

**Effect Of Border Area And Cutback Irrigation Method
On Wheat Yield In Northern State- Sudan**

تأثير مساحة الحوض وطريقة الري القطعي على إنتاجية القمح في الولاية

الشمالية - السودان

By

Bushra Altayb Rooghomt Allah Mohammed

B.Sc (Honors) Agricultural Engineering

College of Agricultural Studies

Sudan University of Science and Technology

2004

A Thesis Submitted in Partial Fulfillment of the
Requirements of the Degree of Master of Science in
Agricultural Engineering

Supervisor: Dr. El Sadig El Mahdi Ahmed

Agricultural Engineering Department

College of Agricultural Studies

Sudan University of Science and Technology

May 2009

Acknowledgment

**Thanks to almighty God for his
blessings**

**And thanks to all who lighted the
way through their science and
knowledge**

**Thanks to Mr. Hassan Omar,
Suliman Habib Allah, and to late Mr.**

.Mahmoud and the late father

**And thanks a lot to Dr. Alsadig
Almahdi for his patience till this
thesis come out and I hope that
the live give as the chance to
.thank him**

Dedication

**To all those who dreams
by change and work for it**

ABSTRACT

This study was conducted in the Northern state, Merewi District, AL Karafab area with the objective of finding the basin size and cutback method on wheat yield.

Experiment was designed following the complete randomized block design with two treatments. Treatment one test three basin sizes each replicated three times. Treatment two tests the interaction of basin size with the cutback irrigation method.

Statistical analysis was carried out using M-stat computer program, which revealed no significant difference in yield for basins size without cutback method. A significant difference was shown for cutback irrigation method associated with basin size. Therefore large basin sizes together with cutback water application method are recommended.

ملخص البحث

تمت هذه الدراسة في الولاية الشمالية ، محلية مروي - منطقة الكرفاب
بهدف معرفة تأثير حجم الحوض - على إنتاجية القمح وكتلتك تأثير طريقة - ل
Cutback على إنتاجية القمح.

صممت التجربة بطريقة التصميم العشوائي الكامل واحتوت علي معاملتين، وكانت المعاملة الاولى حجم الحوض حيث نفنت ثلاثة أحواض مختلفة المساحة كرر كل منها ثلاثة مرات، والمعاملة الثانية كانت حجم الحوض مع استخدام طريقة الـ Cutback عند الري.

تم استخدام برنامج الـ M-stat للتحليل الإحصائي لتحليل نتائج التجربة والتي أظهرت

- عدم وجود فرق معنوي في الانتاجية في حجم الاحواض الثلاثة التي لم تستخدم فيها طريقة الـ Cutback.

- هناك فرق معنوي بين الأحواض التي استخدمت فيها طريقة الـ Cutback وتلك التي لم تستخدم فيها.

وخلصت الدراسة لأفضلية استخدام الأحواض الكبيرة مع تطبيق طريقة الـ Cutback عند الري.

Table of content

Acknowledgment

Dedication

Abstract

Chapter I

Introduction

1

Study objective

3

Specific objective

3

Chapter II

Introduction	4
The perspective and objectives of irrigation	5
Water Application methods	7
Surface Irrigation	8
Advantages and disadvantages of surface irrigation	10
Advantages of surface irrigation	11
Disadvantages of surface irrigation	12
Furrow irrigation	14
Border irrigation	14
Basin Irrigation	16
Methods of operation	20
The cutback method	20
Crop water requirements	22
Evapotranspiration and drainage requirements	24
Crops Adaptation	25
Climatic zones	25
Importance of the crop	26
Crop distribution and extent	26
Soils	27
Temperature	27
Photoperiodism	27
Production in relation to irrigation Water	28
Seed rate	28
Fertilization	29
Crop harvest	29
Yield and yield components	29
Wheat production in Sudan	30
Chapter III	
Land Preparation	34
The Experimental design	34
Estimation of crop irrigation water requirement	35
Irrigation	36
Field treatment	40
Harvesting	40
Chapter IV	
Yield	45
Discussions	56

Chapter V	
Recommendations	58
Reference	59

List of table

The monthly climatic data of Karima town	41
The monthly Rainfall data of Karima town	41
Climatic data table of Karima	42
Crop water requirements for wheat in Karima	42
The average yield in small size basin without cutback	45
The average yield in small size basin using cutback	46
The average yield in medium size basin without cutback	47

The average yield in medium size basin using cutback	48
The average yield in large size basin without cutback	49
The average yield in large size basin using cutback	50
The average yield in the basins irrigated without cutback	51
The average yield in the basin using cutback	52
Table of means	53
Analysis of variance table	54
Original and Ranked order table	55
Area wasted in levees or (tagnat) per feddan in square	57

List of figure

Level basin flood irrigation on wheat	19
The experimental design	43
Alkrafab Agriculture project	44