

EFFECT OF DEFICIT IRRIGATION ON GROWTH
AND YIELD OF SORGHUM GROWN ON RENGAM
AND RHU TAPAI SOIL SERIES

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DEDICATION

This dissertation is dedicated to:

My beloved parents, Alh. Abubakar Siddique and Hajjia Aishatu Abdulkadir. My
Lovely wife and son; Hauwa Daniel Ibrahim and Baba Ali Ibrahim. My Brothers,
Mohammed Bukar, Abdulmumini Ibrahim and Musa Mamman Abubakar.

**‘A constant means of inspiration during the entire period of my study and
throughout of my endeavors’**

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Main Supervisor : Associate Professor Adzemi Mat Arshad, Ph.D

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Faculty : Agrotechnology and Food Science.

A greenhouse experiments were conducted at Faculty of Agrotechnology and Food Science Research Farm, Universiti Malaysia Terengganu to evaluate the effects of regulated deficit irrigation (RDI) and partial rootzone drying (PRD) techniques on growth performance and yield of sorghum planted on two series of soil. Both experiments regulated deficit irrigation (RDI) and partial root zone drying (PRD) consisted of a four irrigation regimes namely Full irrigation (I_{100}), 75% (I_{75}), 50% (I_{50}) and 25% (I_{25}) and the two types of soil viz Rhu Tapai Soil Series and Rengam soil Series. Those experiments were laid out in a randomized complete block design with eight treatments for each experiment, which resulted into a total of sixteen treatments. The treatments were randomly assigned to experimental polythenebags and replicated four times. A total of sixty four polythenebags were used for the study. All agronomic practices starting from preparation to harvesting were adhered to and growth and yield parameters were recorded for both experiments. The result of the study shows that, sorghum performed better under PRD compared to RDI

techniques. The results further revealed that, irrigation regimes I₁₀₀ and I₇₅ performed better in terms of growth, yield and yield parameters, crop water use efficiency, photosynthesis rate and photosynthetic active radiation under both RDI and PRD compared to I₅₀ and I₂₅ irrigation regimes. The study also revealed that there were interaction effects of deficit irrigation and the two types of soil on some of the parameters such as leaf area index, girth, tillers, harvest index, root dry matter and number of panicle used for the study. The benefit-cost ratio of sorghum production under I₁₀₀ and I₇₅ irrigation regimes were found to be economically better compared to I₅₀ and I₂₅ irrigation regimes for both RDI and PRDI irrigation regimes. The study, therefore, recommended the use of PRDI for optimizing sorghum production in this agro ecological zone.

Abstrak tesis yang dikemukakan kepada Senat Universiti Malaysia Terengganu
sebagai memenuhi keperluan untuk Ijazah Master Sains

**KESAN PENGAIRAN DEFISIT KE ATAS PERTUMBUHAN DAN HASIL
SEKOI DITANAM PADA TANAH SIRI RENGAM DAN SIRI RHU TAPAI**

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Penyelidikan di rumah kaca telah di jalankan di Pejabat Ladang, Fakulti Agroteknologi dan Sains Makanan, Universiti Malaysia Terengganu bagi menentukan kesan mengator kekurangan air (MKA) dan teknik pengairan separa kering zon akar (TPSKZA) ke atas tanaman sekoi ditanam di tanah Siri Rhu Tapai dan Siri Rengam. Kedua-dua penyelidikan kesan mengator kekurangan air (MKA) dan teknik pengairan separa kering zon akar (TPSKZA) terdiri dari empat regim air 100% (I_{100}), 75% (I_{75}), 50% (I_{50}) dan 25% (I_{25}) dan dua jenis tanah iaitu Siri Rhu Tapai dan Siri Rengam. Penyelidikan ini menggunakan rekabentuk blok rawak lengkap dengan lapan rawatan bagi satu penyelidikan dan menjadikan jumlah sebanyak enam belas rawatan. Rawatan disusun secara rawak dan diulang sebanyak empat kali bagi satu rawatan. Sejumlah enam puluh empat polibag digunakan dalam penyelidikan ini. Amalan agronomi bermula dari penanaman sorghum hingga

penuaian hasil berkaitan pertumbuhan dan parameter bagi kedua-dua penyelidikan direkod. Keputusan menunjukkan sekoi memberi tindakbalas yang lebih baik bagi teknik TPSKZA dibandingkan dengan MKA. Keputusan juga menunjukkan regim pengairan I_{100} dan I_{75} menunjukkan pertumbuhan yang baik dari segi pertumbuhan, hasil dan parameter hasiln kecekapan penggunaan air oleh pokok, kadar fotosintesis dan fotosintesis aktif radiasi bagi MKA dan TPSKZA dibandingkan regim pengairan I_{50} dan I_{25} . Keputusan menunjukkan terdapat kesan interaksi di antara kedua-dua tanah yang dikaji ke atas beberapa parameter dalam kajian ini termasuk indeks keluasan daun, lilitan batang, anak pokok, indeks tuaian, berat kering akar dan biji sekoi yang dikaji. Analisis nisbah keuntungan dan hasil sekoi bagi I_{100} dan I_{75} regim air didapati lebih ekonomik dibandingkan regim air I_{50} dan I_{25} bagi MKA dan TPSKZA bagi rejim pengairan. Berdasarkan penyelidikan ini TPSZKA disyorkan bagi pengeluaran hasil sekoi di zon agro-ekologi ini.