

Storage Period of Poultry Manure and Its Effects on Diseases Development on Cucumber (*Cucumis sativus* L.) in College of Education Farm, Afaha Nsit

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Abstract

This study determined the storage period of poultry manure and its effects on diseases development on cucumber in College of Education Farm, Afaha Nsit, Akwa Ibom State. Two objectives, two research questions and two null hypotheses were postulated to guide the study. The study adopted experimental design specifically, a randomized complete block design. The population of the study was one thousand and twenty (1020) cucumber seeds selected from a variety of cucumber called Oliviera Bold -F-1. Simple random sampling technique was used in selecting eight hundred and fifty (850) cucumber seeds. Four hundred and twenty-five (425) stands of cucumber plants was used in which more sixty-five stands of cucumber died, three hundred and sixty (360) cucumber plants were used for both the experimental and the control groups. five (5) raised seed-beds in each treatment with seventeen stands of cucumber per raised seed beds, and these gave a total of (5) five treatment groups and twenty-five (25) raised seed-beds. Poultry manure was fermented and kept for three months labeled (Trt1), two months, labeled (Trt2) one month (Trt3) unfermented poultry was labeled (Trt4) and zero application was named (Trt5) respectively. Observations were carried out in the two variables in every one week for four weeks for collection. Percentage and mean were used in answering the two research questions while the two null hypotheses were tested at 0.05 level of significance using analysis of variance (ANOVA). Based on the data analyzed and findings of the study it was concluded that, growers of cucumber need to ferment poultry manure and stored for three weeks before use for cultivation of cucumber to avoid downy mildew and it was also recommended that growers of cucumber should be enlightened by the extension agents on how to ferment poultry manure and kept for three weeks before use for the cultivating cucumber to avoid and also reduces downy mildew disease development. The Agricultural extension agents should introduce the methods of fermenting poultry manure and stored for three weeks before use for cultivation of cucumber to avoid powdery mildew disease development

Key words: Storage Period, Poultry Manure, Diseases Development, Cucumber (*Cucumis sativus* L.) Afaha Nsit

Introduction

Cucumbers are subjected to attack by diseases that could adversely affect their growth when invade the crop cells causing undesirable symptoms, the plants is said to be diseased. Diseases are seen as any disturbance, physiologic or structural which hinders the growth and development of plant therefore, leading to reduction in quantity and quality of products. Disease may develop on any part of the plants such as fruits, leaves, stems, roots and even the entire plants. Crop diseases are mainly caused by microbial such as bacteria, fungi, viruses, nematodes, and protozoa.

Cucumber (*Cucumis sativus* L.) is an herbaceous annual fruit crop in the family of *Cucurbitaceae* and its botanical name is (*Cucumis sativus* L.) that has been cultivated by man for over 3,000 years. Cucurbits are composed of 126 genera (genus) and 989 species and it originated from Northern India, South of the Himalayan hill (Khan, Shah, Gul, Majid, Khan, and Ahmad 2015). Cucumber with respect to economic importance, it ranks fourth after tomatoes, cabbage and onion in Asia and second after tomato in Western Europe, though its place has not been ranked in tropical Africa because of limited use (Eifediyi and Remison, 2010). According to Food and Agricultural Organization (FAO) (2018) the total world production of cucumber in 2017 was 83,753,861 tonnes, with China alone producing 77% of the world's total (688,824,643 tonnes), and Egypt is the highest producer in Africa with 591,858 tonnes. Cucumbers are scientifically considered as fruit as they contain enclosed seeds that develop from a flower, it is a warm crop that performed very well on high sunlight with soil PH of 6.0 to 7.0 (Schrader, Wayne, Aguiar and Mayberry, 2013).

Poultry manure is the decayed, stable end-product of the decomposed poultry droppings which contains about 3.5% nitrogen, 1.5-3.5% phosphorus, 1.5-3.0% potassium and many micronutrients. Poultry manure adds organic matter to soil, and improves soil structure, nutrient retention, aeration, soil moisture holding capacity and water infiltration. Poultry manure readily supplies phosphorous to plants than other organic manure sources. The application of poultry manure to the soil improves yield in terms of quality and quantity of macro and trace elements that is not contained in other organic manures (Akande, Oluwutoyinbo, Makinde, Adepoju and Adepoju, 2010). Poultry manure is make up of poultry feeds, litters and water such can contains microbial which leads to diseases development either bacteria, fungi, viruses, nematodes, and protozoa.

The production of cucumber in Nigeria has increased tremendously probably due to awareness being created by its market demand and economic returns, short duration in maturity or due to its nutritional and medicinal values. Hence it has become a popular vegetable crop in Nigeria. Both older and young people enjoy cucumber fruits of which many in their leisure time usually eat with fried groundnut in their offices, homes, and market places or recreational centres. When given proper care and protection, cucumber tends to produce well. It is a crop that grows well in a well-drained fertile soil with good moisture retention ability either with poultry manure. It was against this backdrop that this work was conceptualized to evaluate the

storage period of poultry manure and its effects on disease development in cucumber (*Cucumis sativus L.*) in College of Education Farm, AfahaNsit, Akwa Ibom State.

Statement of the Problem

Cucumber (*Cucumis sativus L.*) is well known for nutritional and medicinal values of both leaves and the fruits. Cucumber (*Cucumis sativus L.*) had gained medicinal recognition as having been discovered in supporting body hydration and eliminating the toxins present in the body. It is also serves as a good remedy for preventing cancer, constipation, jaundice and indigestion. Considering the immense benefits of cucumber (*Cucumis sativus L.*) to man, there is need to intensify efforts in cucumber (*Cucumis sativus L.*) production to increase the yields to meet the supply to the teeming population in Nigeria. Some farmers in College of Education, Afaha Nsit community have been trained by the extension agents on the cultural practices on cucumber cultivation including fertilization techniques, tillage, pests and diseases control techniques to boost cucumber (*Cucumis sativus L.*) production, but low yield has been recorded over the years.

The researcher having observed the low yield over the years, is posing the question, whether the low yield is caused by wrong methods of application of organic manure, the use of inappropriate inorganic fertilizers, inadequate fertilization, Based on personal interactions with growers of cucumber (*Cucumis sativus L.*) in College of Education Farm, Afaha Nsit community in Akwa Ibom State. It seems growers of cucumber have little or no knowledge and skills concerning the appropriate fertilization of cucumber by cultivating cucumber with poultry manure without fermenting it and keep for some weeks to avoid and reduces the microbial for diseases development. These irregular practices may not be unconnected with poor yield of cucumber recorded in the area over the years. Therefore, this study aimed at determining the storage period of poultry manure and its effects on diseases development on cucumber (*Cucumis sativus L.*) so that recommendations could be made for adoption by cucumber growers, and Agricultural extension agents.

Purpose of the Study

The main purpose of this study was to determine the storage period of poultry manure and its effects on diseases development on cucumber (*Cucumis sativus L.*) in College of Education farm, Afaha Nsit. Specifically, the study sought to determine the:

- (1) effect of downy mildew on cucumber grown with poultry manure at different period of fermentation in College of Education farm, Afaha Nsit.
- (2) effect of Powdery mildew on cucumber grown with poultry manure at different period of fermentation in College of Education farm, Afaha Nsit.

Significance of the Study

It is believed that the study on fermentation period of poultry manure and its effects on diseases development on cucumber (*Cucumis sativus* L.) in College of Education farm, Afaha Nsit would be of great importance to the growers of cucumbers (farmers) and Agricultural extension agents in many ways. The findings of the study downy mildew on cucumber hopefully would aid cucumber farmers to know how to ferment poultry manure and stored for different period before used for cultivation of cucumber to avoid downy mildew development on cucumber. The findings of the study on cucumber powdery mildew hopefully would help Agricultural Extension Agents to know the different ways of fermenting poultry manure before used for cultivation of cucumber to prevent powdery mildew development so that they can relect the information to their clients in rural areas.

Research Questions

The study sought answer to the following research questions

- (1) what are the effects of downy mildew on cucumber when grown with poultry manure at different period of fermentation in College of Education farm, Afaha Nsit
- (2) what are the effects of Powdery mildew on cucumber when grown with poultry manure at different period of fermentation in College of Education farm, Afaha Nsit

Null Hypotheses

- (1) There is no significant different in the mean of downy mildew on cucumber when grown with poultry manure at different period of fermentation in College of Education farm, Afaha Nsit
- (2) There is no significant different in the mean of Powdery mildew on cucumber when grown with poultry manure at different period of fermentation in College of Education farm, Afaha Nsit

Review of the Related Literature

The study adopted production theory by Mill (1844) which emphasized that there is always a minimum quantity of output (yield) which is technically possible on using a given combination of input. Invariably, a definite relationship exists between the quantity of inputs used and the level of product produced. Production is the process and as such it occurs through time and space, because it is a flow concept, production is measured as a “rate of output per period of time. Cucumber when cultivated with fresh or raw poultry manure may leads to diseases development such as downy mildew and powdery mildew etc.

According to Loumedjinson, Baimeyand James (2009), downy mildew (*Pseudoperonosporacubensis*) is caused by *Oomycete* and occurs on cucumbers leaves and has yellow spot on the upper side of the leaves. *Pseudoperonosporacubensis* can be managed by avoiding overcrowding of plants, and by adopting overhead irrigation. Gupta and Thind

(2006) opined that control is by spraying with appropriate fungicides such as team and saaf at appropriate weekly regime or intervals. Downy mildew of cucumber is caused by the fungus *Pseudoperonosporacubensis*. It is a serious fungal disease of cucumber as it is capable of causing significant loss of fruit quality and yield of about 40% in Nigeria. The disease affects mostly the leaves. Symptoms include angular chlorotic lesions on the foliage. These lesions appear angular because they are bound by leaf veins. Magnification of the sporulation reveals the acutely and dichotomously branched sporangiophores bearing lemon-shaped sporangia. Eventually, leaves will turn necrotic and curl upwards. The disease is sometimes called wildfire because of how rapidly it progresses, as if the crop were burned by fire (Alves, Laranjeira, & Camara, 2015). According to Maaz, Fazal, Bibi, Muhammad, Amir, Kabir, Inayat, and Rahman, (2017) downy mildew fungal disease on cucumber developed in unfermented poultry manure due to the present of microbial and this cause a lot of damage to cucumber plant. Powdery mildew (*Erysiphe cichoracearum* and *Sphaerotheca fuliginea*) is caused by fungus and the symptoms are white powdery spot on the upper surface of leaves, stem and fruits. According to Bostanian, Akalach and Chiasson (2005), the fungus can be managed by growing resistant varieties and the control measures may be by spraying with appropriate fungicides such as saaf at the correct proportion, B2 carcinogens and chlorothalonil-2-3 pints; used on less than 2% acreage. Powdery mildew is fungal growth on the upper surfaces of leaves, it is caused by a variety of fungi each affecting a different family of plant but, is commonly seen in the gourds (cucumber family) Lawal, Dada, Adebayo, and Togun, (2017). Opines that fermented and storage period of poultry manure reduces diseases such as powdery mildew on cucumber thereby causes damage on cucumber plant.

Research Materials and Methods

The study adopted experimental design laid out in a randomized complete block design (RCBD) with five (5) treatment groups namely, fermented Poultry manure for three weeks labeled (Trt 1), two weeks labeled (Trt 2), one week (Trt 3), unfermented poultry labeled (Trt 4) and zero application was named (Trt 5) respectively. The area of the study was College of Education farm, Afaha Nsit, where land was available and secured. The population of the study was one thousand and twenty (1020) cucumber seeds selected from a variety of cucumber called Oliviera Bold -F-1 purchased at Ekpo Nnwang food market shop at No: 19 Ukana Offort Street, Uyo, in Akwa Ibom State. Simple random sampling technique was used in selecting eight hundred and fifty (850) cucumber seeds. Four hundred and twenty-five (425) stands of cucumber plants was planted and more than sixty five stands of cucumber died, three hundred and sixty (360) cucumber plants were used for both the experimental and the control groups. Five (5) seed-beds in each treatment with seventeen stands of cucumber per seed beds, and this gave a total of (5) five treatment groups and twenty - five (25) seed-beds. Preliminary survey and clearing of the land was carried out and demarcated with beds at 1 m per bed then

the poultry manure at different fermentation was measured 1kg and incorporated in the marked holes 60cm by 60cm of three weeks labeled (Trt 1), two weeks labeled (Trt 2), one week (Trt 3), unfermented poultry labeled (Trt 4) and zero application was named (Trt 5). Manual method of planting was applied through direct sowing of two seeds of Oliviera Bold -F-1 cucumber manual weeding was done at interval and other cultural practices till harvesting and observations for data collection.

Results

Analysis of Research Questions and Null Hypotheses

Research Question 1: what is the effect of downy mildew on cucumber grown with poultry manure at different period of fermentation in College of Education farm, Afaha Nsit
Result of research question 1 is presented in Table 1

Table 1: Percentage and Mean of Downy Mildew on Cucumber Grown with Poultry Manure at Different period of Fermentation

Period of Planting	Treatment						
	Trt1(3 weeks)	Trt 2 (2 weeks)	Trt 3 (1week)	Trt4 (unfermented)	Trt 5(zero app.)	Trt Total	Means
Week 1	5	20	13.33	33.33	23.33	94.99	18.10
Week 2	21.74	48.48	48.86	71.43	57.58	242.09	48.42
Week 3	42.86	62.86	87.5	107.5	92.12	392.84	87.57
Week4	64.71	66.67	96.00	135.56	135.71	498.65	99.73
Total	134.31	198.01	239.69	347.82	308.74	1228.57	
Means	33.58	49.50	59.92	86.96	77.19		

Source: Field data 2021

The result in Table 1 shows the percentage and mean of downy mildew on cucumber when grown with poultry manure at different period of fermentation. The result shows that percentage and mean of fermented poultry manure for three weeks (Trt1) was (134.31%) (33.58) and (347.82) (86.96) in treatment four (Trt4) of unfermented poultry manure has the highest disease development, therefore this is in favour of fermented poultry manure for three weeks (Trt1)

Null Hypothesis 1: There is no significant different in the mean of downy mildew on cucumber when grown with poultry manure at different period of fermentation in College of Education farm, Afaha Nsit

Result of the hypothesis 1 (Ho1) is presented in Table 2

Table 2: Result of Analysis of Variance (ANOVA) of Downy Mildew on Cucumber when grown with Poultry Manure Different Period of Fermentation in College of Education Farm, Afaha Nsit

Source of Variation	df	SS	Mean Square MS	F-cal	F-crit	Remark
Total	19	27995.22				
Block	3	7280.18	2426.73	14.11	3.49	
Treatment	4	18651.94	4662.99	27.12	3.26	Significant
Error	12	206331.1	171.93			

*Significant $P < 0.05$ alpha level

The result in Table 2 shows that the calculated F- value of 27.12 is greater than the critical -F- value of 3.26 at 0.05 alpha level of significant and at 4 and 19 degree of freedom, with this result the null hypothesis is rejected. This implies that there is a significant different between downy mildew on cucumber when grown with different fermentation period of poultry manure. what is the effects of powdery mildew on cucumber when grown with poultry manure at different period of fermentation in College of Education farm, Afaha Nsit

Result of research question 1 in presented in Table 2

Table 3: Percentage and Mean of Powdery Mildew on Cucumber grown with Poultry Manure at Different period of Fermentation

Period of Planting	Treatment						Trt Total	
	Trt1 3Weeks	Trt 2 2Weeks	Trt 3 1Weeks	Trt 4 ZeroWeeks	Trt 5 No App	Trt Total		
Week 1	0.0	1.39	1.39	2.78	2.78	8.34	1.67	
Week 2	2.78	2.78	4.17	6.94	6.94	23.61	4.72	
Week 3	4.17	5.56	8.33	16.67	13.89	48.62	9.72	
Week 4	8.33	11.11	15.28	30.56	26.61	91.89	18.38	
TOTAL	15.28	20.84	29.17	56.95	50.22	172.46		
Means	3.82	5.2.1	7.29	14.24	12.56			

Source: Field data 2021

The result in Table 3 shows the percentage and mean of downy mildew on cucumber when grown with poultry manure at different period of fermentation. The result shows that percentage and mean of fermented poultry manure for three weeks (Trt1) was (15.28%) (3.82) and (56.95% (14.56) in treatment four (Trt4) of unfermented poultry manure, this has the highest disease development, therefore this is in favour of fermented poultry manure for three weeks (Trt1)

Null Hypothesis 2: There is no significant different in the mean of powdery mildew on cucumber when grown with poultry manure at different period of fermentation in College of Education farm, AfahaNsit

Result of the hypothesis 2 (H_{02}) is presented in Table 4

Table 4: Result of Analysis of Variance (ANOVA) of Powdery Mildew on Cucumber when grown with Poultry Manure Different Period of Fermentation in College of Education Farm, Afaha Nsit

Source of Variation	df	SS	Mean of Square MS	F- cal	F- crit	Remark
Total	19	1318.19				
Block	3	333.88	111.29	7.24	3.49	
Treatment	4	799.81	199.95	13.26	3.26	Significant
Error	12	184.5	15.38			

*Significant $P < 0.05$ alpha level

The result in Table 4 shows that the calculated F- value of 13.00 is greater than the critical -F- value of 3.26 at 0.05 alpha level of significant and at 4 and 19 degree of freedom, with this result the null hypothesis is rejected. This implies that there is a significant different between powdery mildew disease on cucumber when grown with different fermentation period of poultry manure.

Major Findings

Based on the data analyzed, the following are the major findings of the study

- 1 There is was a significant different in the mean of downy mildew on cucumber grown with three weeks (Trt1) poultry manure fermentation in College of Education farm, AfahaNsit

2. There is was a significant different in the mean of powdery mildew on cucumber grown with three weeks (Trt1) poultry manure fermentation in College of Education farm, AfahaNsit

Discussion of Findings

1. This study showed a significant different between downy mildew on cucumber grown with poultry manure at different fermentation and storing period. The reason for this result may be because poultry manure was fermented and stored for different period of weeks these reduces the microbial present in the poultry manure. This findings is in line with the submission by Maaz, Fazal, Bibi, Muhammad, Amir, Kabir, Inayat, and Rahman, (2017) downy mildew fungal disease on cucumber developed in unfermented poultry manure due to the present of microbial and this cause a lot of damage to cucumber plant
2. This study showed a significant different between powdery mildew on cucumber grown with The reason for this result may be because poultry manure was fermented and stored for different period of weeks these reduces the microbial present in the poultry manure. This finding is in line with the submission by Lawal, Dada, Adebayo, and Togun, (2017). Who asserted that fermented and storage period of poultry manure reduces diseases such as powdery mildew on cucumber thereby causes damage on cucumber plant

Educational Implications of Findings

Based on the data analyzed, the following are the educational implications of the findings of the study:

1. There is need for the training of farmers who are engaged in cucumber farming.
2. It is of the advantage for the scholars and researcher who may find this work useful for further study.

Conclusion

Based on the data analyzed and findings of the study, the following conclusions were drawn. Cucumber growers need to ferment poultry manure and stored for three weeks before use for the cultivation of cucumber to avoid and also reduces diseases development on cucumber such as downy mildew and powdery mildew for the effective production of diseases free on cucumber.

Recommendations

Based on the findings of the study, the following recommendations were made.

1. Growers of cucumber should be enlightened by the extension agents on how to ferment poultry manure and kept for three weeks before use for the cultivating cucumber to avoid and also reduces downy mildew disease development.
2. The Agricultural extension agents should introduce the methods of fermenting poultry manure and stored for three weeks before use for the cultivation of cucumber to avoid powdery mildew disease development.

Contribution to Knowledge

The study on the storage period of poultry manure and its effect on diseases development on cucumber have contributed a lot to knowledge specifically, the fermentation of poultry manure for different period have serves growers of cucumber the cost of spending money to buy insecticides and other chemicals to apply on cucumber plants.

Suggestions for Further Research

The researcher hereby makes this suggestion for investigations. The study on the storage period of poultry manure and its effects on diseases development on cucumber should be carried out in another location.

References

- Akande, M. O., Oluwatoyinbo, F. I., Makinde, E. A., Adepoju, A. S. & Adepoju, I. S. (2010). Response of okra to organic and inorganic fertilization. *Journal of Nature and Science*, 8(11): 261-266.
- Alves, K. F., Laranjeira, D., & Camara, M.P, S.J. (2015). Efficacy of Plant extracts for Anthracnose Control in Bell pepper Fruits under controlled conditions. *Horticultural Brasileira* 33: 332-338. .
- Eifediyi, E. & Remison, S. U. (2010). Growth and yield of cucumber (*Cucumis sativus* L.) as influenced by farmyard manure and inorganic fertilizer. *Journal of Plant Breeding and Crop Science*, 2(7): 216-220.
- FAO (2018). Statistic FAOSTAT for Crops, List of Countries by Cucumber Production, <http://www.fao.org/faostat/en/#data/QC/> (Retrieved on 14th June 2019).
- Gupta, S. K. & Thind, T. S. (2006). *Disease Problems in Vegetable Production*. Scientific Publishers, India, 172p.

- Khan, Z., Shah, A. H., Gul, R., Majid, A., Khan, U. & Ahmad, H. (2015). Morpho-agronomic characterization of cucumber germplasm for yield and yield associated traits. *International Journal of Agronomy and Agricultural Research*, 6: 1-6.
- Loumedjinon, S., Baimey, H. & James, B. (2009). Locally available botanical alternatives to chemical pesticides against root-knot nematode pests of carrot (*Daucus carota*) in Benin. *Pesticides Management Management in West Africa*, 7: 34-52.
- Maaz K. E., Fazal, U. E., Bibi, Z. I., Muhammad, N. K., Amir, Z., Kabir, A., Inayat, U. R. & Rahman, A. (2017). Effect offermented poultry manure levels on the growth and yield of cucumber (*Cucumis sativus L.*) cultivars at horticultural research farm, University of Agriculture, Peshawar, Pakistan. *Science International (Lahore)*, 29(6): 1381-1386.
- Lawal, A. A., Dada O. A., Adebayo, A. G. & Togun, A. O. (2017). Performance of cucumber (*Cucumis sativus L.*) on ferruginous soil amended with fermented poultry manure in Ibadan. *Environ tropica—An International Journal of the Tropical Environment*, 14: 75-87.