Nile Valley University Publications
Nile Journal for Agricultural Sciences (NJAS)
(ISSN: 1585 – 5507)
Volume 10, NO. 01, 2025
https://nilevalley.edu.sd

Research paper

Effects of Urea Fertilizers and Chicken Manure on Growth and Yield of Carrot (*Dacaus carota* L)

Intisar Mohammed Bakheit, Samia Ahmed Makki.

Faculty of Agriculture, Nile Valley University
Corresponding Author: intisarbakheit72@gmail.com

Abstract

This study was carried out at Dongola Research Station farm during winter season of 2015 / 16 and 2016/17 to evaluate the effect of chicken manure rate and urea fertilizer on growth and yield of carrot. treatments consisted of 12 levels of urea and chicken manure each alone or in combinations and untreated control. Results showed that all fertilization treatment effect on growth parameter (leaves number and leaves length) although positive was only statistically significant in season 2016/17. The combination of chicken manure and urea affected positively vegetative growth and root yield.

Keyword: *Fertilizer, organic manure, yield components, carrot*

تأثير أسمدة اليوريا وروث الدواجن على نمو و إنتاجية الجزر(*Dacaus carota* L)

انتصار محمد بخيت، سامية أحمدمكي

كلية الزراعة، جامعة وادي النيل

المؤلف : intisarbakheit72@Gmail.com

المستخلص

أجريت هذه الدراسة في مزرعة محطة أبحاث دنقلا خلال موسمي الشتاء 16/2015 و17/2016 لتقييم تأثير معدل سماد الدواجن وسماد اليوريا على نمو وإنتاجية الجزر .تكونت المعاملات من 12 مستوى من اليوريا وروث الدواجن كل على حدة أو في مجموعات ومعاملة حاكمة غير معالجة. أظهرت النتائج أن جميع معاملات التسميد تؤثر على مؤشرات النمو (عدد الأوراق وطول الأوراق) على الرغم من كونها إيجابية إلا أنها كانت ذات دلالة إحصائية فقط في موسم 17/2016 .أثر مزيج سماد الدواجن واليوريا بشكل إيجابي على النمو الخضري وإنتاجية الجذور .

الكلمات المفتاحية: التسميد، السماد العضوي، مكونات الغلة، الجزر

Introduction

Carrot (*Daucus carota L*) is a member of the family Umbelliferae. The carrot is one of the most important vegetable crops and the most widespread crop in the world compared to the crops of other species such as the White carrots, parsley, cactus, coriander, celery etc.(F.A.O, 2000). The crop originated in Southwest Asia and later spread throughout China and the Mediterranean basin (Kwabena, 2011). Carrot fleshy roots are used as vegetables for salads, soups and are also steamed or boiled in other vegetable dishes (Amjad *et al*., 2005). Besides the food value it is used for different medicinal purposes due to a wide range of reported pharmacological effects (Rossi *et al.*, 2007). Productivity and quality parameters of carrot root yield depend on cultivar, climatic, soil, and agronomic factor (Martin *et al*., 2004). However, the Carrots are reported to be high antioxidants and contain a lot of pro-vitamins A which can help to maintain the eyesight (CALU, *2007*).

Kristensen and Kristensen, (2002) reported that in sandy soil, combination of organic and inorganic fertilizers improves the soil structure and apart from this it also allows the shoulder of carrots to expand with ease. Manure is key factor in restoring the productivity of degraded soils as it supplies multiple nutrients, decreasing soil pH and improves soil organic matter, which in turn improves the physical and microbial properties of the soil (Zingore *et al.*, 2007). Generally, most carrot growers use organic and inorganic fertilizers to realize higher yields as opposed to the unfertilized fields, also organic manure likes cow dung improves soil texture, structure and aeration, inorganic fertilizer in combination with organic manures also increases the carrot yield (Rumpel *et al*.,1998).

The objective of this study is to investigate the effect of organic manure and urea on growth and yield of carrot cultivars namely (*Dacaus carota l)***.** And to determine the best dose of fertilizers which influence the yield and root characteristics.

Material and Methods

The experiment was conducted during the seasons of 2015/16 and 2016/17 in Dongola research station farm in the Northern state of Dongola locality (16^{o} :22 N and 20^{o}:32 E), Sudan. The soil was sandy clay loam in texture, deficient in nitrogen and phosphorus as well as low in organic matter. It was also found that the soil contained relatively moderate quantity of calcium carbonates and pH value of 7.11.

In this study carrot seeds variety (Chantenay Red Cored) produce of U.S.A was used for planting. The experimental design was randomized complete block design (RCBD) with four replications, treatment was designed into four replications. Each block was divided 12 plots distributed at random. Urea and chicken manure alone or in combination were applied.

Treatment were; control, 100,150 and 200 urea kg per ha, 1.2 and 2.4 tons of chicken manure per ha, combination of urea and chicken manure 2.4t/ha+ urea 100 kg, 2.4t/ha + urea 150 kg, 2.4t/ha + urea 200 kg.

chicken manure fertilizer, which was applied before planting. Spread in each plot and being incorporated thoroughly into the soil. Urea fertilizer was applied in two doses, the first dose one month after sowing and the seconds dose is one month after the first dose.

In each season the experimental site was tilled and ploughed, using disc harrow, then, leveled and divided into ridged plots. The seeds were sown during the 4th week of November in each season by hand on 70 cm ridge using spacing of 10 cm between plant. Irrigation and other cultural practices done as recommended by researchers.

The data collected were leaves length (cm), Number of leaves per plant, root length (cm), root diameter (cm), yield, from root yield randomly selected plants at harvest at the 50% flowering stage. The recorded data from agriculture till harvest was statistically analyzed, the means values for all the parameters were calculated and the analysis of variance for the characters was accomplished by F variance test, the significant of difference between pair of means was tested by the least significant difference (LSD), test at 5% and 1% levels of probability (Gomez and Gomez 1984).

Results and Discussion

Table (1) shows the effect of fertilizers on vegetative growth parameters. The result in season 2015/16 showed no significant differences between all treatments. However, in season 2016/17 results was significant. Most fertilizer treatments increased significantly leave length compared to the control, in season 2016/17 the result showed that, the highest leaves length (36.1 cm) was obtained by 1.2-ton chicken manure + 150 kg urea and the greater leaves number (16) was registered by 2.4 tons chicken manure + 200 kg urea. Such results agreed with that obtained by Robin, *et al* (2001) who reported higher rate of plant growth due to increased nitrogen supply, Brima (2007) who indicated positive effect of NPK and also agree with, Maurya and Goswamy (1985) they reported significant Increase in leaves length in carrot with the application of higher dose of nitrogen. Mbatha, (2008) also observed increased leaves length and leaf numbers of

carrots subjected to higher rates of different organic fertilizers (chicken, kraal and compost). Saad, (2009) found also significant effect of nitrogen fertilizer on mean leaves length.

Table (2) showed the effect of fertilizers on yield and yield component. Differences in length and diameter of carrot root were not significant in both seasons as affected by feralization treatments. However, root yield showed significant differences as affected by fertilizer application. The highest root yield was 36. 4 tons ha^{-1} obtained from 1.2 tons of chicken manure + 150 kg urea ha^{-1} in season 2015/16 and 34. 063 tons ha^{-1} obtained from 1.2 tons of chicken manure + 200 kg urea ha^{-1} in season 2016/17.

Dechassa *et al*., (2003); Mog (2007); Dawuda *et al*., **(**2011) obtained similar results of increased yield of carrot due to fertilizer application. Results also agree with the findings of Abdel-Mawly (2004) who stated that an increase in nitrogen rate increased yield and Ali *et al*., (2003) who stated that high rate of nitrogen and phosphorus increased the root yield of carrot.

Although results were not statistically significant, slight increase in root length and root diameter were noticed due to application of manure and urea. Findings of Rani and Reddy (2007), Kirad *et al*. (2010), Azad (2000) indicated similar enhancement in root diameter and root length with integrated use of organic manure which led to increased yield of roots.

In the current study, increased root yield in both season was a result of treatments affected positively green leaves which in turn direct photosynthetic assimilates into root growth as a result of increased nutrient content. Kang *et al*. (1990) discussed similar findings that high crop yield can be obtained with judicious and balanced NPK fertilization combined with organic matter accumulation.

Table (1) Effects of chicken manure and urea fertilizers on the vegetative growth (leaves length, number of leaves), of carrot crop:

Treatment	**Leaves length (cm)**		**NO. of leaves**	
Fertilizer rate	**first season**	**second season**	**First Season**	**second season**
Control	21.55	29.50	10.5	13
urea 100 kg/ha	30.025	34.56	11	13.75
urea 150kg/ha	27.50	31.36	11.25	12.75
urea 200kg/ha	31.125	34.48	10.75	13
1.2 t/ha manure	27.95	31.70	11	13.75
1.2t/ha + urea 100 kg	31.85	35.71	10.25	13.5
1.2t/ha + urea 150 kg	31.42	36.100	11.5	13.75
1.2t/ha + urea 200 kg	26.85	33.855	11.75	13.25
2.4 t/ha manure	26.80	30.37 8	12.25	13
2.4t/ha+ urea 100 kg	29.62	30.875	11.5	14
2.4t/ha + urea 150 kg	25.90	31.135	10.25	13.75
2.4t/ha + urea 200 kg	28.27	32	11.25	16.25
CV%	12.78%	%10.29	8.92%	13.78%
SE±	1.8467	1.688	0.4951	0.9402
LSD	5.313	4.858	1.424	2.705
Sig level	Ns	**	Ns	*

*.Mean significant difference**Means with high significant difference ,NS= Means with no significant difference

Table (2) Effect of chicken manure and urea fertilizers on yield and yield component of carrot roots

Treatment	Root length(cm)		Root diameter(cm)		Yield Ton h^{-1}	
Fertilizer rate	**first season**	**second season**	**first season**	**second season**	**first season**	**second season**
Control	21.125a	14.95	2.265	2.22	20.5bc	15.625c
urea 100 kg/ha	21.332	16.075	2.642	2.805	31.55abc	30.625a
urea 150 kg/ha	21.275	16.95	2.527	2.345	23.325bc	30a
urea200 kg/ha	21.813	15.575	2.728	2.495	33.988ab	32.813a
1.2t/ha manure	21.3	13.575	2.697	2.495	27.138abc	16.25bc
1.2t/ha+urea100 kg	19.65	14.4	2.743	2.81	30.4abc	30.938a
1.2t/ha+urea150 kg	20.563	14.85	2.993	2.645	36.512a	30.313a
1.2t/ha+urea200 kg	21.387	19.075	2.462	2.4	20.737bc	34.063a
2.4t/ha manure	22.175	17.175	2.665	2.913	23.2bc	21.875abc
2.4t/ha+urea100 kg	20.088	16.65	2.775	2.855	23.413bc	27.813ab
2.4t/ha+urea150 kg	21.7	16.3	2.64	2.848	18.713c	22.813abc
2.4t/ha+urea200 kg	22.113	17.625	3.053	2.665	21.775bc	22.875abc
CV%	8.10%	18.80%	13.26%	13.74%	31.07%	27.65%
SE±	0.8588	1.5138	0.1778	0.1803	4.0291	3.6407
LSD	2.471	4.355	0.511	0.519	11.59	10.48
Sig level	NS	NS	NS	NS	*	**

Means in columns followed by the same letter (s) are not significantly different at P≤ 0.05, according to Duncan's Multiple Range Test.*Mean significant different.**Means with high significant difference,NS Means with no significant differenc**e**

Conclusion:

Combined effect of chicken manure and urea fertilizer lead to enhanced vegetative growth, yield and yield components, application of (1.2 th^{-1}chicken manure + 150 kg urea h^{-1}) seem to be more suitable dose compared to use urea or chicken manure each alone.

References

Abdel-Mawly, S.E. (2004). Growth, yield, N uptake and water use efficiency of carrot (*Daucus carota* L.) plants as influenced by irrigation level and nitrogen fertilization rate. Ass Univ Bull Environ Res, 7(1):111-122.

Ali, M. D.; Hossain, M.A.; Mondal, M.D.F.; Farooque, M.A. (2003). Effect of nitrogen and potassium on yield and quality of carrot. Pakistan Journal of Biological Sciences, 6 (18): 1574-1577.

Amjad, M.; Naz, S.; Ali, S. (2005). Growth and seed yield of carrot as influenced by different regimes of nitrogen and potassium. Journal of Research Science, 16 (2), 73-78.

Azad, A.K. (2000). Effect of Plant Spacing, Source of Mulching on Growth and Yield of Cabbage. M.Sc. thesis, Department of Horticulture. Bangladesh Agricultural University. Mymensingh. Lanka, 23(4): 171-182. pp: 15-40

Brima, F.I.A. (2007) Effect of Seed Rate and NPK Fertilization on Growth, Yield and Forage Quality of Rhodes grass (*Chloris gayana* L. Kunth). M.Sc. Thesis. Faculty of Agriculture, University of Khartoum, Sudan.

CALU,(2007). Carrot crop Production Guides. CALU-the Development Centre for Horticulture, biomass, novel crops, farm woodlands and novel livestock in Wales, U.K. Ref: 020110, 1-2. www.calu.bangor.ac.uk (accessed on 11th December, 2013). culture, Ecosystems and Environment, 119 (1-2): 112-126.

Dawuda, M. M.; Boateng, P.Y.; Hemeng, O.B.; Nyarko, G. (2011). Growth and yield response of carrot (*Daucus carota* l.) to different rates of soil amendments and spacing. Journal of Science and Technology, 31 (2): 11-20.

Dechassa, N.; Schenk, N.M.K.; Steingrobe, N. (2003). Phosphorus Efficiency of Cabbge (*Brassica oleraceae* L. var. capitata), Carrot (*Daucus carota* L.), and Potato (*Solanum tuberosum* L). Plant Soil 250:

FAO. (2000). Production Year Book, food and agriculture Organization. Rome, Italy ,54:160-161.

Gomez, K.A.; Gomez, A.A. (1984). Statistical Procedures for Agricultural Research (2nd ed.). Wiley-Inter Science Publication , John Wiley and Sons, New York. p. 680 .

Kang, B.T.; Reynolds, L.; Atta-Krah, A.N. (1990). Alley farming. Adv. Agron, 43:315-359.

Kirad, K.S.; Barche, S.; Singh, D.B. (2010). Integrated nutrient management on growth, yield and quality of Carrot. Karnataka J. Agric. Sci 23(3): 542-543. 8.

Kristensen, H.L.; Kristensen, K.T. (2002). Root depth and nitrogen uptake from deep soil layers in organic vegetable production - A preliminary study. Acta Hortic, 571:203–208.

Kwabena, A. (2011). Influence of Grass Cutter, Chicken Manure and NPK Amendments on Soil Characteristics, Growth and Yield Response of Carrot (*Daucus carota*) thesis, MSc level, university of Education, Winnebapp 7376;.

Martin, N. V.; Geert-jan, B.T.; Arne, V.B. (2004). Parameter for Carrot Quality and the Development of Inner Quality Concept. Louis Bolk Institute .

Maurya, K. R.; Goswami, R. K. (1985). Effects of NPK fertilizers on growth, yield and quality of carrot. Prog. Hort., 17 (3):212-. 217

Mbatha, A. N. (2008). Influence of Organic Fertilizers on the Yield and Quality of Cabbage and Carrots. MSc. Thesis, University of the Free State Bloemfontein.

Mog, B. (2007). Effect of Organics and Biofertilizers on Productivity Potential in Carrot (*Daucus carota* l.) (MSc. Agric. Thesis in Crop Physiology). department of Crop Physiology College of Agriculture, dharwad University of Agricultural Sciences, dharwad, India.

Nonnecke, I.L. (1989). Vegetable Production. VanNostrand Reinhold. New york, NY.P.571.

Rani, N. S.; Mallareddy, K. (2007).Effect of different organic manures and inorganic fertilizers on growth, yield and quality of carrot (*Daucus carota* l.). Karnataka Journal of Agricultural Sciences, 20 (3): 686 – 688 .

Robin, L.W.; Burns, I.G.; Moorby, J. (2001). Responses of plant growth rate to nitrogen supply: a comparison of relative addition and N interruption treatments. J. Exp. Bot. 52(355): 309-317.

Rossi, P.G.; Bao, L.; Luciani, A.; Panighi, J.; Desjober, J.M.; Bolla, J.J.; Berti, L. (2007). E-ethylisoeugenol and elemicin: antibacterial components of *Daucus carota* L. essential oil against *Campylobacter jejuni*. J Agric Food Chem, 55:7332-7336.

Rumpel, J.; Jakubczyk, H.; Lata, B.; Sadowski, A.; Whitehead, O. (1998)**.** Effect of long term organic and mineral fertilization on soil properties and development of tomato, carrot and onion . A seminar on ecological aspects of nutrition and alternatives for hervicides in horticulture, Warszawa, Poland. 10-15 June, 1997, pp. 63-64.

Saad, H.H. (2009)**.** Evaluation of Nitrogen Fertilizers on Quality and Quantity of Rhodes Grass (*Chloris gayana* L. Kunth) . M.Sc. Thesis. Faculty of Agriculture Studies, Sudan University of Science and Technology, Sudan

Zingore, S.; Murwira, H.K.; Delve, R.J.; Giller, K.E. (2007). Influence of nutrient management strategies on variability of soil fertility, crop yields and nutrient balances on smallholder farms in zimbabwe. Agriculture, Ecosystems and Environment, 119 (1-2): 112-126.