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EFFECT OF NPK AND CHICKEN MANURE ON THE PRODUCTIVITY AND SOME GROWTH COMPONENTS OF SQUASH (*Cucurbita pepo* L.)

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ABSTRACT

A field experiment was conducted during summer season June-September of the year 2015 in a demonstration farm in Mutaain South Jordan, to investigate the effects of chemical fertilizer NPK (15:15:15) at 150Kg/ha, chicken manure at rate of 20t/ha and their combination on the productivity and growth parameters of squash (*cucurbita pepo*L.). The parameters investigated in the study were, fruit productivity (t/ha), fruit yield (g/plant), fruit length(cm), plant, fruit number per plant, average of leaves number per plant and plant height (cm). The results showed that, all fertilizer treatments had remarkable effect on all growth parameters and crop productivity. The highest fruits production 2.3 t/ha was achieved by the combination of NPK fertilizer and chicken manure compared to 1.79t/ha produced by the control. The combined use of NPK and chicken manure was also increased the number of fruits per plant significantly at ($p<0.05$), where the recorded value was 10 fruits/plant compared to 6.5 fruits/plant recorded by the control.

Keywords: squash, organic manure, chemical fertilizer, yield components.

INTRODUCTION

Squash (*Cucurbita pepo* L.) is a vegetable crop and characterized as a short seasonal crop, adapted to temperate and subtropical climate and grown in many regions. The crop is considered as one of the most important crop of the family Cucurbitaceae (Kathiravan *et al.*, 2006). Sumer quash cultivation grow well in loamy to sandy soils that are biologically active, rich in organic matter, slightly acid to neutral (pH 6.0 to 7.5) and possess high holding capacity of moisture and well drainage. It requires moderate levels of available soil nitrogen (N) and phosphorus (P), and fairly high levels of potassium (K), for optimum yield and quality. Excess moisture and bad aeration hinder plant growth (Seed Ahmed *et al*., 2003).

Plants require essential nutrients or building materials for proper growth and development. In most cases soil contains sufficient nutrients to support plant growth. However, some nutrients may not be occurred due to leaching by water or uptake by previous crops cultivated in the same field and therefore, the application of new source of nutrients is necessary. Application of organic manures as only source of nutrients cannot meet crop nutrients' demand over large areas because of the limited quantities available and slow release of nutrients (Palm *et al.*, 1997).Excess use of chemical fertilizer was also reported to be harmful for human health (Musa *et al*., 2010). In this case, application of organic and inorganic fertilizer in form of NPK fertilizer and chicken manure can decrease the footprint on the environment and meet the nutrient demands for the crop since NPK are essential nutrients for vigorous growth due to their immediate availability to the plant roots and hence high yields (Mohamed *et al*., 2012).

Dry land of Jordan is characterized as low fertile soil due to dominant dry climate and therefor, application of available organic sources such as chicken manure is necessary to increase the content of organic matter, maintain the nutrients balance for crops and improve the physical and chemical properties of the soil. In view of the limited research work and information about the production requirements of Squash (*Cucurbita pepo* L.) in Jordan, it is urgently to undertake this research to deal with some important aspects of production of this crop. Therefore, the study was aimed to investigate the effect of NPK and chicken manure and their combination on the productivity and some growth components of the crop.

MATERIALS AND METHODS

Field experiment was conducted at the farm research center located in in Mutaain South Jordan, during summer season (June to September) of the year 2015. The experimental design used was randomized complete block with four replications. The treatments were; chemical fertilizer NPK (15:15:15) at 150 Kg/ha, chicken manure at rate of 20t/ha, combination of NPK and chicken manure and the control (without fertilizer). The experiment had 16 plots; each plot has total area of $9m^2$. The plots were separated by a distance of 1 meter from each other and 0.6 m between holes. Before sowing, seeds bed was prepared very well by ploughing and disking. Chcken manure was applied 15 days before sowing, chemical fertilizer NPK was applied at three doses with 15 days interval and first dose was at sowing. Four guarded plants were tagged in each plot and then growth parameters data were taken at before harvesting. plant height (cm): Measured from the base of the stem to the tip of the youngest leaf, number of laves and fruits were assessed by visual counting, weight of fruits was assessed by digital balance. Analysis of variance (ANOVA) and Fisher's least significant difference tests were used to analyse the differences among the treatments. Statistical analysis was carried out by using DSAASTAT (Onofri, 2006).

Table-1. Soil properties of the experimental site.

pH	Ec	N	P	K	Soil particles distribution (%)		
	dS/cm	(%)	ppm		Sand	Silt	clay
7.8	1.53	0.036	7.1	284.7	14.2	35.3	50.5

RESULTS AND DISCUSSIONS

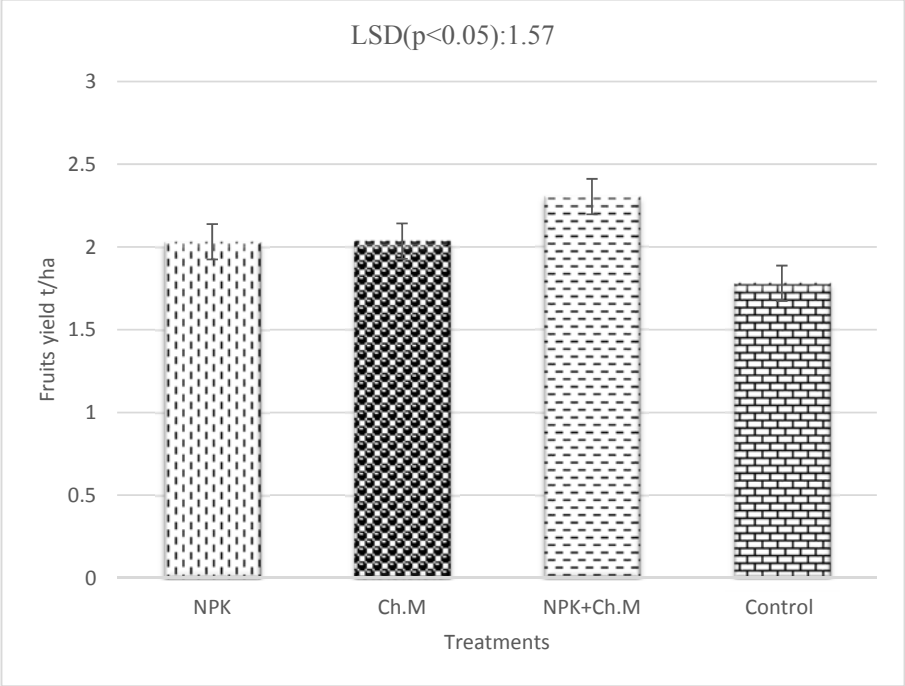

Figure-1. Effect of different treatments on the yield of squash.

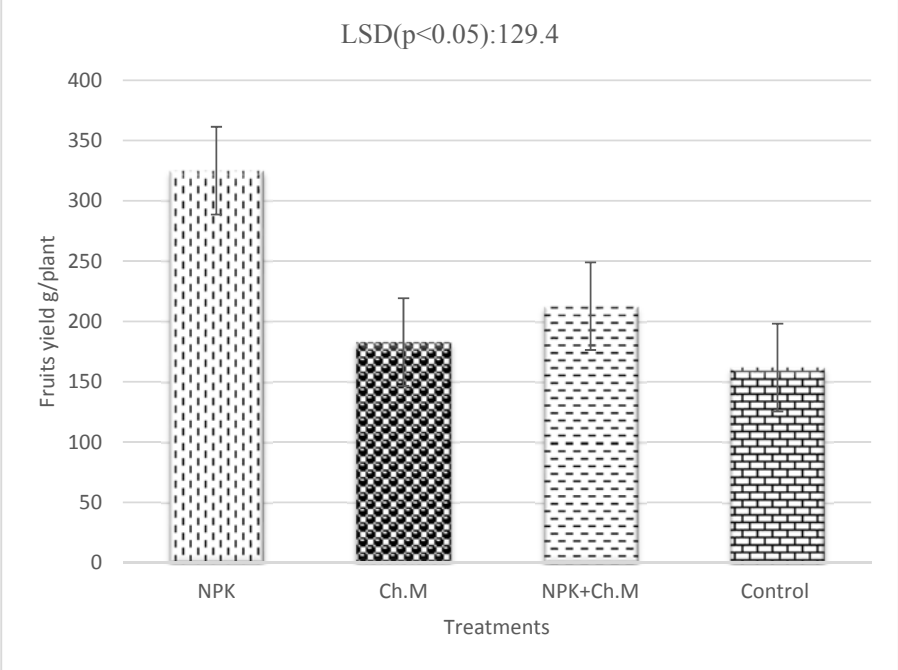

Figure-2. Effect of the treatment on the average weight of fruits/plant.

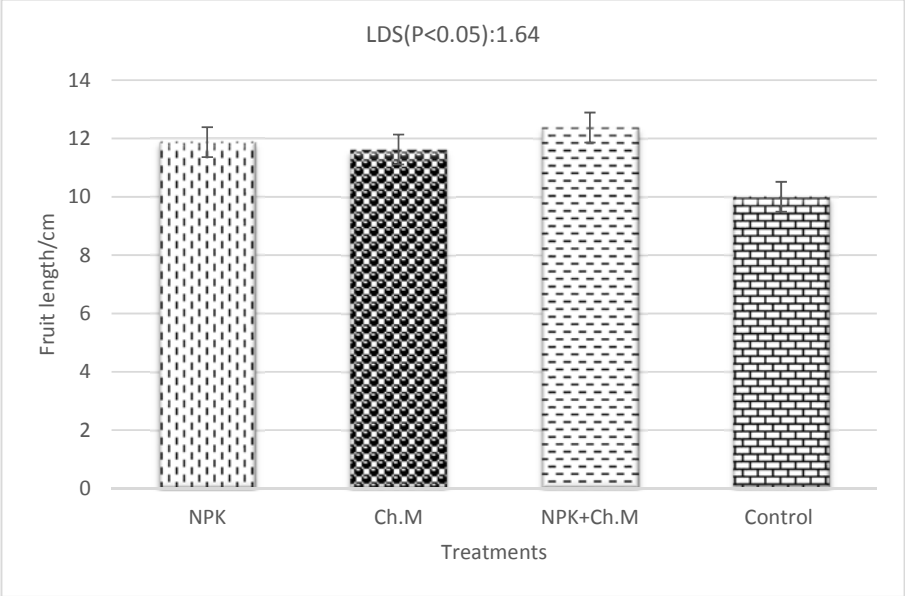

Figure-3. Effect of the treatments on the fruit length.

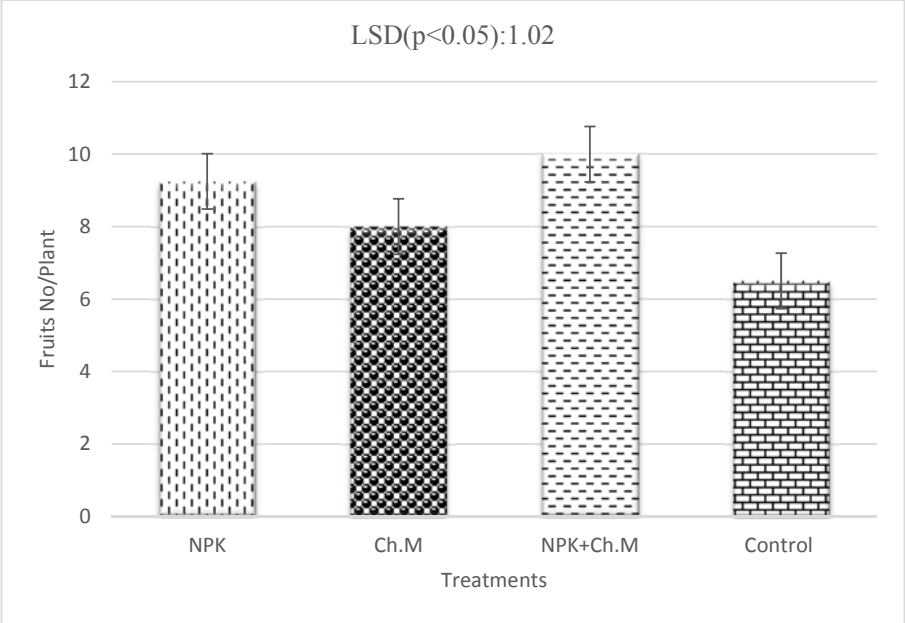

Figure-4. Effect of treatments on fruits number of the plants.

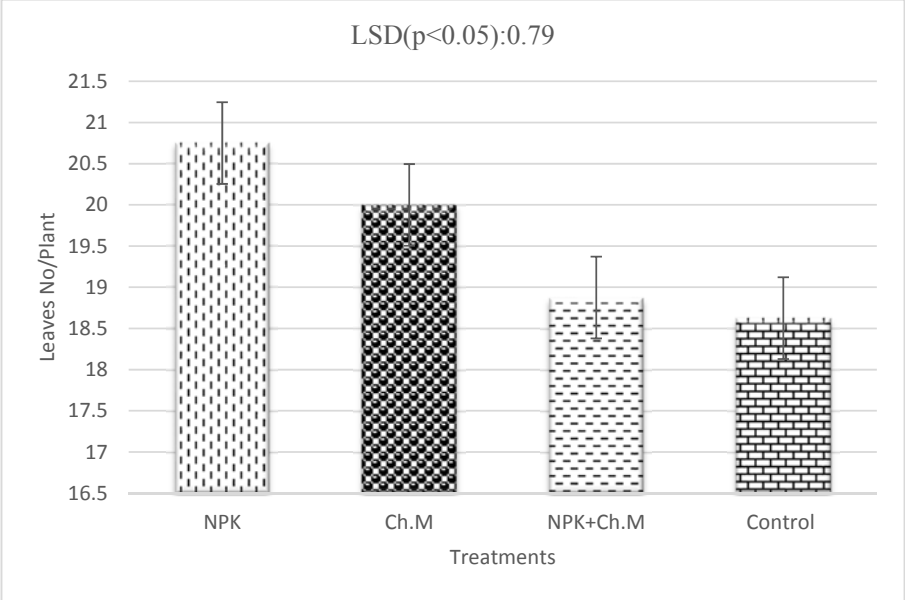

Figure-5. Effect of the treatments on the leaves number of the plant.

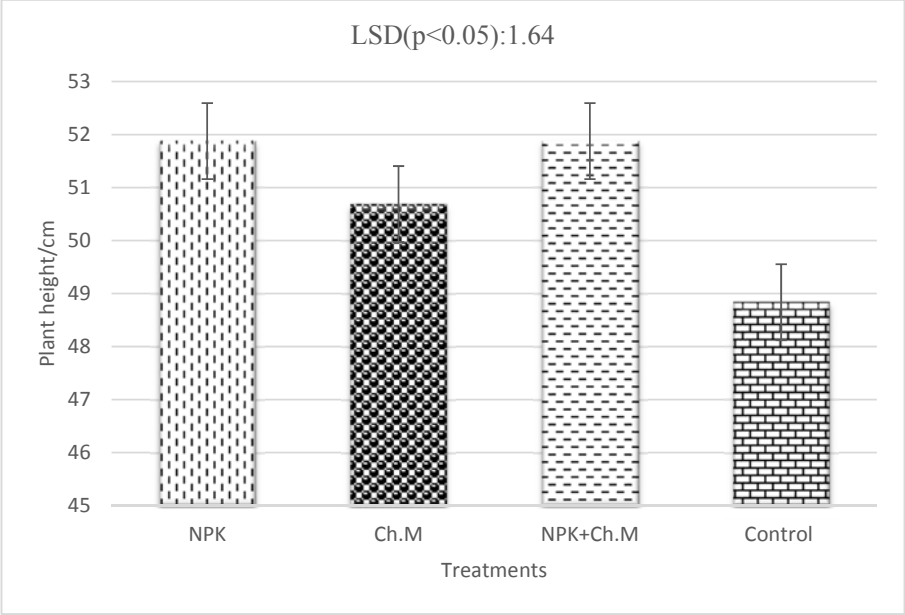

Figure-6. Effect of the treatments on the plant height.

Figure-1 show that all treatments were increased the productivity of the fruits over the control, however, there were no any significant differences among the treatments. The highest production 2.3t/ha was achieved by the combination of NPK with chicken manure, whereas the production of the control was 1.78t/ha. Figure-2 shows that the average of fruit weight per plant with increased by all treatments over the control. The chemical fertilizer NPK affected the fruit weight significantly and recorded the highest weight 325g/plant followed the combination NPK and chicken manure 212.6 g/plant, whereas the control was 161.8 g/plant. Figure-3 show that that fruits length were significantly affected by chemical fertilizer and the combination of NPK and chicken manure together, the recorded values were 11.9 cm and 12.4 cm where the length recorded by the control was 10cm. application of chicken manure alone didn't increase the fruit length significantly over the control. Figure-4 shows that all the treatment increased the number of fruits per plant significantly over the control. Combination of NPK with chicken manure recorded the highest value 10 fruits/plant whereas the number of fruits/plant recorded by the control was 6.5. Figure-5 show that application of chemical fertilizer and chicken manure individually were affected

the number of leaves produced by plants significantly, while the combination of these two fertilizers failed to increase the number of leaves to significant level over the control. Figure-6 show that all the treatment showed significant difference over the control. The highest plant height was recorded by NPK 51.9cm and the combination of NPK with chicken manure 51.9cm. Application of chicken manure alone showed lower plant height (50.7cm) than the chemical fertilizer; however the difference was not significant.

It was clear that, chicken manure and chemical fertilizer NPK application resulted in considerable increase on the productivity of fruits and the most of growth parameters including; plant height, number of leaves per plant and fruit length. These findings were similar to those reported by other researchers (Tandon, 1993; Mohammed, 1993; Eltilib *et al*., 1994; Elyass, 2000).

The positive effect of chicken manure on growth parameters obtained in this study was supported by results of Mohammed (1993) who stated that addition of manure significantly increased plant height. Similarly, Eltilib*et al*. (1994) reported that chicken manure application significantly increased plant height and number of leaves of okra compared to the control. The positive effect of chicken manure on fruit yield of squash in this study was supported by results of many researchers, (Muchtar and Genif, 1989; Eltilib*et al*. 1994) who found that manure application resulted in significant high yield and yield components of the most vegetable crops. From above findings; it appears that, chicken manure promotes crop growth. This could be attributed to the fact that, chicken manure provides the soil with essential elements such as nitrogen, phosphorous and potassium, for crop growth. Moreover, chicken manure has indirect effect on growth through improving soil physical; Chemical and biological properties, and ultimately enhance the vigorous growth of the crop. Furthermore it improves soil aeration.

In this study, it is also observed that application of chemical fertilizer NPK was significantly increased the productivity and all growth parameters compared to control. Similarly, Elyass(2000) reported that, there was an increase in vegetative growth of muskmelon by nitrogen and phosphorous applications. Many researchers had reported significant increase in yield components of squash and other vegetable crops by NPK applications (Dufault, 1986; Fisher, 1969; Nerson and Giskin, 1988). This might explain the consistent increase in fruit number, fruit weight and fruit length by application of NPK fertilizers, observed in this study.

CONCLUSIONS

The study demonstrated that, most of investigated growth and yield parameters of squash were significantly increased by application of chicken manure and chemical fertilizer NPK or their combination compared to the control. It is clear that squash is very responsive to the essential plant nutrients (NPK) and organic fertilizer in the form of chicken manure. Further quantitative studies on the effect of different organic and inorganic fertilizers and their applications at different rates, on growth, yield and yield components of squash under climate condition of south Jordan are encouraged.

REFERENCES

Dufault R.J. 1986. Influence of Nutritional Conditioning on Muskmelon Transplant. Quality and Early Yield. Journal of American Society for Horticulture Science. 111(5): 698-703.

Eltilib A.M.; Ali A.M. and Abdelallah, M.A. 1994. Effect of Chicken Manure and Salinity on Growth and Leaf Nitrogen Phosphorous and Potassium Contents on Okra Grown in Two Soil Types, University of Khartoum Journal of Agric. Sc., 1(2): 16-36.

Elyass S. K. 2000. Response of Muskmelon (*Cucumismelovar Reticulatus* Naud.) to Nitrogen and Phosphorus Fertilization. M.Sc. Thesis, University of Gezira, WadMedani, Sudan.

Fisher K.J. 1969. Effect of Nitrogen Supply during Propagation on Flowering and Fruiting of Glasshouse Tomatoes. Journal of Horticulture Science,44(4): 407-411.

Kathiravan K., G. Vengedesan, S. Singer, B. Steinitz, H.S. Paris and V. Gaba. 2006. Adventitious regeneration in vitro occurs across a wide spectrum of squash (*Cucurbita pepo*) genotypes. Plant Cell Tissue Organ Cult. 85:285-295.

Mohamed SB, Rania M, Nassar A, Ahmed FA. 2012. Response of sesame plant (*Sesamumorientale* L.) to treatments with mineral and Bio-fertilizers. Research Journal of Agriculture and Biological Sciences. 8(2): 127 - 137.

Mohammed M.A. 1993. Effect of Farm Yard Manure on Soil Fertility, Microbial Activity and Wheat Grain Yield.M.Sc. Thesis, University of Gezira, Wad-Medani, Sudan.

Mukhtar M. O. and Genif, A. A. 1989. Effect of Cattle Manure (FYM) ± Urea Nitrogen on Growth, Development and Yield of Potatoes. Annual Report, Gezira Research Station, Agricultural Research Corporation, Wad-Medani, Sudan.

Musa A, Ezenwa MS, OladiranJA, AkanyaHO, OgbadoyiEO. 2010. Effeect of soil nitrogen levels on some micronutrients, antinutrientsand toxic substances in Corchorusolitorius grown in Minna, Nigeria. Afr. J. Agric. Res. 5(22): 3075-3081.

Nerson H. and Giskin M. 1988.Foliar Nutrition of Musk Melon. II. Field Experiments. Communication in Soil Science and Plant Analysis. 16(11): 1985. Soils and Fertilizers, 51(5).Abst. No. 4421.

Onofri A. 2006. Enhancing Excel capability to perform statistical analyses in agriculture applied research. In: International Association for statistical Computing (Ed). Computational Statistics and Data Analysis and Statistical Software Newsletters http://www.csdassn.org/softlist.cfm

Palm CA, Myers RJ, Nandwa SM. 1997. Combined use of organic and inorganic nutrient source for soil fertility maintenance and replenishment. In: Buresh, R. (eds.), Replenishing Soil Fertility in Africa. SSSA Special Publication No 51. Wisconsin, USA. pp. 193-217.

Seed Ahmed, A. A. Yousif M. T. and Mohammed A. A. 2003.Vegetables Production in the Sudan. Principles and Applications (in Arabic) National Institute for Horticultural Exports Development (NIHED), University of Gezira.