

Dedication

To soul of my Father

,To my Mother

Sisters and

,Brothers

My Wife and Daughters: Aasha & Afraa

Acknowledgment

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LIST OF ABBREVIATIONS

ARS	Agricultural Research Service
B.C	Before century
BF	Beginning flower stage
CT	Conventional tillage
CWR	Crop water requirement
DAS	Day after sowing
ET _a	Actual evapotranspiration
ET _c	Crop evapotranspiration
FAO	Food and agriculture organization
FB	Flower bud stage
Ha	Hectares
HI	Harvesting index
HYV _s	High yield varieties

I	Initial stage
K _c	Crop coefficient
Kg	Kilograms
LAI	Leaf area index
MG	Middle season growth stage
NEH	National Endowment for the Humanities
NIWR	Net irrigation water requirement
ST	Strip tillage
SCS	Soil Conservation Service
T	Final growth stage
WUE	Water use efficiency

ABSTRACT

A field study was conducted to know the effect of three tillage types (harrowing, disking, chiseling and control (zero tillage)) and two sowing methods (Ridge and flat) and irrigation water levels (100%ET_c, 85% ET_c and 75% ET_c) on sunflower crop (*Helianthus annuus L.*) hybrid hysun33 in summer season during (2011- 2012) in Faculty of Agricultural Science farm, University of Dongola, Northern State by

A two-year field experiment was carried out using a strip-split plot arranged in randomized complete block design

with four replications in two seasons 2011 - 2012. Recognized standard methods were used for assessing yield, vegetative growth, soil physical properties and field :water regimes. Results can be summarizing as follows

Significant differences in yields were obtained at 100%ET_c irrigation water levels. This indicates the sensitivity of the crop to water stress. Analysis of variance, in both seasons, showed significant differences due to tillage treatments. The highest values in yield were obtained under harrowing treatments and lowest values were obtained under no-tillage treatment. This may be attributed to the fact that sunflower plant is a tap rooted plant that penetrates well in tilled soils. The number of seed per head was not affected by tillage treatments, water stress and sowing methods. It seems that these characters are genetically .control rather than environmentally affected

Sunflower is well known for its empty seeds problem. 100% ET_c irrigation water level showed no improvement in the reduction of the number of empty seeds, but, on the reverse the number of empty increased. This implies that the number of empty seeds phenomenon is associated with level of irrigation at a certain growth stages of the plant life duration. On the other hand there was no .significant difference due to sowing methods

Full 100%ET_c should be given to the crop to get maximum yield. Empty seeds should be studied under different .deficit irrigation levels at mid stage of plant growth

الخلاصة

أجريت هذه الدراسة لمعرفة تأثير ثلاثة عمليات حراثة مختلفة (المشط القرصي الثقيل، محراث قرصي ومحراث حفار) بالإضافة الي ارض غير محروثة كشاهد وطريقتين للزراعة (احواض مسربة واحواض مسطحة) وثلاثة مستويات مياه مختلفة (الري بالعجز، 100%) (Deficit irrigation)

85% و 75%) من الاحتياج المائي للمحصول علي محصول زهرة الشمس (*Helianthus annuus L.*) الصنف هاي صن 33 في الموسم الصيفي لموسمين متتاليين (2011 - 2012)م بمزرعة كلية العلوم الزراعية - جامعة دنقلا - الولاية الشمالية بتصميم القطع المنشقة - المنشقة بتوزيع القطاعات العشوائية الكاملة مع 4 مكررات لموسمين. تم استخدام طرق قياسية لأخذ قياسات الانتاجية، تطور النمو، التربة وكمية مياه الري ويمكن تلخيص النتائج فيما يلي.

أظهرت النتائج فروقات معنوية في الانتاجية بمستوي مياه ري 100% من الاحتياج المائي للمحصول وكان ذلك مؤشر واضح لحساسية المحصول للشد الرطوبي. ايضاً تحليل التباين في الموسمين اظهر فروقات معنوية نتيجة لعمليات الحراثة المختلفة وقد حققت الحراثة بالمشط القرصي الثقيل اعلي قيمة للإنتاجية وكانت الإنتاجية بالارض الغير محروثة متدنية وهذا يرجع الي ان محصول زهرة الشمس له جذوره وتدية تخترق التربة المحروثة بسهولة. بينما نجد ان عدد البذور في القرص لم يتأثر بالمعاملات المختلفة ويبدو ان هذه خاصية محكومة وراثياً ليس للعوامل البيئية أي تأثير فيها.

معروف ان محصول زهرة الشمس به مشكلة البذور الفارغة و اشارت النتائج الي ان معاملة مياه الري 100% ETC لم تظهر أي تحسن في تقليل نسبة البذور الفارغة بل علي العكس فقد اعطت نسبة اكبر مقارنة مع معاملات الري الاخرى. وهذا يشير الي ان مشكلة نسبة البذور الفارغة مرتبط بكمية مياه الري في مرحلة محددة من دورة حياة المحصول. علي صعيد آخر لم تظهر أي فروقات معنوية بين الزراعة بالاحواض المسربة والاحواض المسطحة. معاملة مياه الري 100% ETC من الاحتياج المائي للمحصول اعطي انتاجية عالية ويمكن معالجة مشكلة البذور الفارغة وذلك بدراسة اثر الري بالعجز لمراحل النمو الوسطي المحصول.