Gezira J. of Agric. Sci. 2(**1**): 86-93 (2004)

# Effect of Chicken Manure, N and P on Yield and Quality of Muskmelon (*Cucumis melo* var. *Reticulatus* Naud)

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## ABSTRACT

Two experiments were conducted at the National Institute for the Promotion of Horticultural Exports (NPÆ) Research Farm, Wad Medani, Sudan, during the summer of 20m and winter of 2000/2001, to study the effects of chicken manure, nitrogen and phosphorus on muskmelon yield and quality. The treatments were four levels of chicken manure (0, 4.5, 9 and 18t/ha), two levels of nitrogen (0 and 55kg N/ha) and two levels of phosphorus (0 and 55 kg $P_20_5$/ha) arranged in a randomized complete block design with 3 replications. The results showed that muskmelon growth, yield and quality were significantly affected by chicken manure, N and P application. The most vigorous plant growth, the highest fruit yield and the largest fruits with best netting and highest total soluble solids were obtained by the application of 18 tons of chicken manure with 55kg N and 55kg $P_20_5$/ha.

## INTRODUCTION

Manure obtained from animal production areas, when recycled to agricultural land, supplies nutrients and organic matter, which can help to meet crop requirements and maintain soil fertility (Smith *et al* (2000).

The soils under muskmelon cultivation in Gezira and Khartoum State are deficient in organic matter, phosphorus and nitrogen. Hence, fertilizers are being applied at different levels for muskmelon production (Elyas, 2000). Muskmelon growth is enhanced by organic matter, regardless of the soil type (Peirce, 1987).

Muskmelon growth, sex expression, yield and quality were significantly affected by nitrogen and phosphorus application (Elyas, 2000) There was a close interaction between N and P fertilization in their effects on yield and quality. Salisbury and Ross (1978) stated that excess N delayed maturity and abundant P speeded it up. Relatively higher nitrogen application was found to be important for higher muskmelon yield (Bhella and Wilcox, 1986).

In the Sudan, animal production is now being gradually integrated in agricultural rotation in the Gezira Scheme. Because of escalating prices of chemical fertilizers in recent years, chicken manure may be used to compliment chemical fertilizers. Studies on the effects of manure alone or in combinations with chemical fertilizers on growth, yield and quality of horticultural crops are meagre. Large quantities of chicken manure are currently being produced in poultry farms. These progressively accumulating quantities can be an environmental hazard and at the same time very useful in agricultural production. The objective of this research is, therefore, to investigate the effects of chicken manure, N and P on yield and quality of muskmelon.

## MATERIALS AND METHODS

The experiments were carried out at the Research Farm of the National Institute for the Promotion of Horticultural Exports, University of Gezira, Wad Medani, Sudan, during the summer season of 2000 and winter 2000/2001 to study the effects of chicken manure, nitrogen and phosphorus on yield and quality of muskmelon.

The soil at the experimental site is fine montmorillonitic isohyperthermic entic chromostert (USDA, 1982). Surface soil samples (0-15cm) were taken before conducting the experiment to determine some physical and chemical properties of the soil . The soil contains %64clay with a pH of 8.2, 470 ppm total N, 3.6 ppm available P and %0.56organic carbon. Chicken manure samples were taken and analyzed for the determination of N, P and K contents. The amounts of these elements on dry matter basis were 2.10, 0.12 and 1.24% respectively

Fertilizers were applied on the sixth of February 2000 for summer planting and 15$^{th}$ of October 2000 for winter planting. Chicken manure was applied ht the rates of and 18 t/ha on the ridge side and

then uphilled, and phosphorus as triple super phosphate ( TSP) was applied at O or 55 kg/ha . Nitrogen was applied at the rate of 0 or 55 kg/ha, 30 days after planting as urea in bands over the ridges and then uphilled

Muskmelon, (*Cucumis melo* var. *reticulatus Naud*) cultivar "Galia‹" was provided by the National Institute for the Promotion of Horticultural Exports, and sown in February and October 2000 at 2.25m between rows and 30cm within-row spacing.

Five weeks after sowing, five plants from the central bed of each plot were chosen randomly and tagged. At the full slip stage all fruits were harvested and weighed for yield determination.

For quality evaluation, five fruits from each plot were chosen randomly for determination of netting percentage, fruit diameter, fruit weight and total soluble solids (TSS) which was measured by a hand refractometer (Belling ham and Stanley, U.K.) using unfiltered juice.

## RESULTS AND DISCUSSION

Main effects of chicken manure, N and P on yield of muskmelon Chicken manure, N and P significantly affected muskmelon yield (Table l). The highest yield was obtained at 18t/ha manure, 55 kg/ha N and 55 kg/ha P. Muskmelon yield increased as the rates of manure increased. Application of N and P resulted in a significant increase in

Table l. Main effects of chicken manure, N and P on total yield of muskmelon (summer, 2000 and winter, 2000/2001)

| Rates of fertilizer | Total yield (t/ha) | |
|---|---|---|
| Manure (t/ha) | Summer 2000 | Winter 2000/2001 |
| 0 | 6.75d | 7.89d |
| 4.5 | 10.14c | 10.99c |
| 9.0 | 13.90b | 13.90b |
| 18.0 | 17.56a | 19.00a |
| N(kytha) | | |
| 0 | 11.19 | 12.34 |
| 55 | 12.90 | 13.56 |
| P(kg/ ha) | | |
| 0 | 11.49 | 12.31 |
| 55 | 12.63 | 13.61 |
| C.V.% | 13.49 | 9.88 |

Means followed by the same letter (s) within each column are not significantly different according to Duncan's Multiple Range Test.

yield as compared to the control. These results are in agreement with the findings of Ali et al. (1992) who reported that application of organic manure resulted in 21.17% increase in wheat yield than the untreated control.

**Interaction effects N and P on muskmelon yield**

Muskmelon yield was significantly affected by the application of N and P in both seasons (Table 2). The highest yield was obtained at the application of 55 kg/ha of N and P. These results are in agreement with those reported by Bhella and Wilcox (1986) who found that high nitrogen applications were important for higher muskmelon yield. Similar results were reported by Elyas (2000) who showed that muskmelon yield was significantly affected by N and P application.

Table 2. Interaction effects of N and P on total yield of muskmelon (summer , 2000 and winter 2000/2001)

| Rate (kg/ha) | | Total yield (t/ha) | |
|---|---|---|---|
| N | P | Summer 2000 | Winter 00/2001 |
| 0 | P | 4.75d | 6.40d |
| 55 | 0 | 5.99c | 8.21bc |
| 0 | 0 | 7.12b | 8.02bc |
| 55 | 55 | 8.43a | 9.20ab |
| C.V.(%) | 55 | 13.49 | 9.88 |

Means followed by the same letter (s) within each column are not significantly different according to Duncan's Multiple Range Test.

**Main effects of chicken manure, N and P on fruit quality of musk. melon**

Fruit weight, fruit diameter, total soluble solids and netting percentage of muskmelon were significantly affected by manure, nitrogen and phosphorus application. The highest levels of these parameters، were obtained at 18t/ha manure, 55 kg/ha nitrogen and 55 kg/ha phosPhorus (Table 3). This was probably due to the good soil physical and chemical conditions for growth brought about by manure application. Osman (1999) reported that application of animal manure and N signi-

ficantly increased total soil N, soil organic carbon, available nitrogen and phosphorus. Available N increased netting percentage as reported by Bhella and Wilcox (1986) who showed that poor netting was generally associated with low nitrogen. Elyas (2000) stated that total soluble solids increased significantly as nitrogen increased. Also, fruit weight increased by increasing the availability of N in the soil resulting from applied manure. This is in accordance with Wiedenfeld (1986) who reported that an increase in muskmelon fruit weight was obtained by increased nitrogen rate.

Table 3. Main effects of manure, N and P on muskmelon fiuit quality (summer, 2000 and winter 2000/2001)

| Rate of fertilizers | Fruit wt.(g) | | Netting % | | Fruit diameter (cm) | | TSS (brix) | |
|---|---|---|---|---|---|---|---|---|
| Manur(tha) | Summer | Winter | Summer | Winter | Summer | Winter | Summer | Winter |
| 0 | 544d | 329d | 72d | 74d | 7 d | 8 d | 7 d | 7 d |
| 4.5 | 647c | 428bc | 81c | 82c | 8 c | 9 c | 9 c | 8 c |
| 9.0 | 746b | 459bc | 89b | 89b | 10 b | 10 b | 10 b | 10 b |
| 18.0 | 870a | 611a | 94a | 95a | 11 a | 12 a | 12 a | 12 a |
| N (kg/ha) | | | | | | | | |
| 0 | 671b | 429b | 82b | 84b | 8 b | 9 b | 0 a | 9 b |
| 55 | 733a | 513a | 86a | 87a | 9 a | 10 a | 10a | 10 a |
| P (kg/ha) | | | | | | | | |
| 0 | 689ab | 436b | 83b | 85b | 9 b | 9 b | 10 | 9 b |
| 55 | 715a | 490a | 85a | 86a | 10 a | 10 a | 10 a | 10 a |
| C.V.(%0 | 3 | 15 | 3 | 2 | 5 | 5 | 6 | 5 |

Means followed by the same letter (s) within each column are not significantly differently different according to Duncan's Multiple Range Test.

**Interaction effects of N and P on fruit quality of muskmelon**

Fruit weight, fruit diameter, total soluble solids and netting percentage were significantly affected by the interactions of nitrogen and phosphorus (Table 4). The highest levels of these parameters were obtained at the combination of N and P applied at 55 kg/ha each.

Table 4. Interaction effects of N and P on fruit quality of muskmelon (summer, 2000 and winter 2000/2001)

| Rate (kh/ha) | | Fruit Wt.(g) | | Fruit diameter | | TSS (brix) | | Netting (%) | |
|---|---|---|---|---|---|---|---|---|---|
| N | P | Summer | Winter | Summer | Winter | Summer | Winter | Summer | Winter |
| 0 | 0 | 741 a | 263 d | 6 b | 7 c | 7 c | 7 b | 64 d | 68 d |
| 55 | 0 | 571 bc | 360 bc | 6 b | 9 a | 8 b | 8 a | 75 bc | 78 a |
| 0 | 55 | 524 bc | 362 bc | 7 a | 8 b | 8 b | 7 b | 74 bc | 74 c |
| 55 | 55 | 611 b | 376 ab | 7 a | 9 a | 9 a | 8 a | 77 a | 76 b |
| C.V. | (%) | 3 | 15 | 5 | 5 | 6 | 5 | 3 | 2 |

Means followed by the same letter (s) within each column are not significantly different according to Duncan's Mltiple Range Test.

These results agree with those of Bhella and Wilcox (1986) who reported that muskmelon growth and quality were significantly affe-cted by nitrogen and phosphorus application. This is probably due to the good chemical conditions for growth obtained from nitrogen and phosphorus application.

In view of the escalating prices of chemical fertilizers and the concern over environmental pollution and human health, it is neces-sary to use organic fertilizers. Large quantities of chicken manure are produced in poultry farms every year. Results of this study should encourage more use of this important organic fertilizer.

## REFERENCES

**Ali, N. A. A**. salih, S. H. Ahmed, B Abdalla, B. E. Abd EI Rahman, M. G. Mansi and O. Abd Elwahab. 1999. Effect of organic fertilization on wheat production under Sudan conditions. ICARDA /NVRP-Doc-031, Annual Report, Agricultural Research Corporation, Wad Medani, Sudan.

**Bhella, H.S**. and G.E. Wilcox. 1986. Yields and composition of musk. melon as influenced by pre-planting and trickle applied nitrogen. HonScience 210): 86-88.

**Elyas, S.K.** 2000. Response of Muskmelon (*Cucumis melo* vat *reticulatus* Naud) to Nitrogen and Phosphorus Fertilization. M.Sc. Thesis, University of Gezira, Wad Medani, Sudan.

**Osman, I.O.** 1999. Effect of Farm Yard Manure and Nitrogen on Nutrients Availability and Sorghum (Sorghum bicolr L. Moench) Yield Components. M.Sc. Thesis, University of Gezira, Wad Medani, Sudan.

**Peirce, L.C**. 1987. Vegetable Characteristic Production and Marketing. John Wiley and Sons. New York, USA.

**Salisbury, F.B**. and C W. Ross. 1978. Plant Physiology. Wathworth Publishing Company. New York, USA.

**Smith, K.,A**.J. Brever, A.M.Dawner and D. W. Wilson. 2000. A survey of the production and use of animal manures in England and Wales-I. Pig manure. Soil Use and Management 16: 124-132.

**USDA, SCS**. 1982. Soil Survey Investigation Report No. l. Soil Survey Laboratory Methods and Procedures for Collecting Samples. Washington. D.C., USA.

**Wiedenfeld R**. P. 1986. Rate, timing and slow release nitrogen fertilizer on bell peppers and muskmelon. HortScience 2 (2): 233-235.