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EFFECTS OF KASHIN KUDA (LANTANA CAMARA) ON FUNGI ASSOCIATED WITH TOMATOE FRUITS FROM FARIN-GADA MARKET, JOS NORTHERN NIGERIA.

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ABSTRACT

The experiment was conducted in the Biology Laboratory of Federal College of Forestry Jos, Plateau state, Nigeria during 2017/2018 session. It was carried out to determine the antifungal effect of different concentrations of aqueous extract from Lantana camara leaves on the most two occurring fungi on tomato fruits. The treatments consisted of plant extract with four varying concentrations (50, 100, 150 and 200g/l) evaluated alongside the control. The treatments were laid out in completely randomized design (CRD) with three replications. The result of the experiment showed that, Aspergillus niger and Rhizopus stolonifer at 50% and 33% respectively were found to be most prevalent than the other fungi tested. The result further revealed that, Lantana camara leaves extract was significantly ($p \leq 0.01$) in controlling Aspergillus niger and Rhizopus stolonifer at 50g/l and

Introduction:

Tomato (*lycopersicon esculentum Mill. Syn. Solanun lycopersicon)* is a widely grown fruit in the world over (Agrios, 2005). It is native to South America, but was introduced into West Africa by Purtuguese trades and freed slaves from West Indies. Tomato is rich in vitamins (John *et al.*, 2010), minerals and *lycopene*, an excellent antioxidant that helps to reduce the risk of prostate and breast cancer Global production is about 89.8million metric tons from an area of about 3,170.00ha Nigeria is second largest producer of tomato in Africa (Erinle, 2009) where a total area of

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100g/l respectively at both preventive and curative methods. It was observed that treating tomato with varying concentrations of Lantana camara leaves extract significantly (p<0.00) inhibited radial mycelial growth of Aspergillus niger and also reduced weight loss of tomato in curative and preventive methods of control. Based on the result of this study, it is recommended that farmers should use Lantana camara at 50g/l for post-harvest treatment of tomato as control measure for Aspergillus niger and Rhizopus. stolonifer.

Keywords: *Lantana camara, tomatoes, Fungi, In-vivo, isolation.*

One million hectares is used for tomato cultivation every year (Botunde *et al.,* 2010). Tomato accounts for about 18% of the average daily consumption of vegetables in Nigeria (Olayide *et al.,* 2010), and may be pressed into pastes or purse which is used for cooking and in the production of fruits drinks. The quality and nutritional value of freshly produced tomato fruits is affected by pre- and post-harvest diseases, improper handling and other conditions. Fungi are the most important and prevalent pathogens that infect a wide range of host plants, causing destruction and economic loss in tomato either in the field, storage or transportation (Sommer, 2010). The estimated total loss in Nigeria due to these constraints is about 60%. Also submitted that 21% of tomato harvested in Nigeria was lost to rot in the field and additional 20% to poor storage system, transportation and marketing. This huge loss has prompted the search simple, effective and economical methods to control pre-and harvest diseases and other losses in tomato (Wilson and Wisnieski, 2010).

Medicinal plants represent an important source of medically important compounds. Since ancient time medicinal plants are used to cure several types of health problems. Systemic analysis of these plants provides a variety of bioactive molecules for the development of newer pharmaceutical products. Recently, there is a growing interest in the pharmacological evaluation of various plants used in different traditional system of medicine. In last few decades, many of traditionally known plants

have been extensively studied by advanced scientific techniques and reported for various medicinal properties viz, anticancer activity, anti-inflammatory activity, antidiabetic activity, anthelmintic, antibacterial activity, antifungal activity, hepatoprotective activity, antioxidant activity, larvicidal activity etc. *Lantana camara* Linn is a flowering ornamental plant belonging to family Verbenaceae,*L. camara* is also known as Lantana, Wild Sage, Surinam Tea Plant, Spanish flag and west Indian lantana. *L. camara* is a well-known medicinal plant in traditional medicinal system and recent scientific studies have emphasized the possible use of *L. camara* in modern medicine. About 80 000 to 120 000 species of fungi have been described to date, although the total number of species is estimated at around 1.5 million (Hawksworth, 2011). This would render fungi one of the least-explored biodiversity resources of our planet. It is notoriously difficult to delimit fungi as a group against other eukaryotes, and debates over the inclusion or exclusion of certain groups have been going on for well over a century.

In recent years, the main arguments have been between taxonomists striving towards a phylogenetic definition based especially on the similarity of relevant DNA sequences, and others who take a biological approach to the subject and regard fungi as organisms sharing all or many key ecological or physiological characteristics the 'union of fungi' (Barr, 1992). Being interestedmainly in the way fungi function in nature and in the laboratory, we take the latter approach andinclude several groups in this book which are now known to have arisen independently of the monophyletic 'true fungi' (Eumycota) and have been placed outside them in recent classificationschemes. The most important of these 'pseudofungi' are the Oomycota. Based on their lifestyle, fungi may be circumscribed by the following set of characteristics (modified from Ainsworth, 2000).

MATERIALS AND METHODS

Study Site: The research work will be carried out at the biology laboratory of federal college of forestry, Jos, plateau state, Nigeria at a temperature of 26 ± 30^0C. The college lies in the northern guinea savannah and is located at latitude $7^0$11'N and latitude $7^0$38'E with an altitude of 1250 above sea

level. The climate of the area ranges between (146-148) mm and daily temperature ranges between 10^0C to 32^0C minimum and maximum respectively.

Materials and Reagents: Petridishes, slides, Bunsen burner, cotton wool, tape, meter rule, microscope, wireloop, lactophenol, methylated spirit, cork borer and foil paper.

Sterilization of Glasswares: All items used during practical or experiment were washed with detergent and rinsed with distilled and clean water. The items were later transferred to even for sterilization.

Preparation of Aqueous Plant Extract: The leaves of the local plant *Lantana camara,* were collected at the worker's nursery, federal college of forestry Jos (W.N.F.C.F.J), from the underneath of the trees. These extracts were air-dried under room temperature and grinded separately, using mortal and pistil, 50g/l, 100g/l, 150g/l, and 200g/l of each sample was added to one litre of distilled water in separate flasks. This was will vigorously stirred and left to stand for 24hours. The sample was filtered with a Whitman paper and the filtrate used as extract.

Collection of Infected and Healthy Tomato Fruits: Infected tomato fruit with symptoms of softness were randomly procured locally from Faringada market in Jos North plateau state. Five samples were collected from the market, these were taken and placed in sterile polyethylene bags and conveyed into the laboratory for fungal isolation and subsequent identification.

Isolation of Fungal Organism: Diseased portion of the tomato were cut under asquint conditions in to small bits into s sterile dish with the aid of scissor which was flamed over a bursen burner flame and dipped inside methylated spirit (Fawole *et al.*, 2008). The cut diseased and sterilized bits with 70% ethanol were then placed on petri dishes containing solidified (potato dextrose agar) PDA. The solidified plates were incubated at room temperature (28 ± 2^0C) in the dark for 96hours. The fungal colonies grown from the incubated plates were sub-cultured into fresh medium until pure culture was obtained. Microscopic examination was used after the colony characteristics. A sterile glass slide stained with lactophenol cotton blue and examined under the microscopic for fungal structures. The

morphology and culture characteristics observed were compared with structures in atlas manual.

Information on the Plant Used: The common name of the used plant is Kashin Kuda. The Scientific name is *Lantana Camara.* The family name is *verbenaceae* and the part used is the leaf.

In-vivo assessment of plants on *Aspergillus niger* and *Rhizopusstoloniferas* causal agent of fruit disease of tomato fruits.

Freshly purchased tomato fruits from faringada market in Jos North were cleaned and aseptically injured by boring 0.8cm diameters hole into the tomato fruits using a screw borer and they are divided into two groups and each group was arranged into three replications ina randomized sample block designed. First group were treated with plants extracts concentration and after 30minute the fruits were inoculated with pathogen. This is called preventive method of control. The second group was first inoculated with the pathogen and after 30minutesis treated with various concentration. This is called curative method of controlling fungi. Those that are not treated with the plant extracts before or after inoculation were the control. The weight loss and radical growth of the identified fungi were recorded at interval of 24hours for 5 days.

Data Collection and Analysis: The data were collected at interval of 24hours for 5 days by taking the weight of the fruits and also measuring the increase in mycelia growth in the fruits. The weight was obtained with the help of electrical weighing balance and the weight obtained subtracted from the initial weight of the fruits recorded as weight loose. Then increase in disease over time was recorded by measuring the edges of the mycelia growth with a ruler and subtracting the initial diameter of 0.8cm injury and the result was recorded as radial growth. The data collected were subjected to analysis of variance using Minitab, statistical package and means separated by Duncan's Multiple Range Test.

RESULTS AND DISCUSSIONS

Percentage of Fungi on tomatoes in Farin-gada Market, Jos

Table 1: Shows the percentage frequency of fungi in tomatoes market Jos North Local Government Plateau State. *Aspergillus niger* and *Rhizopus*

stolonifer are found to be most too prevalent than the others with 50% and 33% respectively.

Table 1:Percentage of Fungi on Tomatoes in Farin-gada Market, Jos

Pathogens	1st Plate (%)	2nd Plate (%)	3rd Plate (%)
Aspergillus niger	50	33	-
Penicillum spp.	-	-	33
Rhizopus stolonifer	50	33	-
Fusariumspp.	-	33	-

In-vivo effect of different concentration of plant extracts on radial growth of *Aspergillus niger* on tomato

Data in table 2 shows effect of different concentration of plant extracts on radial growth of *Aspergillus niger*. Radial growth varied significantly ($p \leq 0.01$) with the treatments on *Aspergillus niger*. The radial growth was significantly ($p \leq 0.01$) higher in the control (6.33cm) and the least was (0.00cm) at five days with the concentration 50g/l of the plant extracts.

Table 2: In-vivo effect of *Aspergillus niger* on preventive method of control.

	Radial growth of *Aspergillus niger* Days After Inoculation				
Treatment	1	2	3	4	5
50g/l	1.02^{b}	2.10	0.01b	1.00^{b}	0.00^{c}
100 g/l	1.00^{ab}	1.67^{ab}	0.67	0.33^{b}	3.67^{b}
150 g/l	2.33^{a}	4.00^{ab}	2.33a	2.00^{a}	4.33^{ab}
200 g/l	2.33^{a}	4.33^{ab}	3.33a	2.67^{a}	6.00^{a}
Control	2.67^{a}	4.67^{a}	3.67^{a}	3.00^{a}	6.33^{a}
S.E $\pm$	0.632	0.856	0.471	0.494	0.632
Level of Significance	**	**	**	**	**

Means with different superscripts in the same column are significantly different.

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** = Significant at 1%
NS= No significant

Table 3 shows the effect of different concentration of plants leaves extracts on radial growth of *Aspergillus niger* is indicates that lantana significant ($p \leq 0.01$) difference on radial mycelia growth of *Aspergillus niger*. The mycelia growth was significantly less (1.20,1.20,2.33,and 4.67cm) at 50,100,150 and 200g/l respectively in the control of mycelia growth of *Aspergillus niger*.

Table 3: In-vivo effect of *Aspergillus niger* on curative method of control.

	Radial growth of *Aspergillus niger* Days After Inoculation				
Treatment	1	2	3	4	5
50g/l	1.82^{d}	1.43d	1.66c	1.95^{c}	1.71^{d}
100 g/l	3.33^{c}	2.00^{c}	1.20b	2.00^{b}	4.00^{ab}
150 g/l	5.00^{b}	4.33^{b}	2.33b	2.33^{b}	5.33^{a}
200 g/l	7.33^{a}	7.00^{a}	5.00a	4.67^{a}	7.33^{a}
Control	8.33^{a}	7.67^{a}	5.33^{a}	5.33^{a}	8.00^{a}
S.E ±	0.365	0.615	0.516	0.576	1.282
Level of Significance	NS	*	NS	**	*

Means with different superscripts in the same Colum are significantly different.
** = Significant at 1%
* = Significant at 0.05
NS= No significant

In-vivo effect of *Rhizopus stolonifer* on preventive method of control.

Data in table 4 shows effect of different concentration of plants leaves extracts on radial growth of *Rhizopus stolonifer*. The result indicates that lantana significant ($p \leq 0.01$) difference on radial mycelia growth of*Rhizopus stolonifer*. The mycelia growth was significantly less in all the concentrations at five days.

Table 4: In-vivo effect of *Rhizopus stolonifer* on preventive method of control.

	Radial growth of *Rhizopus stolonifer* Days After Inoculation				
Treatment	1	2	3	4	5
50g/l	2.00^{b}	1.83^{b}	1.04^{b}	0.05^{b}	0.00^{a}
100 g/l	4.00^{ab}	3.00^{a}	3.00^{a}	3.00^{a}	1.67^{a}
150 g/l	5.33^{a}	4.00^{a}	3.33^{a}	4.00^{a}	2.67^{a}
200 g/l	7.33^{a}	4.67^{a}	4.00^{a}	4.33^{a}	3.33^{a}
Control	8.00^{a}	4.67^{a}	4.00^{a}	4.33^{a}	3.33^{a}
S.E ±	0.494	0.394	0.494	1.247	0.365
Level of Significance	NS	*	**	**	**

Means with different superscripts in the same Colum are significantly different.

** = Significant at 1%

* = Significant at 0.5%

NS= No significant

In-vivo effect of *Rhizopus stolonifer* on curative method of control.

Data in table 5 shows effect of different concentration of plants leaves extracts on radial growth of *Rhizopus stolonifer*. The result indicates that lantana significant ($p \leq 0.01$) difference on radial mycelia growth of *Rhizopus stolonifer*. The mycelia growth was significantly reduced (0.31cm) at 100g/l after four days of inoculation.

Table 5: In-vivo effect of *Rhizopus stolonifer* on curative method of control.

	Radial growth of *Rhizopus stolonifer* Days After Inoculation				
Treatment	1	2	3	4	5
50g/l	8.67^{c}	1.33^{bc}	1.33^{cd}	1.67^{cd}	2.00^{bc}

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100 g/l	1.24^{d}	3.00^{c}	2.10^{d}	0.31^{d}	1.00^{b}
150 g/l	9.67^{bc}	2.00^{b}	2.67^{bc}	3.33^{bc}	3.33^{b}
200 g/l	10.33^{ab}	4.33^{a}	4.33^{ab}	5.00^{ab}	6.00^{a}
Control	11.00^{a}	6.00^{a}	5.67^{a}	6.33^{a}	7.00^{a}
S.E±	0.558	0.537	0.856	0.789	1.033
Level of Significance	*	NS	**	**	**

Means with different superscripts in the same column are significantly different.

** = Significant at 1%

* = Significant at 0.5%

NS= No significant

Effect of plant extract on weight loss of tomatoes infected with *Aspergillus niger,* using preventive method.

Table 6 presented the effect of plant extracts and method of control preventive on weight loss of tomatoes infected with *Aspergillus niger*.The result showed a significant ($p \leq 0.01$) difference on plant extract in *Aspergillus niger* on preventive method on controlling weight loss of infected tomato at 50g/l concentration (0.41g).

Table 6: In-vivo effect of*Aspergillus niger*on preventive method of control.

	Weight loss Days After Inoculation				
Treatment	1	2	3	4	5
50g/l	1.67^{c}	2.00^{a}	1.34^{a}	0.41^{a}	1.00^{a}
100 g/l	3.33^{b}	1.33^{ab}	1.47^{a}	1.07^{ab}	1.33^{a}
150 g/l	4.67^{ab}	2.03^{bc}	4.03^{a}	2.90^{abc}	8.77^{a}
200 g/l	7.00^{a}	3.17^{b}	7.27^{a}	5.07^{a}	10.13^{a}
Control	7.67^{a}	4.73^{a}	11.33^{a}	6.93^{a}	13.07^{a}
S.E±	0.425	0.987	2.893	0.785	2.844
Level of Significance	NS	NS	**	**	*

Means with different superscripts in the same column are significantly different.

** = Significant at 1%
* = Significant at 0.05%
NS= No significant

Effect of plant extracts on weight loss of tomatoes infected with *Aspergillus niger*, using curative method.

Table 7 presented the effect of plant extracts and method of control curative on weight loss of tomatoes infected with *Aspergillus niger*.The result shows, a significant ($p \leq 0.01$) difference on plant extract in *Aspergillus niger* on curative method of controlling weight loss of infected tomato (0.01,1.50,3.03,and 4.17) in all the concentration at day 1 and 3 respectively.

Table 7: In-vivo effect of *Aspergillus niger* on curative method of control.

	Weight loss Days After Inoculation				
Treatment	1	2	3	4	5
50g/l	1.67^{c}	2.00^{a}	1.34^{a}	0.41^{a}	1.00^{a}
100 g/l	3.33^{b}	1.33^{ab}	1.47^{a}	1.07^{ab}	1.33^{a}
150 g/l	4.67^{ab}	2.03^{bc}	4.03^{a}	2.90^{abc}	8.77^{a}
200 g/l	7.00^{a}	3.17^{b}	7.27^{a}	5.07^{a}	10.13^{a}
Control	7.67^{a}	4.73^{a}	11.33^{a}	6.93^{a}	13.07^{a}
S.E±	0.425	0.987	2.893	0.785	2.844
Level of Significance	NS	NS	**	**	*

Means with different superscripts in the same columnare significantly different.
** = Significant at 1%
* = Significant at 0.05%
NS= No significant

Effect of plant extracts on weight loss of tomatoes infected with *Rhizopus stolonifer*, using preventive method.

Table 8 presented the effect of plant extracts and method of control preventive on weight loss of tomatoes infected with *Rhizopus*

stolonifer.The result showed a significant ($p \leq 0.01$) difference on plant extract in *Rhizopus stolonifer* on preventive method of controlling weight loss of infected tomato (0.85,1.50,3.03 and 4.17) in all the concentration at day 1 and 3 respectively.

Table 8: In-vivo effect of *Rhizopus stolonifer* on preventive method of control.

	Weight loss Days After Inoculation				
Treatment	1	2	3	4	5
50g/l	0.85^{ab}	1.30^{e}	11.20^{c}	4.00^{b}	3.01^{c}
100 g/l	5.87^{a}	1.73^{d}	1.50^{bc}	1.57^{b}	1.50^{bc}
150 g/l	7.33^{bc}	3.33^{c}	3.03^{abc}	3.50^{ab}	3.10^{ab}
200 g/l	11.30^{ab}	4.77^{b}	4.17^{ab}	7.07^{ab}	4.90^{a}
Control	19.60^{a}	6.73^{a}	5.33^{a}	11.93^{b}	5.27^{a}
S.E ±	3.463	1.312	4.224	2.146	4.129
Level of Significance	*	***	**	NS	NS

Means with different superscripts in the same columnare significantly different.

*** = Significant at 0.5%

** = Significant at 1%

* = Significant at 0.05%

NS= No significant

Effect of plant extracts on weight loss of tomatoes infected with *Rhizopus stolonifer,* using curative method.

Table 9 presented the effect of plant extracts and method of control curative on weight loss of tomatoes infected with *Rhizopus stolonifer*.The result showed a significant ($p \leq 0.01$) difference on plant extract in *Rhizupus stolonifer*oncurative method of controlling weight loss of infected tomato (0.01,2.20,3.10 and 4.50) in all the concentration at 5 days.

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Table 9: In-vivo effect of *Rhizopus stolonifer* on curative method of control.

	Weight loss Days After Inoculation				
Treatment	1	2	3	4	5
50g/l	1.04^{c}	2.01^{b}	5.05^{a}	1.82^{ab}	0.01^{c}
100 g/l	5.87^{bc}	2.77^{ab}	2.50^{a}	2.50^{ab}	2.20^{ab}
150 g/l	7.33^{bc}	4.63^{ab}	4.53^{a}	3.10^{c}	3.10^{a}
200 g/l	11.30^{ab}	7.33^{ab}	10.30^{a}	4.70^{c}	4.50^{a}
Control	19.60^{a}	10.47^{a}	13.83^{a}	6.76^{ab}	5.57^{a}
S.E ±	2.898	4.158	1.259	0.819	1.907
Level of Significance	NS	**	NS	**	*

Means with different superscripts in the same columnare significantly different.

** = Significant at 1%

* = Significant at 0.05%

NS= No significant

Discussion

The primary aim for applying plant protection chemical is to reduce crop loss to a tolerable level. To achieve this aim the pesticide should be applied at a right dosage and appropriate time. This study is intended to provide some of the information required at different concentration levels of *Lantana camara* leaves as alternative to synthetic fungicide for the effective control of fruit root disease of tomato caused by *Aspergillus niger* and *Rhizopus stolonifer*.

Percentage of fungi of tomato in jos north: The most occurring fungi of tomato in Jos North Local Government of Plateau State were *Aspergillus niger* and *Rhizopus stolonifer,* they were found to be most prevalent two with 50% and 33% in Jos North. Effect of different plant leaves extracts on radial growth of *Aspergillus niger* and *Rhizopus stolonifer,* indicates that *Lantana camara* significant ($p \leq 0.01$) difference inhibition on radial mycelia growth of *Aspergillus niger* and *Rhizopus stolonifer*. The inhibition of the mycelia growth by *Lantana camara* leaves extract is an indication that it is fungicidal. This supports the earlier reports of Koul et al., 2000.

Who worked on the action component of Neem, Jatropha and Lantana leave extracts, Highest, inhibitions of *Lantana camara* leaves extracts was recorded with *Aspergillus niger* and *Rhizopus stolonifer.*

In-vivo evaluation: Mycelia growth of *Aspergillus niger* and *Rhizopus stolonifer* was inhibited with the application of the *Lantana camara* leaves extract. This result from the variation is the principle active ingredient in the plant leaves extract.

Inhibition of the mycelia growth by the plant extracts implied that less tissues were infected compared to the control where the infected tissues were more. Fruits rot disease is known to destroy cell walls, which consequently lead to loss of water and thus loss in weight in the tomato tissue. The loss in weight of fruit was reduced significantly when the plant extracts were applied on the infected fruits. The reduction in the weight loss was as a result of the deleterious effect of the plant extract *Lantana camara* on the pathogen growth.

CONCLUSION AND RECOMMENDATION

Conclusion: From the foregoing, it is evident that plant product can be used as component of tomato production package. If the use of these plant product becomes widespread, it may become necessary to product detailed studies in improving their formulations for long term usage especially the influence of such physical factor like temperature, sunlight etc. during storage. It was therefore, suggested that *Lantana camara* being the effective in the control of pathogens associated with tomato fruits. This, if fully exploited could enhance Agricultural production in Nigeria.

Recommendation: It is therefore recommended that farmers should use *Lantana camara* at 50g/l. For post-harvest treatment for tomato as control measure for *Aspergillus niger* and *Rhhizopus stolonifer.*

REFERENCES

Agrious, E.O (2005) Survey of the insect pest and farmers practices in the cropping of tomato in Nigeria 20:181 to 186.

Botunde O.U, Umeh, V.C Raja N (2010) Botanicals sources of eco-friendly bio-pesticides, journal of bio-fertilizer and bio-pesticides 5; 122.

Erinle A.E. (2009) invitro screening of selected plant extract against alternate journal of experimental biology and agricultural sciences 293) 344-351.

John C.E, Opadokun N.I, Tindall O.E (2010), Knowledge of biotic diversity in Northern Nigeria. Economic Botany, 60, 73 to 80.

Koul O, Isman M.B. Kathar C.M. (1990). Properties and Uses of Neem. Azadiracta indica. Can Journal of Botany 68: 1-11.

Olayide N.O Etkin N.L fontem D.A (2010) Local knowledge of biotic diversity and its conversation in Rural Housa cud, north in Nigeria. Economic Botany, 56; 73 to 88.

Sommer I.E (2010) Nematode management in tomatoes, paper and eggplant, IFAS extension publication EMY 032. University of Florida.

Wilson O.K and Wisnieski I.O (2010), Pest and Disease of Tropical Crops. Longman Group U.K