



Using the Best Land Preparation Leads to an Increase the Crop Productivity in Sudan



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INTRODUCTION

Agriculture is considered as the mainstay of the Sudanese economy and accounts for about 38.9% of the GDP, provides about 80% of the country's export, and employs 62% of the labour force, with about 80% of the population dependent on agriculture for livelihood and raw materials for the industries.

Tillage is the practice of modifying the state of the soil in order to provide condition favorable for plant growth. Excessive tillage may increase the risk of water loss and soil erosion by wind and water. Conventional tillage practices in the semi arid regions often-burrry excessive quantities of residues and reduce soil tendency for clodding and surface roughness.

The main purpose of tillage operations is to prepare the appropriate cradle for seeds by dismantling and loosening the soil and uprooting the grass plants which grow there. Success or failure of crop production depends on the good preparation of the land. In addition, tillage has changes the physical properties of the soil.

The research is investigated to select the best methods of tillage under desertified areas, in order to reduce costs of traditional tillage so as to increase crop production of the land.

STUDY AREA

The Field experiments were carried out for two successive seasons in the study area of Omdurman west of Khartoum state which located between latitudes 15 65 and N and longitude 32 48 E as shown in figure (1). The climate of the area is arid and semi-arid with an average rainfall of 121 mm/year.

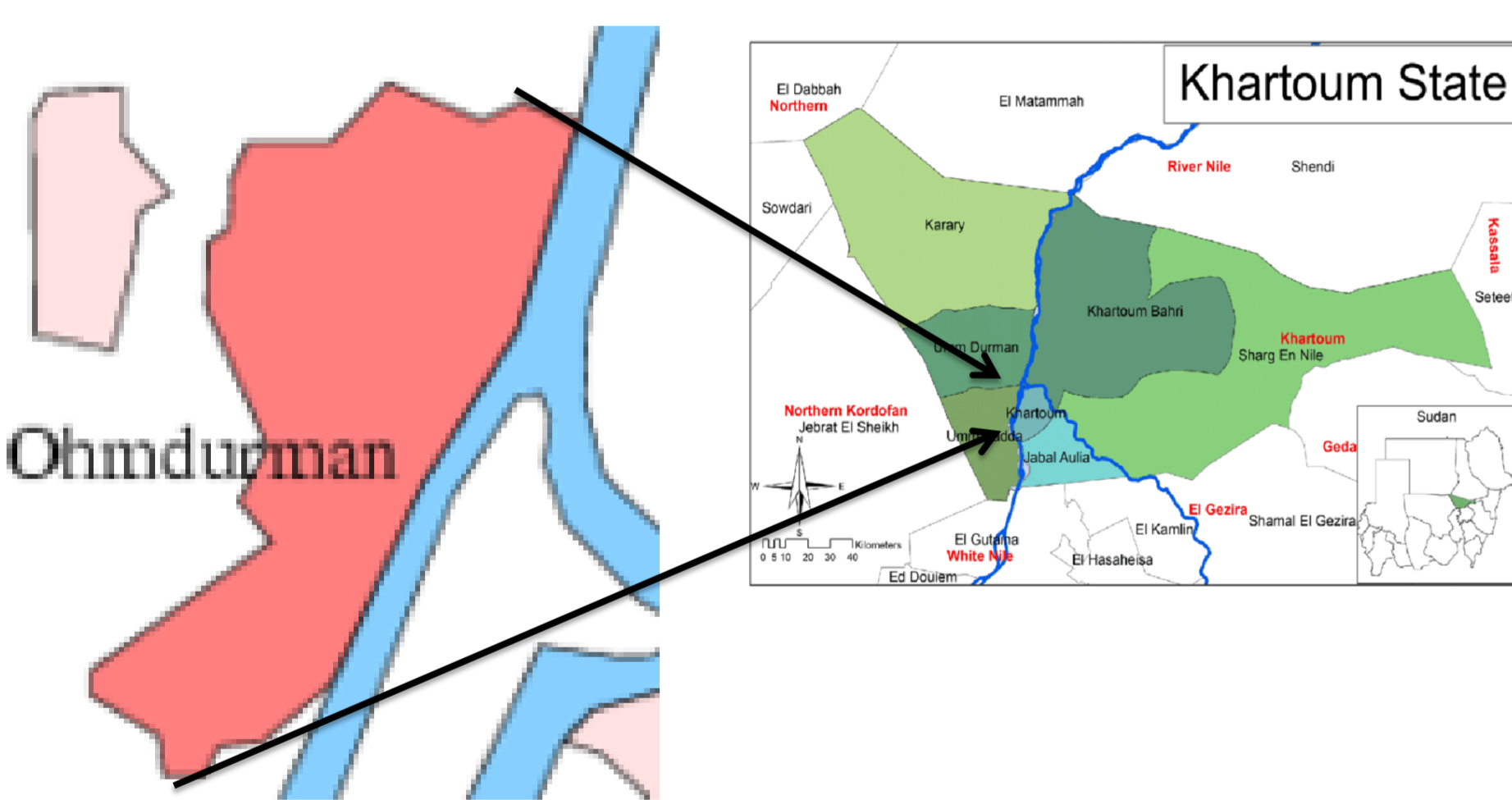


Fig.1: Location of the study area.

METHODS

To achieve the objectives of this study, two tractors with different drag force were used. The first tractor used as a tester and the second used as auxiliary, as well two primary ploughs (disc plough) and chisel plough and two secondary ploughs (disc harrow plough and chisel plough) and Ridger plough in addition to an animal-drawn plough. Tillage parameters have been investigated such as; in a first test, the land has been prepared by using chisel plough to a depth of 30 cm, then opening furrows using Ridger plough. The second test by using the disc plough to a depth of 20 cm, and then furrows using Ridger plough. The third test using offset harrow plough to a depth of 25 cm then furrows using Ridger plough. The fourth test opened the furrows using Ridger plough to a depth of 30 cm. The fifth test opened the furrows using the animal-drawn plough to a depth of 15 cm.

The following tillage implements were used:

1. Disc plough (depth 20 cm) + leveling + ridging.
2. Chisel plough (depth 30cm) + leveling + ridging
3. disc harrow (depth 25 cm) + leveling + ridging
4. Ridging only (depth 25 cm).
5. Animal drawn plough (depth 15cm).

DH+R	1 m	CH+R	DP+R	R	An
1m					
CH+R		DH+R	R	An	DP+R

Treatments:

DH + R: Offset disc harrow + Ridger plough

CH + R: Chisel plough + Ridger plough

Dp + R: Disc plough + Ridger plough

R: Ridger plough

An: Animal drawn plough



Fig. 2: Chisel plough



Fig.3: Disc plough



Fig.4 : Offset disc harrow plough



Fig.5 : Animal drawn plough



Fig.6 : Ridger plough for smoothing and leveling

RESULTS

The results recorded that the field efficiency of (chisel plough (90.5), disc plough (85.5), harrow plough (70.5), Ridger plough (50.5) and the animal-drawn plough (15.5) respectively. the results showed that the fuel consumption in litter/ ha recorded 6.50, 3.30, 2.60 and 2.10, respectively.

Implement	Draft (KN)	EFC ha/hr	TFC ha/hr	FE%	Fuel Consumption L/ha
Chisel Plough	7.50	0.15	0.17	90.50	6.50
Disc plough	6.50	0.22	1.27	85.50	3.30
Ridger plough	6.00	0.45	0.66	60.50	2.10
(Off set) Disc Harrow	5.00	0.34	0.70	70.50	2.60
Animal Drawn	—	0.15	1.17	15.50	—

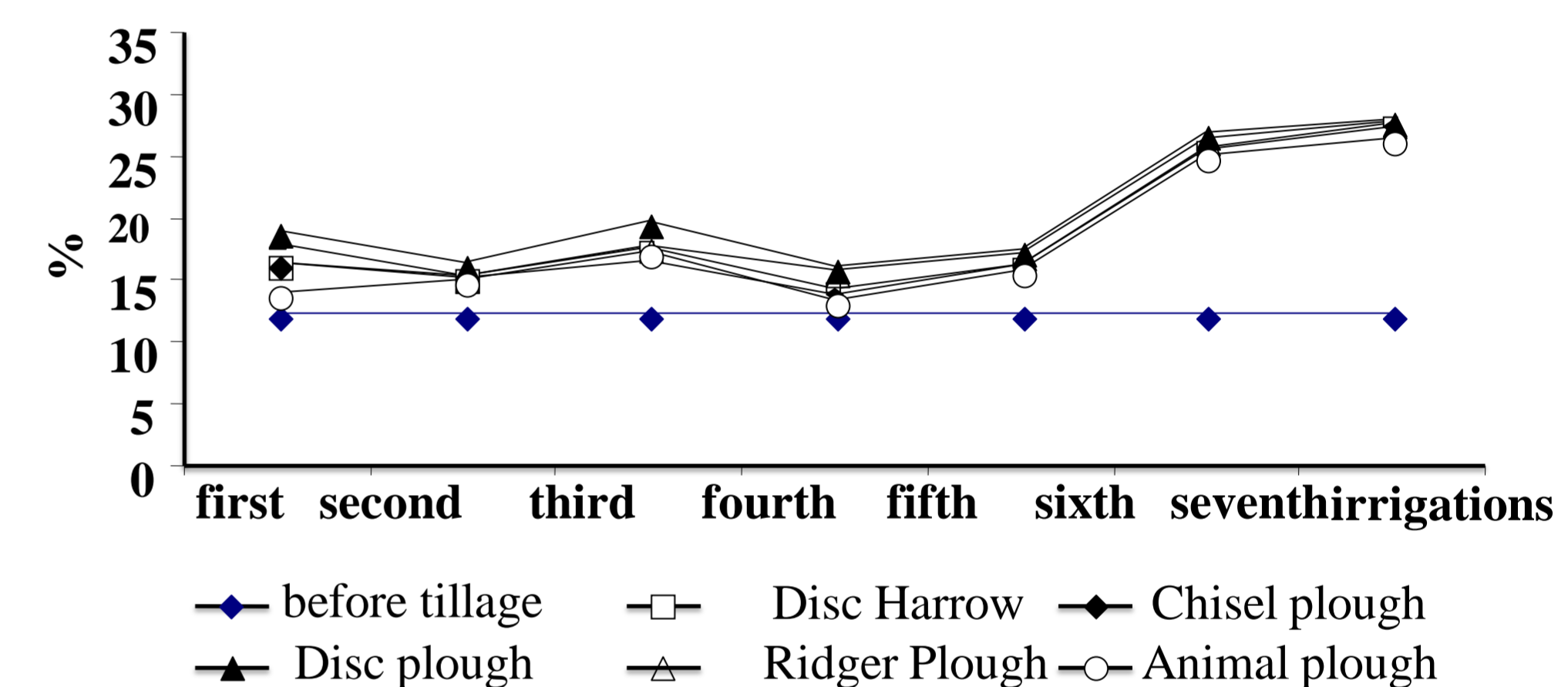


Fig.7: Effect of different tillage treatments on moisture contents (%) at 15cm, 20cm, 25cm and 30cm

The results showed that the highest draft force (7.50KN) and highest field efficiency (90.50) were recorded by the chisel plough tillage treatment, while recorded the highest fuel consumptions which it means high cost of tillage operation.

Other ploughs disc plough and disc harrow were recorded also highest draft force and field efficiency when comparing with ridger plough in fuel consumption, while the ridger plough recorded less draft force and high field efficiency and less fuel consumption when comparing with all others ploughs.

The results showed the Animal drawn plough recorded the minimum field efficiency without fuel consumption.

The results showed that the ridger plough is best for preparing land, increasing soil moisture content with minimum fuel consumption which it lead to increase the crop production

CONCLUSIONS

The study recommended that the most suitable practice is the Ridger plough which was recorded the higher field efficiency and less fuel consumption for enhancement soil moisture and increasing the crop production in the land. Also, recommended to avoid the tillage in deep depth which case in increase soil bulk density and more fuel consumption.

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