5. SUMMARY

A field experiment was carried out in the Agricultural Experimental Station at Koam Oshem (El-Fayoum governorate) to evaluate the reclamation effect of using soil amendments of; gypsum (G), Sulphur (S); and organic matter (M) in a form of chicken manure, in a factorial randomized complete block design with 3 replicates. Wheat (var. Sakha, 69) was grown on the soil after reclamation. The soil was a clay : EC; 13.3 dS/m, ESP of 26, and pH of 8.2 (mean of 0-40 cm surface layer).

Treatments for each factor was as follows:

G: G_0, G_1, G_2 and G_3 ; S: S_0, S_1, S_2 and S_3 ; M: M_0, M_1 and M_2.

The 4 G rates were none; 25%; 50% and 75% gypsum requirement (GR) added as gypsum.

The 4 S rates were also none; 25 %; 50% and 75% (GR) added as sulphur. The amount in GR was equivqlent to 5.53 Mega gram (Mg). i.e. 5.53 metric ton of agricultural gypsum H_2SO_4. $2H_2O$/feddan or 1.05 Mg pulverized sulphur "S" /fed. On the basis of (Mg gypsum = 0.19 Mg sulphur).

The 3 rates of chicken manure were, none; 10 m3/fed; and 20 m3/fed.

There fore the overall treatment combinations were 48 (4x4x3).

I. Soil physical properties:-

- Soil bulk density (BD) decreased with addition of G, S and M , the main effect regarding each of them was gypsum 1.279 > sulphur 1.361 > and Farm yard manure 1.37 gm/ cm3.
- BD values decreased with increasing the dose of the studied amendments.
- Total porosity increased with using amendments; the pattern was gypsum 12.35%; sulphur 5.48% and FYM 2.68% , $G_3S_3M_2$treatment showed the greatest effect .
- Hydraulic conductivity (HC) values increased by application of amendments, gypsum (G) had the most prominent effect 0.083 mm min^{-1}. Vaules for S; FYM , and the no-amendments were; 0.034, 0.028 and 0.0115 cm min^{-1}.
- Infiltration rate increased with applied amendments, with gypsum treatments giving the promotive effects on infiltration with a mean value of 0.0266 mm min^{-1}, followed by sulphur 0.0133 mm min^{-1} and FYM 0.0125 mm min^{-1}. The IR value for the non-amended treatment was 0.01003 mm min^{-1}.
- Adding any of the tested amendments increased total stable aggregate. Increases in stable aggregates were as follows: due

to G addition = 43.0 %; due to S addition = 13.0 %; due to M addition = 6.5%.

- Instability index values decreased with applied tested amendments. The treatment of no-amendment showed an average value of 0.889 as compared with average values of 0.666 for treatments receiving G; 0.695 for those receiving S and 0.667 for those receiving M.
- Pores size distribution in the tested soils values as a results of the applied amendments showed that quickly drainable pore, slowely draianble pores, water holding pores percentage increased, Meanwhile, the fine capillary pores decreased.

II. Soil chemical properties:

- The pH values decreased under all treatments, manure treatments were more effective in this respect, the greatest reduction in pH value was by the ($G_0S_2M_2$) treatment and the value of pH 7.37.
- Soil electerical conductivity EC values decreased with increasing the dose of the studied amendments. The gypsum treatment was more effective in reducing of EC value than sulphur or organic manure. The greatest decrease in EC value was recorded by the $G_2S_3M_2$ treatment and the value is 5.23

dS/m as compared with an EC of non receiving of the materials treatment $G_0S_0M_0$.

- Cation exchange capacity CEC value was slightly increased after adding the manure treatment.
- Exchangeable sodium percentage (ESP) values were decreased due to added amendments. The decreasing order was: gypsum 17.8 > sulphur 19.94 > and manure 21.18. The most effective treatment for reduction in ESP value was $G_3S_3M_1$ treatment and the value is 9.10.
- The availability of N and K in soil tested increased with increasing the dose of the studied amendments, while there was a slight decrease in availability of P by G or S; only FYM treatments showed increased P availability.
- The availability of Fe, Mn, Zn, Cu in the tested soil increased with application of the tested amendments. The increasing pattern follows the order: gypsum > sulphur > manure.

III. Yield quality and production.

- The concentrations of N,P,K in wheat grains increased as a result of applying soil amendments, particularly with increasing rates. The pattern followed the order: manure 2.05% > gypsum 1.91% > sulphur 1.68%.

- The concentration of (Fe, Mn, Zn, Cu) in wheat grains were increased with applying soil amendments particularly with increased rates. The gypsum treatment is more effective followed by sulphur and manure.
- Wheat grain yield increased with using amendments, and the maximum yield was recorded with $G_2S_2M_1$ treatment and it was 3.7 matric ton/fed., while it was 1.1 matric ton/fed. in untreated soil.
- The best increasing in (grains + straw) yield was recorded in cause of $G_3S_3M_2$ treatment and it was 12.5 matric ton/fed., while it was 9.5 matric ton/fed in untreated soil.
- It can be concluded that application of gypsum, sulphur and organic manure in combination was the most effective treatment for taking a good harvest and good physical and chemical properties in soil.