi Ijazah **SARJANA MUDA SAINS (SAINS BIOLOGI)**., Fakulti Sains dan Teknologi,Universiti Malaysia Terengganu.

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DECLARATION

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

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ABSTRACT

Water becomes as major plant limiting factor in performance and yield especially in agriculture term. Responses of non-enzymatic antioxidants to excess water in *Zea mays* were observed to determine their tolerability. The objectives of this study were to determine the effect of different water volumes on the α-tocopherol, ascorbic acid and carotenoid content of *Zea mays*. 7 days old plants were treated with different volumes of water (100 ml, 120 ml, 140 ml, 160 ml, 180 ml and 200 ml) for 7 days. Non-enzymatic antioxidants were assayed at 0, 1, 2, 3, 5 and 7 days of treatments. Results showed that α-tocopherol concentration increased significantly ($p<0.05$) for first 3 days of treatments compared to control except for day 2. *Zea mays* treated with 140 ml, 160 ml and 200 ml of water showed maximum production of α-tocopherol of 43.22± 3.98, 49.11± 5.12 and 44.78± 6.26 μg/g fwt respectively on the third days of treatment. Longer treatment period significantly lowered ($p<0.05$) the α-tocopherol concentration. However, control plants were unaltered during the time course experiment. Water stress significantly ($p<0.05$) induced the ascorbic acid concentration in *Zea mays* treated with 120, 140, 160 and 180 ml of water on first 5 days of treatment and their concentration started to decreased at the later stages of treatment except for *Zea mays* treated with 120 ml of water, which shows continuously increased in their ascorbic acid concentration. Water stress also significantly increased ($p<0.05$) carotenoid concentration especially after 3 days of treatment except for plant treated with 180 ml and 200ml of water, where their carotenoid concentration was lowered at the end of the experiment. *Zea mays* treated with 180 ml of water showed the maximum increased in carotenoid concentration up to 5 days of treatment compared with others volumes. Results indicated that water stress could induce oxidative stress in *Zea mays* by inducing the α-tocopherol, ascorbic acid and carotenoid concentration of *Zea mays*.

KESAN AIR BERLEBIHAN TERHADAP KANDUNGAN α-TOKOFEROL, ASKORBIK ASID DAN KAROTENOID DALAM *Zea mays*

ABSTRAK

Air menjadi faktor penghad utama dalam pertumbuhan dan pengeluaran hasil tumbuhan terutamanya dari aspek agrikultur. Tindak balas antioksidan bukan enzim terhadap air berlebihan ke atas *Zea mays* diperhatikan untuk menentukan tahap kerintangannya. Objektif kajian ini adalah untuk mengkaji kesan air berlebihan terhadap kandungan α-tokoferol, askorbik asid dan karotenoid dalam *Zea mays*. Pokok yang berumur 7 hari dirawat dengan isipadu air yang berbeza (100 ml, 120 ml, 140 ml, 160 ml, 180 ml dan 200 ml) selama 7 hari. Kandungan antioksidan bukan enzim di analisis pada 0, 1, 2, 3, 5 dan 7 hari rawatan. Keputusan menunjukkan kepekatan α-tokoferol meningkat secara signifikan ($p<0.05$) pada 3 hari pertama rawatan berbanding kawalan kecuali pada hari kedua. *Zea mays* yang dirawat dengan 140 ml, 160 ml dan 200 ml air, menunjukkan kandungan α-tokoferol maksimum (43.22± 3.98, 49.11± 5.12 dan 44.78± 6.26 μg/g fwt) masing-masing pada hari ketiga rawatan. Pemanjangan masa rawatan menurunkan kandungan α-tokoferol secara signifikan berbanding tumbuhan kawalan yang tidak mengalami sebarang perubahan. Tegasan air juga meransang secara signifikan ($p<0.05$) kepekatan askorbik asid dalam *Zea mays* yang dirawat dengan 120 ml ,160ml dan 180 ml air pada hari ke 5 rawatan. Walaubagaimanapun kepekatannya berkurangan pada hari yang berikutnya kecuali *Zea mays* yang dirawat dengan 120 ml air yang menunjukkan peningkatan askorbik asid yang berterusan. Tegasan air juga secara signifikan ($p<0.05$) meningkatkan kandungan karotenoid terutamanya selepas hari ketiga rawatan kecuali kepada pokok yang dirawat dengan 180 ml dan 200 ml air yang menunjukkan penurunan kandungan karotenoid di akhir rawatan. *Zea mays* yang dirawat dengan 180 ml air menunjukkan peningkatan maksimum kepekatan karotenoid selepas hari kelima rawatan berbanding dengan rawatan air yang lain. Keputusan menunjukkan tegasan air mempengaruhi tegasan osidatif dalam *Zea mays* dengan meningkatkan kepekatan α-tokoferol, askorbik asid dan karotenoid dalam *Zea mays*.