Global Scientific JOURNALS

GSJ: Volume 7, Issue 11, November 2019, Online: ISSN 2320-9186
www.globalscientificjournal.com

RESPONSE OF GLOSSY NIGHTSHADE (SOLANUM AMERICANUM) TO POULTRY MANURE COMPOST APPLICATION IN THE NORTHERN GUINEA SAVANNA AGROECOLOGICAL ZONE OF NIGERIA.

[1]Garjila Y.A, [2]Mbashak, R, [2]Pajo N.D, [3]Raymond, J.

[1]Department of Agronomy, Faculty of Agriculture, Federal University Kashere P.M.B 0182 Gombe, Gombe state, Nigeria. ygargila@yahoo.com

[2]Department of Crop Science, Taraba State College of Agriculture, P.M.B 1025 Jalingo, Nigeria.mbashak1@gmail.com.,nwukabupago@gmail.com

[3]Department of Horticultural Technology Federal College of Horticulture Dadin kowa P.M.B 108 Gombe, Gombe State.jockeyraymond9@gmail.com

Abstract :

A field trail to examine the response of Glossy nightshade (Solanum americanum) to Poultry Manure Compost application in the Northern Guinea Savanna.Agroecological Zone of Nigeria was conducted in the Teaching and Research farm of Crop Science Department of the Taraba State college of Agriculture, Jalingo (Latitude 80 50"N and Longitude 11 50"E) during the 2017 and 2018 cropping seasons. The treatment evaluated consisted of five rates: O(Control), 2.0, 4.0, 6.0, and 8.0 t/ha of poultry manure compost. Each treatment were replicated four times and laid out in a randomized complete block design (RCBD). Parameters measured included plant height, number of branches, leaf length and width, and leaves yield/ha. Parameters measured were subjected to analysis of variance (ANOVA) using Mini tab and means difference were separated using least significant difference (LSD) at P = 0.05. the result obtained indicated that poultry manure compose application improved the performance of glossy nightshade. The application of 8.0 t/ha gave a superior yield over the other treatments in both cropping seasons (2017 and 2018) with means of 49.600 and 49.925 t/ha respectively. Application of Poultry Manure at 8.0 t/ha could be adopted to enhance and maximize the productivity of Solanum americanum for yield benefit to farmers in the Northern Guinea Savanna Agroecological Zone of Nigeria.

Key words: Glossy nightshade, Poultry Manure, Response and Northern Guinea Savanna.

INTRODUCTION

Glossy nightshade (*Solanum americanum*) commonly called Kumbi (Hausa), Azibashwi (Mambila) and Morelle noire (French) is a vegetable and herbaceous Flowering plant [1,2]. *Solanum americanum* is reported as a cultivated leafy vegetable from Sierra Leone, the lower land of Ethopia, Kenya, Uganda, Tanzania, Seychelles and Mauritius. The leaves are eaten as a vegetable and as a popular wild pot herb in Mambila Plateau in Nigeria, Cote d‟ ivore and Cameroon, eastern Zimbabwe and Mozambique [1,3].

The shoots and younger leaves of Glossy nightshade are boiled as leafy vegetable. Depending on the bitterness, the cooking water is refreshed. And this is done for children. To further reduce the bitterness, the leaves are served together with cooked amaranth, either separately or as a mixture [4]. The young green shoots are cooked and eaten as greens, after boiling in water in Africa, South America, New Guinea and Oceania (5).

In Cameroon, Kenya, Hawaii, Panama, Sierra Leone, Tanzania, Pakistan and Nigeria, *Solanum americanum* is used as a medicine [1,6,7]. While in China a tea from the whole plant is used to treat cancer of the Cervic [8].

Soils in most areas in the Nigeria Savanna Zone have low fertility status and low organic matter content making them fragile and easily degradable under intensive cultivation. Also soil fertility is often implicated in low farm yields especially in Sub-sahara Africa [9]. Farmers usually tackle this challenge by applying inorganic fertilizers with the aim of maintaining the fertility and productivity of their farm plots to guarantee sustainable crop yield. High cost of inorganic fertilizers makes it

unaffordable by the traditional farmers to procure and apply the recommended dosages which lead to how yield.

Glossy night shade requires a fairly large amount of nutrients. Incorporating well-decomposed farm yard manure or compost into the soil prior to planting will improve yield and maintain soil fertility [9]. However, the rates of organic nutrients applied depend largely on the quality of the organic manure and the fertility status of the soil as well as other soil factors [10]. This trail is undertaken to examine the effect of different rates of Poultry manure on the performance of *Solacum americanum* nightshade with a view to determining the rate for sustainable productivity of Glossy nightshade in Northern Guinea Savanna Agroecological zone of Nigeria.

MATERIALS AND METHODS

The field experiment was conducted in 2017 and 2018 cropping seasons at the Teaching and Research Farm of the College of Agriculture, Jalingo (Latitude 80 50‟N and Longitude 11 50‟E). The experimental site had been continuously used for maize crop production for over three years under rain fed without any fertilizer application. The treatments applied to *Solanum americanum* were (O Control) 2.0, 4.0, 6.0, 8.0 t/ha of composed Poultry manure. The experiment was laid out in a randomized block design (RCBD) with each treatment replicated four times. The Poultry manure sourced from the college Poultry farm were well composted under shade for four weeks before being used. The poultry farm incorporated into the soil two weeks before transplanting.

Before applying the composted poultry manure, composite soil samples were taken from the gross plot area for routine analysis in the laboratory using the procedure [11]. The poultry manure was also analyzed for nutrient contents.

The seeds of Glossy Nightshade were sourced from farmer‟s seed banks in Jalingo and broadcasted in a prepared nursery seed bed measuring 2m x 4m ($8m^2$).The seed bed were mulched and irrigated daily for two weeks before transplanting into unit plots measuring 2m x 3m ($6m^2$) at a spacing of 20 cm x 30 cm.

Weeding of the plots were carried out manually using hoe at 3 and 6 weeks after transplanting. Harvesting of the Vegetative parts were carried out at 6(WAT) by cutting with a sharp Knife 5cm above the ground bi-weekly, 2-3 times before flowering and seeding. Data collected on five tagged plants used for sampling were plant height, number of branches, leaf length and width and leaves yield/ha. All the data collected were subjects to analysis of variance using Minitab. Treatment means were separated using the least significant difference (LSD) where significant occurred at 5 % level of probability.

RESULTS AND DISCUSSION

Soil and Poultry Manure Analysis

The physical and chemical properties of the soil at the experimental site are shown in Table 1. The relative proportions of sand, silt and clay contents in the soil indicated sandy clay loam texture of the soil. The texture of soils has critical agronomic importance as it influences the aeration and determines the irrigation potential of the soil.

The soil exhibited strongly acidic reaction and such soils frequently require liming to raise the ptt to about 6.2-6.5, a mildly acidic range required by most vegetable, tree and arable crops [12]. High soil acidity suppresses the activity of rhizobium Bactria with a consequent effect on Nitrogen(N) fixation by legumes. Also Mn, Fe and P are easily „fixed‟ in insoluble complexes and are commonly unavailable to plants on

acid soils. Liming of the soils at the experimental area could improve their productivity. The nutrient profile of the soil was also low. Organic carbon and total N were low and typical of sandy soils under continuous cropping. Exchangeable K, Ca, Mg, and cation exchange capacity of the soil were all below the critical levels, requiring a sustainable approach such as organic manure application to restore and maintain the fertility of the soil as a vital prerequisite for increasing productivity.

Table 1. Physio-chemical Properties of the soil at the site before planting (0-30cm depth)

Soil Parameter	Value
P^H (H_2O)	4.53
Org. C (%)	1.40
Total N(%)	0.14
Available P (mg/kg)	9.19
Exchangeable cations (cmol/kg)	
K	0.24
Ca	0.59
Mg	0.51
Na	0.03
(Al + H)	0.54
ECEC	1.54
Base Saturation (%)	68.0
Particle size distribution (%)	
Sand	62.5
Silt	10.2
Clay	27.3
Texture	Sandy clay loams

Poultry manure usually contains adequate levels of nutrients and organic matter (Table 2) and their regular use on farmland improves and sustains the quality of soil in the long-run. The soil productive capacity is largely influenced by its organic matter content which is important for

nutrient supply, water holding capacity, contain exchange capacity, and soil structure as well as energy source to drive biological and chemical processes in the soil and enhances soil biological activity [13,14]

Table 2. Some Chemical Properties of Poultry Manure used in the Experiment.

Parameter	Value
N (%)	2.43
NH_4^+ (%)	0.14
P_2O_5 (%)	1.27
K_2O (%)	1..70
Ca (%)	3.63
Mg (%)	2.17
Mn (%)	0.04
Org. C (%)	36.20
Organic matter	62.10
C/N ratio	14.50
Ec (ms/cm)	5.50
PH (H_2O, 1:10)	7.20

Effect of Poultry Manure on Vegetative Growth and Yield of Glossy nightshade

The application of poultry manure significantly ($P \leq 0.05$) influenced the growth of *Solanum americanum* plant height and number of branches increased with increasing rates of poultry manure (Table 3). Tallest plants with highest number of branches were found in plots amended

with 8.0 tonnes of poultry manure per hectare in both cropping seasons (2017 and 2018) respectively with and 4 weeks after transplanting in 2018 cropping seasons.

means of 31.750 and 49.500 cm at 2 and 4 weeks after transplanting in 2017 and 32.500 and 50.750 cm at 2

Table 3. Plant height (cm) and number branches of Glossy nightshade as affected by application of poultry manure.

Poultry Manure rates (t/ha)	Plant height(cm)				Number of branches/plant	
	2017		2018		2017	2018
	2WAT	4WAT	2WAT	4WAT	6WAT	6WAT
Control	17.000	31.250	18.000	32.250	2.0500	2.1250
2.0	22.750	42.000	24.250	43.500	3.1750	3.3500
4.0	26.500	46.250	28.500	47.500	3.8500	3.8750
6.0	29.000	48.750	30.250	48.750	4.2500	4.4500
8.0	31.750	49.500	32.500	50.750	4.5250	4.7250
LSD (0.05)	1.7	1.9	1.8	1.9	0.9	0.9

While the application of 8.0 tones of poultry manure produced higher number of branches with means of 4.5250 and 4.7250 in 2017 and 2018 cropping season respectively. The control plots (Unfertilized with poultry manure) produced shorter plants and fewer number of branches. The best growth exhibited by plants in

plots fertilized by the highest poultry manure rate was probably due to adequate supply and availability of nutrients which obviously stimulated rapid crop growth in such plots. This observation is consistent with the report of IFA(15) and that of Tisdale and Nelson (16) in which good plant growth was similarly attributed to

adequate nutrients supply in poultry manure plots particularly Nitrogen and Phosphorus which promoted crop performance.

The leaf length and leaf width of Glossy nightshade were all influenced by poultry manure application with significant ($P \leq 0.05$) increase in leaf length and wideness of leaves (Table 4.). The application of 8 tonnes of poultry manure per hectare significantly produced longer leaves and wider leaves in both cropping seasons (2017 and 2018) with means of 13.375 and 14.875 cm leaves length at 4WAT and 6WAT in 2017 and 13.575 cm at 4WAT and 6WAT in 2018 cropping season respectively. While the widest leaves with means of 8.5750 and 11.900 cm at 4 and 6WAT in 2017 and 8.7750 and 11.9750 cm at 4 and 6 WAT in 2018 cropping season respectively. Shorter and losses leaves were obtained in unfertilized poultry manure plots. This is also in conformity of Tisdale and Nelson [16].

Table 4. Leaf length width (cm) and leaves yield of Glossy nightshade as affected by application of poultry manure.

Poultry manure rates (t/ha)	Leaf Length				Leaf Width				Leaves (t/ha)	Yield
	2017		2018		2017		2018		2017	2018
	4WAT	6WAT	4WAT	6WAT	4WAT	6WAT	4WAT	6WAT		
Control	7.625	10.600	7.725	10.825	4.475	6.125	4.800	6.350	20.525	20.700
2.0	11.575	13.050	11.850	13.175	5.950	7.750	6.125	7.800	25.625	27.025
4.0	12.400	13.400	12.675	13.725	7.000	8.525	7.150	8.750	31.175	32.675
6.0	13.050	14.100	13.200	14.425	7.875	10.950	8.000	11.500	49.600	49.925
8.0	13.375	14.875	13.575	15.275	8.575	11.900	8.775	11.975	49.600	49.925
LSD(0.05)	1.2	1.7	1.3	1.6	0.7	0.9	0.6	0.8	3.6	3.8

The leaves yield of *Solanum americanum* was influenced by poultry manure application in both cropping seasons (2017 and 2018). The application of 8 tonnes per hectare of poultry manure significantly ($P \leq 0.05$) produced highest leaves yield with means of 49.600 and 49.925 tonnes per hectare respectively (Table 4). Increasing the rates significantly increased the yield of the plants. While the control plots produced the lowest leaves yield per hectare. This result is similar to [16] who reported that application of farm yard manure increases the performance of vegetative and leaves yield of Glossy nightshade.

CONCLUSION

Growth and leaves yield of Glossy nightshade were improved by poultry manure application and the best crop performance was obtained in plots incorporated with the nutrient at 8.0 t/ha which could be adjusted to be optimum for sustainable productivity of Solanum americanum in the study area.

REFERENCES

1. Garjila, Y.A. (2016). A handbook of Common Vegetables in Taraba State for Schools and Colleges. Fountain Printing and Publishing Co. No. 4. Massa Ibi Street Sabon Layi, Jalingo Taraba State ISBN: 978-978-955-440-9. Pp 140.
2. Edmond, J.M. and Chweya, J.A. (1997). Black nightshades. Solanum nigrumL. and related species. Promoting the conservation and use of underutilized and neglected crops 15. Institute of Plants Research, Gatersleben Germany International Plant Genetic Resources Institute , Rome, Italy. 113 pp.
3. "Solanum americanum" Natural Resources Conservation Service

PLANTS Database. USDA Retrived 17 November 2015.

4. "Factsheet"- Solanum americanum Electronic Flora of South Australian Government Retrieved 29 May 2013.
5. "American Black Nightshade" Solanum americanum- Plant Profile "www.coolforests.org. Retrieved 2017-12
6. ab Conn, Barry J. (2001). " Solanum americanum – New South Wales Flora Online". Plant NET- The Plant Information Network System. 2.0: Sydney Australia: The Royal Botanical Gardens and Domain Trust Retrieved 27 May 2013.
7. Zubiada, Y., Azbta, K.S., Syeda, M.A. (2004). "Medicinally Important Floral of Dhibbia Karsal Village (Mian wali District Punjab)" Asian Journal of Plant Sciences 3(6): 757-762.
8. a b c d e f g h i j Nellis, David W. (1997). "Black nightshade Solanium americanum Poisonous Plants and Animals of Florida and the Caribbean. Pineapple Press. Pp 76, 243. ISBN 978-1-56164-111-6.
9. Henao, J. and Baanante, C. (2006). Agricultural production and soil nutrient mining in Africa: Implication for resource conservation and policy development. Technical Bulletin. Link: http//www.ifde.org.
10. Odunze, A.E. (2006). Soil properties and management strategies for some sub humid of savanna zone Alfisols in Kaduna State, Nigeria. Samaru Journal of Agricultural Research, 22:3-14.
11. FFD (2012) (Federal Fertilizer Department). Fertilizer Use and Management Practices for

Nigeria. Federal Ministry of Agriculture and Rural Development Abuja, Nigeria. Pp 1-215.

12. NJAES (New Jersey Agricultural Experiment Station. NJ 08901-8525 2016.
13. Spore Soil Fertility: Feeding the land spore. 139 February CTA Wagenigen. The Netherland, 2009.
14. Spargo, J. Allen, T. interpreting your Soil Test result. Soil and Plant Nutrient Testing Laboratory,
17. merica; 1990.

University of Massachusetts, 2016.

15. IFA. International Fund for Agricultural Development. Fertilizers and their use FAO Rome, Italy: 2000.
16. Tisdale, SL. Nelson WL. Soil Fertility and effect of magnesium sources on the yield and chemical composition of crops. Michigan Agricultural Experimental Stations Bull press, Michigan, A