WHEAT PRODUCTIVITY AND QUALITY UNDER INTEGRATED ORGANIC FARMING AND BIOFERTILIZATION

BY

MOHAMED AHMED ABD EL-HADY HASAN
B.Sc. Agric. Sc. (Agronomy), Ain Shams University, 2002

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This thesis for M.Sc. degree has been approved by:

Prof. Dr. Salah El-Din Abdel-Razzak Shafshak ……
Prof. Emeritus of Agron., Fac. of Agric. Moshtohor, Banha Univ.

Prof. Dr. Abdel-Azim Ahamed Abd El-Gawad ……
Prof. Emeritus of Agron., Fac. of Agric., Ain Shams Univ.

Prof. Dr. Nemat Abdel-Aziz Noureldin ……
Prof. Emeritus of Agron., Fac. of Agric., Ain Shams Univ.

Prof. Dr. Mohamed Samy El-Habbal ……
Prof. Emeritus of Agronomy, Fac. of Agric., Ain Shams Univ.

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Under the supervision of:

Prof. Dr. Mohamed Samy El-Habbal
Prof. Emeritus of Agronomy, Agron. Dept., Fac. of Agric., Ain Shams Univ.

Prof. Dr. Nemat Abdel-Aziz Nour El-din
Prof. Emeritus of Agronomy, Agron. Dept., Fac. of Agric., Ain Shams Univ.

Prof. Dr. Mohamed Fawzy Hamed
Prof. of Agronomy, Agron. Dept., Fac. of Agric., Ain Shams Univ.

إنتاجية وجودة القمح تحت ظروف الزراعة العضوية والتسميد الحيوي المتكاملة

رسالة مقدمة من
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صفحة الموافقة على الرسالة

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(محاصيل)

وقد تمت مناقشة الرسالة والموافقة عليها
اللجنة:

أ.د./ صلاح الدين عبد الرازق شفشق
أستاذ المحاصيل غير المتفرغ، كلية الزراعة بمشتهر، جامعة بنها. .....

أ.د./ عبد العظيم أحمد عبد الجواد
أستاذ المحاصيل غير المتفرغ، كلية الزراعة، جامعة عين شمس. .....
أ.د./ نعمت عبد العزيز نور الدين
أستاذ المحاصيل المتفرغ، كلية الزراعة، جامعة عين شمس. .....
أ.د./ محمد سامي يوسف الحبال
أستاذ المحاصيل المتفرغ، كلية الزراعة، جامعة عين شمس. .....

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لجنة الاشرف

ا .د./ محمد سامي الحبال
أستاذ المحاصيل المتفرغ، قسم المحاصيل، كلية الزراعة، جامعة عين شمس (المشرف الرئيسى)
ا.د./ نعمت عبد العزيز نور الدين
أستاذ المحاصيل المتفرغ، قسم المحاصيل، كلية الزراعة، جامعة عين شمس
ا.د./ محمد فوزي حامد
أستاذ المحاصيل، قسم المحاصيل، كلية الزراعة، جامعة عين شمس

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ABSTRACT

Mohamed Ahamed Abd El-Hady. Wheat Productivity and Quality Under Integrated Organic Farming and Biofertilization. Unpublished M.Sc. Thesis, Agronomy Dept., Fac. of Agric., Ain Shams Univ., 2006.

A field experiment was conducted in 2003/2004 growing season and repeated in 2004/2005 in Agric. Expt. Farm at Shalakan, Kaliobia Governorate to study the response of wheat crop (variety Giza 168) to integration organic farming and biofertilization. Concerning chemical characteristics of the experimental soil the concentration of organic carbon, total nitrogen, organic matter, soluble phosphorus and total available potassium were considerably affected versus applying the studied treatments. Regarding growth criteria, at booting stage plants fertilized by 20 kg MN + 40 kg ON/fad + B recorded the significant highest tillers and biomass dry weight (g/m^2). At heading stage adding 80 kg MN/fad + B exhibited the significant highest tillers dry weight. The data indicated that spikes No/m^2 and grain No/spike recorded the highest value by applying 80 kg MN + B, while 1000-grain weight by applying 20 kg MN + 60 kg ON/fad + B was the highest. The response of wheat yields, i.e., grains, straw, biological, crude protein and total carbohydrates was in descending order with applying 80 kg MN + B followed by 80 kg MN and 20 kg MN + 60 kg ON/fad + B. Except the treatment of ***B. polymyxa***, the highest marked increase of NUE was for applying 20 kg MN + 20 kg ON/fad + B. NRE was tremendously increased due to applying 80 kg MN/fad. The data revealed slight differences in NPE due to the application of 80 kg ON/fad, B, 80 kg ON/fad + B, 20 kg MN + 60 kg ON/fad + B, 20 kg MN + 40 kg ON/fad + B, 20 kg MN + 20 kg ON/fad + B. The highest NHI values were found due to applying 80 kg MN/fad, 80 kg ON/fad, 80 kg MN + B. Regarding grain quality, adding 80 kg

MN/fad with or without inoculation recorded the highest values of crude protein content and the lowest values of total carbohydrates. Applying 80 kg MN/fad showed significant lowest value of ash content. The data indicated that wheat plant fertilized with 80 kg MN + B produced statistically the highest wet and dry gluten in extracted flour.

The Data of net return (total return - total cost) could be arranged in respective descending order as follows: 80 kg MN/fad + B, 80 kg MN/fad, 20 kg MN/fad + 60 kg ON/fad + B, 20 kg MN/fad + 40 kg ON/fad + B, 20 kg MN/fad + 20 kg ON/fad + B, 80 kg ON/fad, 80 kg ON/fad + B and ***B. polymyxa***. The treatment of 20 kg MN + 60 kg ON/fad + B ranked the third one yet it reduces environmental pollution and develops more sustainable farming comparing to the treatment of 80 kg MN/fad. Moreover, the residual effect of organic fertilizer to the succeeding crops as soil conditioners, reservoir for nutrients, and a source of food for microorganisms is promising.

Key words: Wheat, Organic Farming, Biofertilization, Mineral Nitrogen fertilizer**.**

1. INTRODUCTION

Agricultural soils over Egypt are deficient in available nitrogen and organic matter, and their removal are usually greater than their input. Since nitrogen availability is a major factor determining crop productivity, it is imperative that soil nitrogen fertility be maintained. In the quest of achieving high yield of wheat, farmers tend to apply nitrogen in excess of the requirements. It leads to further lowering of nitrogen use efficiency, which is not more than 33% (**Raun and Johnson, 2001; Mullen *et al.*, 2003**). This indicates that much of the applied fertilizer nitrogen is not utilized by the plant and is susceptible to the loss from the soil-plant system. Due to the predominantly alkaline reaction of the soil, urea top dressed is preferently lost via leaching, nitrification-denitrification, or both (**Bejay-Singh *et al.*, 2001**). This is leads to spreading millions of tons of nitrogenous fertilizers manufactured at high cost. Therefore, nitrogen taken up is utilized at high energy cost to the plant and suggest that current nitrogen strategies are extremely inefficient.

Organic farming is a method of naturally occuring organic fertilizers for crop production. It is a method of farming system which primarily aimed at cultivating that land and raising crops in such a way to decrease the pollution effects of applying mineral nitrogen fertilizers. The beneficial effects of organic matter in improvement or maintenance of soil physical and chemical properties has being known. It serves as a reservoir for macro- and micro-nutrients, improves soil structure, drainage, aeration, cation exchange capacity, buffering capacity, water holding capacity and provides a source of food for microorganisms.

The biological materials along with beneficial microbes (biofertilizers) to release nutrients to crops is an another way for

increasing sustainable production in an eco-friendly and pollution-free enviornment. Biofertilizers are ready to use live micro-organisms, which on application to grains, roots or soil mobilize the availability of nutrients by their biological activity in particular and help build up the microflora and in turn the soil. Nitrogenous fertilizers harvest atmosphere nitrogen and converts into ammonical form which is available to the plants.

To overcome the deficit in nutrient supply and to overcome the adverse effects of chemical cultivation it is suggested that efforts should be made to exploit all the available resources of nutrients under the theme of integrated nutrient management. Under this approach the best available option lies in the complementary use of organic manures and biofertilizers in suitable combination of chemical fertilizers. This integrated approach of nutrient management not only ensures higher productivity and quality but also ensures the good health of our soil and environment.

For these reasons, the target of the present investigation was to reduce the amount of mineral nitrogen fertilizers use in growing wheat cultivar by partial or full sublimentation with organic manure and biofertilization.