

DEDICATION

I dedicate this work to

All those who are concerned about date palm trees

and to my brothers, teachers, friends, wife and

parents' souls.

Hussein ARahman Idris

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Above all, I render my thanks to the merciful Allah who offers me all things to accomplish this study. I wish to thank my supervisor Prof. El-Sadig Hassan El-Sadig for his continuous help and criticism throughout the progress of this study. I am also grateful to the date palm farmer Mr. Zibair Mohammed Seed Ahmed in the Northern State for his cooperation throughout this study. Thanks are also extended to Prof. Tag El-Sir Ibrahim Mohammed who guided me to research in date palm trees, and to all my friends and colleagues at the Faculty of Agricultural Science , University of Dongola, specially Dr. Kamal Bashir and Dr. Sami A.Ghfar. Thanks are also extend to my generous family and brothers for their support during the study period.

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ABSTRACT

The experiment was conducted during the successive seasons of 2009/2010 and 2010/2011 at the Farm of Mr. Zibair Mohammed Seed Ahmed, at Elseilaim- Dongola, Northern State, Sudan. The study was conducted on high terrace soil (Arid soils).

The aim of this experiment was to study the effect of fertilization and irrigation on yield, yield components and fruit quality of date palm (*Phoenix dactylifera* L.) "Barakawi" CV under Northern Sudan Conditions in order to improve date production and hence raise the growers' income. Experimental design was randomized complete block with three replications. The treatments included seven levels of compound fertilizer and three levels of irrigation intervals as shown below:

Control, (30 kg Organic + 0.25 kg N₁₅ P₁₅ K_{15%}), (60 kg Organic + 0.25 kg N₁₅ P₁₅ K_{15%}), (120 kg Organic + 0.25 kg N₁₅ P₁₅ K_{15%}), (30 kg Organic + 0.50 kg N₁₅ P₁₅ K_{15%}), (60 kg Organic + 0.50 kg N₁₅ P₁₅ K_{15%}), (120 kg

Organic + 0.50 kg N₁₅ P₁₅ K_{15%}) and three irrigation intervals (10, 20 and 30 days).

In this study investigated: Yield components included fruit weight, pulp weight, pulp/ seed ratio and yield per palm. Fruit physical characteristics included fruit length, fruit diameter and flesh thickness. Seed physical characteristics included seed length, seed diameter and weight of the seed. Bunch characteristics included number of bunches/palm number of fruit/bunch and weight of fruit/bunch. Strands characteristics attribute included number of strand/bunch, number of fruit/strand and length of strand. Growth parameters included stem length stem diameter, number of new growing leaves and number of total growing leaves. Fruit chemical compositions included total soluble solids (TSS), total sugars, reducing and non-reducing sugars, fruit moisture contents and acidity.

The results showed that there were highly significant differences due to fertilization and irrigation treatments in most growth parameters, yield and yield components and fruit quality. However, there were no significant differences due to irrigation treatments on seed weight and number of fruit per strands in the first season. Besides no significant difference was obtained due to fertilization on seed weight in the second season, may be seed characteristics were control by genes. Moreover, there were no significant differences due to interaction in stem length and number of new growing leaves in the first season, seed diameter in the second season, (may be the seed characteristics under genetic control) and in number of leaves and seed length in both seasons. The results also showed no significance differences on acidity of the fruits due to either fertilization or irrigation or their interaction.

According to the study, date palm tree grown in terrace soil needs irrigation every 10 day and an annual fertilization composed 30 kg organic + 0.50 kg N₁₅ P₁₅ K_{15%}), to achieve good growth, high yield and good quality fruit

under sandy soil conditions. Nevertheless, the amount of fertilizer and irrigation needed by palm tree depends on soil type, kinds of intercrops grown under, as well as variety and age of the tree.

الملخص

أجريت تجربة حقلية خلال الموسمين المتعاقبين 2009/2010 و 2010/2011 بمزرعة السيد/زبير محمد سيد احمد، بمنطقة السليم، دنقلا، الولاية الشمالية، السودان. على أراضي التروس العليا (رتبة الاراضي الجافة)، لدراسة تأثير السماد والري على الانتاج والخواص الممتازة في نخيل البلح (صنف البركاوي).

صممت التجربة باستخدام تصميم القطاعات العشوائية الكاملة بثلاثة

مكررات، اشتملت على سبعة مستويات

اسمده " مركبه " وهي على النحو التالي:

(الشاهد، 30 كجم سماد عضوي + 0.25 كجم $N_{15} P_{15} K_{15}$ ، 60

سماد عضوي + 0.25 كجم $N_{15} P_{15} K_{15\%}$ ، 120 كجم سماد عضوي +

0.25 كجم $N_{15} P_{15} K_{15\%}$ ، 30 كجم سماد عضوي + 0.50 كجم $N_{15} P_{15}$

، 60 كجم $N_{15} P_{15} K_{15\%}$ ، 120 كجم سماد عضوي + 0.50 كجم $N_{15} P_{15} K_{15\%}$ ،

سماد عضوي + 0.50 كجم $N_{15} P_{15} K_{15\%}$ و ثلاث فترات ري هي (10 ،

20 و 30 يوماً).

وفي هذا البحث الدراسة شملت:

مكونات الانتاجية وهي: وزن الثمرة، وزن اللب، نسبة اللب للبذرة وانتاجية النخلة. الخصائص الطبيعية للثمار هي: طول الثمرة، عرض الثمرة وسمك الثمرة. الخصائص الطبيعية للبذرة: طول البذرة، عرض البذرة ووزن البذرة. خصائص السبيطة: عدد السباط في النخلة، عدد الثمار في السبيطة ووزن الثمار في السبيطة. خصائص الشمرخ: عدد الشماريخ في السبيطة، عدد الثمار في الشمرخ وطول الشمرخ. مقاييس النمو الخضري: طول الساق، قطر الساق، عدد الاوراق الجديدة النامية وعدد الاوراق الكلي النامي (الجريد). الخصائص الكيماوية للثمار: جملة المواد الصلبة القابلة للذوبان، السكريات الكلية، السكريات المخفضة وغير المخفضة، محتوى رطوبة الثمار والحموضة.

وبصورة عامة في هذه الدراسة ووفقاً للنتائج يمكن القول بأن التسميد والري قد أديا الي زيادة معنوية كبيرة في معظم مقاييس النمو، الانتاج، مكونات الانتاج وجودة الثمار. بينما لم يظهر اي أثر معنوي للري في وزن البذرة وعدد الثمار بالشمرخ في الموسم الاول. وكذلك لم يكون هنالك اثر للتسميد في وزن البذرة في الموسم الثاني، ايضاً لم يظهر أي تغيير معنوي للتفاعل المشترك (الري و التسميد) في طول الساق وعدد الاوراق الجديدة في الموسم الاول، قطر البذرة في الموسم الثاني، (ربما تكون خصائص البذرة تحت سيطرة الجينات) والعدد الكلي للأوراق وطول البذرة في كلا الموسمين. وكذلك لا يوجد اي فرق معنوي في حموضة الثمار سواء أكان في الجرعات السمادية او فترات الري او في التفاعل المشترك (التسميد والري).

تؤكد نتائج التجربة أن نخلة البلح تحتاج الي ري كل 10 يوم وسماد مكون من (30 كجم عضوي + 0.50كجم 15% K 15 P 15 N) في اراضي التروس العليا سنوياً لتحقيق نمو مناسب وانتاجية ذات جودة عالية تحت ظروف التربة الرملية. وتختلف كمية الاسمدة الواجب إضافتها للنخلة، حسب نوع التربة ودرجة خصوبتها ونوع المحاصيل المزروعة تحت أشجار النخيل.

