Interdisciplinary Journal of Agriculture and Environmental Sciences
ISSN: 2837-9977| Impact Factor : 8.17
Volume. 12, Number 2; April-June, 2025;
Published By: Scientific and Academic Development Institute (SADI)
8933 Willis Ave Los Angeles, California
https://sadijournals.org/index.php/IJAES| editorial@sadijournals.org

EFFECTS OF DIFFERENT LEVELS OF POULTRY MANURE UNDER IRRIGATION INTERVALS ON THE GROWTH AND YIELD OF LATE-SEASON GARDEN CRESS *(Lepidium sativum l.)* IN SOUTHEAST NIGERIA.

[1]Ihenacho L. U, [1, 2] Chukwuka K. S. and [3]Iwuanyanwu J. C.
[1]Department of Agricultural Technology, Imo State Polytechnic Omuma.
[2]Department of Botany, University of Ibadan, Nigeria
[3]Department of Agronomy, College of Crop Science, Michael Okpara University of Agriculture, Umudike, Abia State
Email: lynusacho@gmail.com, 08037916638
DOI: https://doi.org/10.5281/zenodo.15482126

Abstract: A field trial on the effects of different levels of poultry manure under irrigation intervals on the growth and yield of Garden cress (Lepidium sativum L.) was carried out at the Teaching and Research Farm, School of Agriculture and Agricultural Technology, Imo State Polytechnic Omuma. The experiment was arranged in a Factorial Design fitted into a Randomized Complete Block Design replicated (4) four times. The seeds of garden cress were planted via a broadcast method using a plastic cover of Coca-Cola to ensure a uniform plant population. The treatments were poultry manure levels of 0t/ha, 3t/ha. 6t/ha and 9t/ha which were incorporated into the soil two (2) weeks before planting. Watering can be used to apply water to the crop manually at one (1) and two (2) day intervals. Data were collected on plant height and the number of leaves/plant at 2, 4. 6 weeks after planting, whereas leaf yield was determined at harvest 8 weeks after planting. Analysis of variance (ANOVA) showed that 9 t/ha poultry manure under one (1) day irrigation interval produced the highest leaf yield of 4±0.21 t/ha and other parameters evaluated. The lowest yield of 1.0±0.05 t/ha was obtained using 0 t/ha poultry manure under two (2) days irrigation interval.

Keywords: Lepidium sativum, irrigation interval, poultry manure, late season, yield.

INTRODUCTION

Garden cress *(Lepidium sativum L)* is an annual edible herb in the Brassicaceae family. It is a fast-growing herb native to Egypt and southwest Asia (Diwakar *et al.,* 2010). It comprises about 150 species and is distributed all over the world; nine (9) species can be found, with the yield reaching as high as six (6) tons per hectare (Gupta, 2006). It is known with various local epithets according to tribes and races, Dan Algaro or Lansir in Hausa, Habburshad in Arabia, Chandrasur in India, and Lepido in Spanish. The leaves, seeds, and roots are important for commercial value.

The crop is mostly grown for seed and consumed under effective pathological conditions (Wealth of India, 1998). The crop is used in folk medicines for the treatment of respiratory diseases, liver diseases, antimicrobial, inflammation, diabetes, gastrointestine, fractures, osteoarthrities, spleen diseases, muscular pain, and kidney problems (ElGhazal *et al.,* 2004). Garden cress helps to prevent irregular menstruation in women. The leaves and shoots are typically used in sandwiches with boiled egg. Salts and mayonnaise.

Traditionally, agricultural soils are fertilized using livestock manure, which is rich in nutrients and organic matter. Poultry manure is a good supplement for chemical fertilizers (Amanullah *et* al., 2007). Approximately 75% of total N and majority ((90 - 100%) of P and K in poultry litter are available for plants when applied in crop production (Hammond *et al.,* 1997). Mullins (2002) explained that poultry litter contains a considerable amount of other organic matter due to the bedding material.

Water supply is a major environmental constraints in the production of crops and medicinal plants (Razmjoo *et al.,* 2008). Moisture deficiency induces various physiological and metabolic responses like stomata closure, decline in growth rate and photosynthesis (Flexa and Mediano, 2002). A high soil water potential throughout the growing season is necessary to maintain unpaired economic yield. Moisture is supplied to crops through rainfall or by artificial means (irrigation). The cultivation of crops during dry or late seasons requires that moisture be supplied through artificial means (irrigation).

The production of garden cress *(L. sativum)* as a vegetable and its use as a medicinal plant is limited to northern Nigeria. However, farmers in South East Nigeria are not familiar with the crop. Therefore, the objective of this research / trial was to evaluate the effects of different levels of poultry manure under irrigation intervals on the growth and yield of late season garden cress *(L. sativum)* in southern eastern Nigeria.

MATERIALS AND METHODS

The experiment was carried out at the Teaching and Research Farm in the School of Agriculture and Agricultural Technology, Imo State Polytechnic, Omuma. The experimental site was cleared and mapped out in a plot using rope, peg, cutlass, and measuring tape; thereafter, seedbed preparations were made. The experiment was arranged in a factorial fashion and fitted into a randomized complete block design. There were 32 plots, each measuring 2 m x 3 m. The distance between plots was 0.5 m and 1m between replicates. The seeds of garden cress *(Lepidium sativum)* were planted or sown on beds using a broadcasting method of planting. A plastic cover of coca cola, (2) two precisely was used to measure the seeds to ensure a uniform plant population. Poultry manure at rates of 3 t/ha, 6 t/ha, and 9 t/ha was incorporated into the soil two (2) weeks before planting, and 0 t/ha was used as a control. Water was applied manually to the crops using a 15-L can on one (1) day interval and two (2) day interval. Data was collected on the following: plant height and the number of levels at 2, 4. 6 weeks after planting (WAP), whereas leaf yield was determined at harvest 8 weeks after planting. All data were subjected to analysis of variance (ANOVA) for factorial design, while means were separated using least significant difference (SAS Institute, 2001).

RESULTS

Plant height

The effects of different levels of poultry manure under irrigation intervals on the mean plant height of garden cress are shown in Table 1. At 2 WAP, plants that received 9 t/ha poultry manure at 1 (1) day irrigation interval produced the highest mean height / plant of (10.3±0.5 cm), which were statistically not different from 9.5±0.5 cm obtained using 9 t/ha poultry manure and 2 2 days irrigation interval. The highest mean height.' plant (19.41±1.0 cm) was obtained at 6 WAP using 9 t/ha poultry manure at one (1) day irrigation interval, which is significantly (P <0.05') different from all others. The plants that did not receive any poultry manure gave the lowest plant height of 9.4±0.4 cm at the two-day

irrigation interval (Table 1).

Table 1: Effects of different levels of poultry manure and irrigation interval on mean plant height of garden cress.

Mean plant height (cm)						
	I-day irrigation interval			**2 d irrigation interval**		
Treatments	**2WAP**	**4WAP**	**6WAP**	**2WAP**	**4WAP**	**6WAP**
Poultry manure 0 t/ha	4.8± 0.2	6.2±0.3	10.4±0.5	4.5±0.2	5.5±0.3	9.4±0.4
Poultry manure 3t/ha	6.3±0.3	8.6±0.4	13.3±0.7	5.5± 0.3	8.0±0.5	11.5±0.6
Poultry manure 6t/ha	7.5± 0.4	10.1±0.5	16.5±0.8	7.2±0.4	9.0±0.5	14.3±0.7
Poultry manure 9t/ha	10.3±0.5	13.6± 0.7	19.41±1.0	9.5±0.5	11.6±0.6	17.8±0.9
LSD (0.05)	1.3	1.4	2.2	1.0	1.2	2.0

Number of leaves /plants

Table 2 shows the effects of different levels of poultry manure under irrigation intervals on the mean number of leaves/plant of garden cress. Plants that did not receive any poultry manure under (2) 2-day irrigation interval produced the least mean leaf per plant of garden cress. At 2 WAP, 0t/ha (control) at two (2) days interval of irrigation gave the least mean leaf per plant (3.0±0.1) There is however, no statistical difference with the mean leaf per plant 3.0±0.1) obtained at one-day irrigation interval. At 8 WAP, the highest mean number of leaves per plant 14.6±0.8 was obtained using 9 t/ha poultry manure at one (1) day irrigation interval was significantly (P <0,05) different from all others (Table 2).

Table 2: Effects of different levels of poultry manure and irrigation interval on the mean number of leaves of garden cress.

Mean number of leaves						
	I-day irrigation interval			**2 d irrigation interval**		
Treatments	**2WAP**	**4WAP**	**6WAP**	**2WAP**	**4WAP**	**6WAP**
Poultry manure 0 t/ha	3±0.1	5±0.2	8±0.4	3±0.1	4±0.2	6±0.3
Poultry manure (3 t/ha)	6±0.3	8.6±0.5	9.6±0.5	6±0.3	7±0.4	9±0.5
Poultry manure 6t/ha	7 ± 0.4	9.0±0.5	10.0±0.5	6± 0.3	9±0.5	9.2±0.5
Poultry manure 9t/ha	9.42±0.5	11.62±0.7	14.61± 0.8	8.0±0.4	10.5±0.6	12.6±0.7
LSD (0.05)	0.8	1.4	1.6	0.8	1.3	1.6

Leaf yield/ha

Higher poultry manure rates under irrigation intervals influenced the leaf yield of garden cress *(Lepidium sativum)* at harvest. At 9 t/ha poultry manure under a 1-day irrigation interval, a leaf yield/ha of 4.0±0.21 t/ha was

produced. This was closely followed with a leaf yield/ha of 3.04±1.6 t/ha obtained using 9 t/ha poultry manure under (2) two-day irrigation interval. These means are however, statistically not different. The control plot (0 t/ha) at one (1) day and two (2) days of irrigation interval gave a leaf yield of 1.1±0.05 t/ha and 1.0±0.05 t/ha, respectively, which were statistically not different from 1.3±0.06 t/ha and 1.5±0.07 t/ha obtained using 3 t/ha poultry manure under one (1) and two (2) days of irrigation interval (Table 3).

Table 3: Effects of different levels of poultry manure and irrigation interval on the mean leaf yield of garden cress.

Leaf yield (t/ha)

Treatments	I-day irrigation interval	2 d irrigation interval
Poultry manure 0 t/ha	1.1±0.05	1.0±0.05
Poultry manure (3 t/ha)	1.5±0.07	1.3±0.06
Poultry manure 6 t/ha	2.8±0.14	2.0±0.11
Poultry manure 9t/ha	4.0±0.21	3.04±0.16
LSD (0.05)	2.6	1.6

Discussion

Leaf yield and other growth parameters were influenced by higher poultry manure rates up to 9 t/ha under one (1) day irrigation interval. The higher leaf yield of garden cress due to higher poultry manure rates compared with the control and other groups is attributed to the fact that organic manure contains nutrients that enhanced soil fertility. Poultry manure application improved the soil organic matter, resulting in an increase in pH and reduction in soil acidity. This is in agreement with the work of Akpabio *et al.* (2018), who opined that poultry manure could be used for soil management to sustain the production of garden eggs. Ikeh *et al.* (2017) reported that strong acidic soil conditions limit the availability of cations, particularly Ca, Mg, and K. This indicates the role of poultry manure in improving soil quality, which results in low acidity and improved yield when applied to acid soil. The good performance of garden cress with regard to the application of poultry manure at 9 t/ha agrees with the work of Ojo *et al.,* (2013) that the application of poultry manure at 10 t/ha enhanced the growth and flowering of French marigold. The improvement of garden cress in terms of yield, height, and number of leaves at one (1) day irrigation interval agrees with the finding of Anonymous, (2009) that the more water, the more crop yield, on the contrary, over irrigation and over fertilization have significant adverse effects on water resources. Simek and Comlekcioglu, (2011) reported that water is crucial for maintaining efficient crop production and higher yields. They further reiterated that irrigation becomes a bigger issue when the area is under harsh climatic conditions, where water and land resources are limited, and rainfall is considerably low. The application of 9 t/ha poultry manure under one (1) day irrigation interval that brought about a significant change in the production of garden cress in the late season agrees with the findings of Simek and Comlekcigolu (2011) that the combination of full irrigation and basic fertilization gave the largest size fruit of melon *(Cucumis melo).* Sensoy *et al.* (2007) reported that the highest melon yield was obtained from treatment with the greatest frequency and quantity of irrigation. The increase in plant height and other growth parameters as recorded in the production of garden cress at one (1) day irrigation interval agrees with the findings of Habatmu *et al.* (2014), who observed an increase in plant height as irrigation

interval increases from 3-6 days and a gradual decrease after 6 days. The decrease in yield and other parameters recorded in this study at (2) two-day irrigation intervals indicate that extending water supply to plants through irrigation hinders crop growth. This supports the work of Mohammed and Makki (2005), who reported a decrease in the number of leaves per plant when irrigation intervals were prolonged.

Conclusion

Late season planting of garden cress requirean artificialal supply of water or moisture through irrigation at 1-day intervals to avoid moisture shortages for sustainable production. For increased yield, poultry manure levels up to 9 t/ha are feasible at one (1) day irrigation interval in the study area.

References

Akpabio I.I. Ham- G. I., Idem N. U., Udom G. N., (2018). Response of garden egg to varying organic fertilizer rates and spacing in the Uyo Rainforest zone of Nigeria. Proceedings of 5th Annual conference, crop science society of Nigeria, 8- 1 0th October 20 1 8 at University of Nigeria Nsukka. Pp 58-65.

Amanullah, M. M. Somasundaram E. Vaiyapuri K, Sathyamoorthi K. (2007) Poultry manure to crops-A Review Agric Rev. 28(2) 2 1 6-222.

Anonymous (2009) Final Report of 5th World forum http://iwlearn.net/iw-projects.2007 09-0069695373/workshopt/wwf5. Final report pdf.

Diwarkar, B. T., Dutta, P. K., Lokesh, B. R., & Naidu, K. A. (2010). Physiochemical properties of garden cress. *Lepidium sativum L.}* Seed oil. *Journal Am. Chemical society.* 87537-548.

Flexa J. and Mediano H. (2002) Drought inhibition of photosan thesis in C_3 plants Stougata and non-stomata limitations were revisited. *Annual biology* 89: 185-189.

EL Ghazall E. L., Abdalla G. S, Eyami IE. Masboul A. A. B; Azi A. L, Hamad A. D. (2004) Aromatic plants of Sudan- National center for research, medicinal. *Aromatic plant research institute.* Kharotun.

Gupta, S. (2006). Effects of nutrients and plant density on the growth and yield of garden cress. *(Lepidium sativum)* M.Sc. Horticulture Thesis: University of Agricultural Sciences, BangalorE

Habtamu A., Ibrahaim A., Hamza T, Dagmawit D., Bogale A. and Damene Tilahum (2014). Emergence and seedling growth of corn (Zea mays) as influenced by Irrigation schedules on vertisol. *International Research Journal of Plant Science,* 5(1) 17-22.

Hammond C., Segars B, Gould C (1997) Land application of livestock and poultry manure. *www.bae.uga.edu.*

Ikeh, A. O., Etokerem, U. E. Etokerem, I.E Essien, E. A., Ukut, A. N., & Nwanne, A. J. (2017). Effects of crop residue ash application on soil, cowpea yield and economic returns to management in Uyo, Niger Delta Region of Nigeria. *Journal of Forestry, Environment and sustainable Development,* 3(1) 154-165.

Mohammed A. E and Makki E. K. (2005) Wheat Response to irrigation scheduling, University of

Khartoun. *Journal of Agricultural Sciences. 13(1): 53-66.*

Mullins L. G. (2002). Poultry litter as a fertilizer and soil amendment. Crop and soil environmental science and ES, Bendfeldt Associate Extension Agents Agric and Natural Resources R. A Clark Extension Agent, Agriculture and Natural Resources, Virgina Tech. Publication number 424-534.

Ojo, V. O. A. Dele R. A., Olarite J. A., Adeoye S. A., Ajayi S. O, and Idowu O. M. O. (2013) influence of manure type on the productivity of *pennisetum purepurem* under different planting method and age. *Journal of organic Agriculture and Environment* 1 (1): 71-77.

Razmjoo K, Heidarizahed P, and Sabzalian M. R. (2008) Effect of salinity and drought stresses on growth parametres and essential oil content mattricaria chamomile. *Int. Journal of Agric and Biology.* 10, 451-454.

SAS Institute (2001). Technical report on SAS/STAT software changes and improvements, release 8.02 SAS institute, Gary NC.

Sensoy, S., Ertek, A, and Gredik I.K. (2007). Irrigation frequency, amount, and effect on the quality of field–grown melon *(cucumis melo L) Agric Water Mgt.* 88:269–274

Simek, M. and Comlekcioglu, N. (2011). Effects of different irrigation regimes and nitrogen content levels of yield and quality of melon *(cucumis melo L) in the African Journal of Biotechnology,* vol. 10 (49) pp 10009–10018.

The Wealth of India (TWI) (1998). A dictionary of Indian Raw materials and industrial products; Council of scientific and industrial research; New Delhi vol vi pp 70-73.