

At the request of Mr. Mofdy Morgan, the General Manager of Hundzsoil, the company which produces the soil conditioner in question, to cooperate with him in the scientific oversight regarding the cultivation of wheat crop with in conjunction with the Egyptian Armed Forces National Service Corps, on a farm located on Cairo-Alexandria Highway, 90 kilometers from Alexandria. A test was conducted on this site to assess the effect of using the natural soil conditioner Hundzsoil on increasing the water holding capacity and organic matter level in soil, in accordance to the policy set forth by the Agricultural Research Center regarding research protocols used in regards to testing done on irrigated water.

In accordance with the Egyptian Government's wishes to increase food security by increasing the area of land used, along with the crop density of cultivation of grains, among them, wheat and corn. Given the climactic conditions of the region; the lack of irrigation, along with the lack of adoption of sustainable agriculture methods present obstacles to crop expansion.

Since the region in question is mostly desert and the soil is mostly sand, it has low fertility and low water holding capacity. It became necessary to find new ways to increase the capacity of the soil to retain water and thus increase its efficiency of the land use where it can provide conditions ideal for crop cultivation. Additionally, it would improve the retention and composition of soil nutrients, mainly nitrogen.

Whereas this product, by the name of Hundzsoil, can save up to 50% on water irrigation due to its water retention properties and retain water at 300% of its dry weight, in addition to the fact that it is a natural organic compound produced primarily from plant waste.

Hundz soil Registered number 8443 dated 21/3/2010 recovered the Egyptian Ministry of Agriculture

Ahmed Awad

Report on agricultural operations that have been carried out in the field planting wheat

Using a soil conditioner (Hundzsoil)

Location: Farm Land Army Cairo Alexandria Desert Road Kilo 90 of Alexandria

FIRST: HUNDZSOIL SITE

The strength of the earth: sand (94% sand) ratio of calcium carbonate: 5.0%

Field water holding capacity at saturation: 11% , field capacity: 5.5%

Irrigation system: using a sprayers (RB30) fixed rate of 30 liters of water / hour

(1.29 m³ / h / 144 m²)

Crop: Wheat

Brand: Giza 168

Seeds rate: 62 kg / acre Area: 10 acres

Agriculture method: using a planter / seeder

Fertilization way: with irrigation water

Sowing date: November 22, 2013

The level of salinity of the soil before planting: Ec = 5.6

The level of salinity of the soil after 40 days is Ec = 3.5

The level of salinity of irrigation water :Ec = 0.67

Amount Hundzsoil added at a rate of 5.3 m³ / acre

Germination rate of 90%

Irrigation

2 hours in the first day , and then 2 hours after one week

Rate irrigation during the month of December 2013 and January 2014: 45 minutes every 8 days

Irrigation rate during the month of February 2014: 60 minutes every 8 days

Irrigation rate during the month of March and 15 days in April 2014: 90 minutes every 5 days

Fertilization

Date	Potassium	phosphate	Nitrogen
4/12/2013	-----	-----	50 KG of urea Nitrogen
10/12/2013	15.5 Kg of potassium sulphate	3 liters of phosphoric acid	15 Kg of Amonium nitrate
20/12/2013	-----	-----	20Kg of Amonium nitrate
30/12/2013	5Kg of potassium sulphate	2 liters of phosphoric acid	10Kg of Amonium nitrate
10/01/2014	5Kg of potassium sulphate	-----	10Kg of Amonium nitrate
20/01/2014	-----	-----	10Kg of Amonium nitrate
19/02/2014	10 Kg of potassium sulphate	-----	-----
24/02/2014	-----	-----	15Kg of Amonium nitrate
Total units	17 Kg of potassium oxide	5Kg phosphorus oxide	47 Kg of pure Nitrogen
12/12/2013	Micro element spray		
13/02/2014	Potassium spray		

Amounts of irrigation water

The amount of irrigation water are : (4 hours) through November 2013 = (155.7 m³).

The amount of irrigation water for every 45 minutes / acre = 28.50 m³ (8 irrigations during December and January) (213.75 m³).

The amount of irrigation water for every 60 minutes / acre = 38.92 m³ (4 irrigations through February) (116.76 m³).

The amount of irrigation water for every 90 minutes / acre = 58.38 m³ (9 irrigations during March and April) (525.42 m³).

Total Irrigation: 22 Times+1(sowing)=23 times

The total amount of irrigation water added through out the test period (22/11/2013 until 04/15/2014) = **1011.60** m³ / acre.

SECOND : CONTROL FIELD

Irrigation system: using a spray gun RB30 fixed rate of 30 liters of water / hour

The strength of the earth: sand (92% sand) ratio of calcium carbonate: 7%

Field water holding capacity at saturation: 13% field capacity: 6.5%

Crop: Wheat

Brand : Giza 168

Seeds rate: 62 kg / acre Area: 10 acres

Agriculture method: using planter seeder

Method of fertilization: spreader and then follow fertilization with irrigation water

Sowing date: November 22, 2013

The level of salinity of the soil before planting: Ec =1.8

The level of salinity of the soil after 40 days of Agriculture: Ec = 1.2

The level of salinity of irrigation water: Ec = 0.67

Add compost at a rate: 5 tons / acre (has been added in the area of 1 acre for comparison) and the rest of the space without compost

Germination rate of 95%

IRRIGATION

3 hours in the first day , and 3 hours after one week

Irrigation rate during December 2013 and January and February, 2014 is 120-180 minutes every 5 days

Fertilization processes:

50 kg urea nitrogen per acre on 04/12/2013(23 Kg nitrogen)

50 kg ammonium nitrate / acre (17.0 Kg nitrogen)

50 kg ammonium nitrate / acre (17.0 Kg nitrogen)

Magnesium sulphate 25 kg / acre

Humic acid 2 kg / acre

25 kg ammonium nitrate / acre (9.0 Kg nitrogen)

50 kg ammonium nitrate / acre on 24/02/2014 (17.0 Kg nitrogen)

Total units of nitrogen added 85.0 kg nitrogen / acre

Irrigation operations

Amount of irrigation

28 times+(sowing)=29 times

The total amount of irrigation water added until 02/28/2014 = 1011.92 m³ / acre (every 5 days)
then irrigation for 3 hours every 5 days (9 irrigations) until April 15, 2014 the amount of 1050.8 m³ /
acre with total amount of irrigation water in **2062** m³ / acre.

Summary information

	Hundzsoil field	Control field
Salinity of the ground before planting	EC 5.6	EC 1.8
Sand ratio	95%	92%
The proportion of calcium carbonate	5.0%	7.0%
Field capacity	5.5%	6.5%
Product	Giza 168	Giza 168
Sowing date	November 22, 2013	November 22, 2013
Seed rate	64 kg / acre	62 kg / acre
Rate of nitrogen units	47 kg nitrogen / acre	85 kg nitrogen / acre
Rate of Phosphorus units	of 5 kg P 2 O 5 / acre	without
Potassium units	17 kg K2O / acre	without
Magnesium sulfate rate	without Mag.	25 kg / acre
Humic acid	without	2 kg / acre
Irrigation	23 Times	29 Times
Amount of irrigation water	1012 m 3 / acres	2062 m3 / acres
Irrigation pump hours	45,60, 90 minutes	120,180 minutes
Leave nutrient spray	twice	No information

Yield and its components

	Hundzsoil field	Control field
Crop Diversity (straw + grain), tons	6.3 tons/acre	5.9 tons/acre
Cereal yield (Combine), TON/ acre	2.175 TON/ACRE	1.785TON/ACRE
Cereal yield (14:00 2 samplesTON/	2.415 TON/ACRE	2.205 TON/ACRE
Plant height	100.0 cm	97.5 cm
Number of spikes / m2	447.0	428.0
Number of grains /spike	66.0	61.0
Weight 100 grain	4.47 gm	4.00gm
Harvest Index	36.5	35.6

Efficient use of water and fertilizers, the net savings in them

	Hundzsoil field	Control field
Efficient use of irrigation water	2,154 kg grain / m 3	0.866 kg grain / m 3
Efficient use of nitrogen	46.380 kg grain / kg N	21.020 kg grain / kg N
Amount of water saving, m 3 /acre	1050 /acre =103.75%	
Amount of nitrogen fertilizer saving, kg	38 Kg / acre	

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Authorize by Dr. Sanaa Hamad/Abdel Salam
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Summary:

Therefore, the use of soil conditioners with water retention properties can in fact increase the water holding capacity of soil. This will result in a reduction of use of irrigated water, that could allow for the expansion of new land used for cultivating crops in desert lands, which will, in turn, add to the water security and therefore the national security of Egypt.

Of the previous results it is possible to assert the following:

1. The use of soil conditioners can increase the soil fertility as well as its water holding capacity.
2. The capacity of wheat production with the least amount of materials used, from irrigated water and nutrients that result in a 50% saving in water and 43% in nitrogen fertilizer due to its efficiency of use.
3. The possibility of achieving an increase in biological crop yield (grain & hay) at 400 kilograms per acre.
4. The use of Hundzsoil has resulted in an increase in grain yield over traditional methods on average, to the amount of 290 kilogram per acre.
5. The use of Hundzsoil has resulted in a hay yield of 4,125 tons per acre in comparison with 4,115 tons per acre using traditional methods.
6. Hundzsoil is added 5 m³ per acre to increase the water holding capacity of soil which lasts 6 planting seasons.
7. It is possible to see a reduction in cost due to the increased efficiency of the resources used for irrigation be they diesel fuel or electricity, maintenance costs and equipment wear.
8. It is possible to achieve an efficiency in irrigated water use at about 1,288 kilogram per cubic meter of grain as opposed to traditional methods.
9. It is possible to achieve an efficiency in nutrient use, namely nitrogen, at 25.36 kilogram of grain per kilogram of fertilizer as opposed to traditional methods.
10. The average increase in crop density in the Hundzsoil fields is 19 stalks more per square meter and 5 more grains per stalk.
11. The previous results indicate the use of Hundzsoil is to be recommend, to increase crop yield and efficiency.
12. These results could be replicated in larger fields, any climate, or any crop be they summer or winter crops.

Approved by

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