



SUMMARY AND CONCLUSION

5. SUMMARY

Moisture and nutrients in soils are the main factors to measure crop yield and its quality in desert region. Application of fertilizer without sufficient water is not profitable and at times can lower yields. Water requirements needed to produce a unit weight of a crop can be reduced by adequate nutrition. The use of organic manure (either alone or in combination with biofertilizers) with lower moisture level can enhance plant growth and its nutrient content.

Therefore, the objectives of this work were to study the following:

- 1: study the effect of mineral conditioner $(\text{NH}_4)_2\text{SO}_4$ with and without biofertilizers at three rates 0, 30 and 90 kg N/fed. on wheat plant growth and its nutrients uptake i.e., N, P, K, Fe, Zn and Mn under different soil moisture levels.
- 2: The effect of organic manures (chicken manure and organic compost) at two rates of application i.e., 0.5 and 2% on wheat plant growth and its nutrients uptake i.e., N, P, K, Fe, Zn and Mn under different soil moisture levels.
- 3: The role of biofertilizers in minimizing the negative effect of soil moisture deficit on plant growth and its nutrients uptake.

The experimental work involved a pot experiment conducted at the greenhouse of Soils Department, Faculty of Agriculture, Benha University.

In this experiment, plastic pots were uniformly packed with 5 Kg portion of air-dried loamy sand soil collected from El-deer Village, Kalubeia Governorate and sieved through a 2mm sieve. The soils of pots were treated with either mineral conditioners $(\text{NH}_4)_2\text{SO}_4$ at rates of 0, 30 (N_1) and 90 (N_2) kg N/fed. or organic manures namely, chicken manure (CM) or composting manure (Comp.) at rates of 0.5 and 2%. However, there were treatments include inoculation with biofertilizer, the other treatments were conducted without biofertilization. Plants of all treatments were subjected to different soil

moisture levels, 50, 80 and 100% of field capacity. Two different plant samples were taken, the first sample was collected at 45 days of growth and the other one was taken at 70 days from sowing, oven dried at 70°C, and sub samples of fine plant material were digested with mixture of H₂SO₄ and HClO₄ acids (1:1).

Dry matter yield of wheat plant and the nutrients content of the digested solution were measured.

The obtained results could be summarized in the following:

- 1- Application of soil conditioners significantly increased wheat plant growth and the obtained values were increased as the rate of applied conditioner increased.
- 2- Subjecting wheat plants to soil moisture stress i.e. decreasing soil moisture levels from 100 to 80 and 50% of field capacity significantly decreased wheat plant growth as compared to the control (100% of field capacity).
- 3- Inoculation of wheat grains before sowing with nitrogen fixer's bacteria and phosphorus dissolving bacteria significantly increased wheat plant growth as compared with the un inoculation treatments.
- 4- Chicken manure as organic conditioners produced higher values of straw wheat dry weight followed by mineral conditioner then organic compost and control treatment (zero application).
- 5- Application of conditioners either in mineral form or inorganic significantly increased values of both macro and micronutrients i.e. N,P,K, Fe, Zn and Mn taken up by wheat plants at both growth stages 45 and 70 days, however higher values were achieved at 70 days from sowing.
- 6- Subjecting of wheat plants to moisture stress (50% of field capacity) decreased values of both macro and micronutrients uptake by wheat plants. Meanwhile, the highest moisture levels resulted in the highest values of nutrients taken up by wheat plants.
- 7- Inoculation of wheat grains before sowing produced higher values of nutrients uptake especially when conditioners were applied. Meanwhile, the biofertilization maximized the effect of soil conditioners and minimized the negative effect of soil moisture deficit.

- alone or in combination with biofertilizer
highest values of both macro and micronutrients uptake.
- 9- The dual effect of organic manure especially chicken manure and biofertilization was more pronounced when plants were subjected to moisture stress. Meanwhile, application of conditioners with biofertilization at low level of soil moisture produced higher values of nutrients uptake and reached in some cases to the same values or quite similar to those ones achieved at 100% or 80% of field capacity.
- 10- Chicken manure either alone or combined with biofertilizers produced higher values of chlorophyll followed by mineral conditioner $(\text{NH}_4)_2\text{SO}_4$ then organic compost and finally control treatment.
- 11- The highest values of nutrient uptake and chlorophyll were obtained by increasing the rate of applied conditioners.

Finally. It could be concluded that, the results of the current investigation indicate the great role of soil conditioners especially chicken manure in improving wheat plant growth, as well as, enhance the uptake of macro and micronutrients. These conditioners especially organic forms enhanced wheat plants growth and their nutrients uptake at moisture deficit due to their ability in conserving more available water at moisture stress and consequently improved soil properties and increased roots hair penetration. The use of organic conditioners, in general, is of a minimum or no-polluting effect on soil environment, as compared to chemical fertilizers. On the other side, the importance of using biofertilizer might be due to reducing the use of chemical N fertilizers and in turn saving money. Also, it is considered an important factor in reducing soil pollution as well as the other induced N losses in the form of nitrate under conditions of such soil.