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Survey Of Fusarium Wilt On Garden Egg (*Solanum Melongena*) At Imawa Village Of Kura Local Government, Kano State, Nigeria

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ABSTRACT
Survey of fusarial wilt of *Solanum melongena* was carried out at Imawa village of Kura Local Government area located on N11°47'56.8" and 08°27'33.7". During the survey four randomly selected fields were visited weekly for 8 weeks. Symptoms of disease were carefully observed from 35 egg plants (*Solanum melongena*). The disease incidence (%) was calculated as percentage (%) and the results of the investigation have shown that plot B was having the highest (%) incidence. In the same vein, 10-20g of soil from the depth of 2-4 cm near the roots of both healthy and infected egg plants was collected separately using spatula and composite mixture of the soil sample was made. Isolation of the pathogen was done using serial dilution technique where 1g of the soil was mixed with 9ml of distilled water to obtain 10^{-1} up to 10^{-4} and then 1ml was poured directly in to prepared P.D.A and stored at room temperature for 5-7 days after which the dominant pathogen was identified as species identified are *Fusarium oxysporum* 4 isolates with 50% percentage abundance followed by *Rhizophus stolonifer* and *Aspergillus niger* each with 2 isolates conforming to 25% abundance each.

Keywords; fusarial wilt, Garden egg, Imawa village,

INTRODUCTION
Eggplant (*Solanum melongena* L.) also known as garden egg, aubergine, brinjal, or Guinea squash, is in the fourth ranked vegetable crops. It is of considerably economic importance in Asia, Africa, and sub-tropics (India, Central America), but is also grown in some warm temperate regions (Mediterranean area, South of the USA). In 1999, 1.3 million ha were cultivated in the world for a total production of 21.2 million tons of which 92.4% of the world production was covered by Asia. [1].
Although lower than that of tomato, eggplant nutritious value is comparable to other common vegetables. Its fresh weight is composed of 92.7% moisture, 1.4% protein, 1.3% fibre, 0.3% fat, 0.3% minerals, and the remaining 4% consists of various carbohydrates and vitamins (A and C) [2]. Eggplant is susceptible to numerous diseases and parasites, particularly bacterial wilt, *Fusarium* and *Verticillium* wilts, nematodes and insects. It exhibits partial resistance to most of these pathogens, but often at insufficient levels. This crop is highly vulnerable to plant parasitic nematodes especially with *Meloidogyne spp*. or root knot nematodes.
Among the most devastating and important disease is Fusarial wilt caused by the pathogen *Fusarium oxysporum* especially in the tropics where the temperature is favorable for the activities of the pathogen among which Nigeria is included especially northern Nigeria. Imawa

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village is among the areas where garden egg is largely cultivated and affected by wilt pathogen leading to huge economic loss, as a result there is need for the study of the disease incidence due to the nutritional and medicinal value of the plant.

Fusarium oxysporum is a common soil pathogen and saprophyte that feeds on dead and decaying organic matter. It survives in the soil debris as a mycelium and all spore types, but is most commonly recovered from the soil as chlamydospores. This pathogen spread in two basic ways: it spreads short distance by water splash, and by planting equipment, and long distances by infected transplants and seeds. *F. oxysporum* infects a healthy plant by means of mycelia or by germinating spores penetrating the plant's root tips, root wounds, or lateral root. The mycelium advances intracellularly through the root cortex and into the xylem. Once in the xylem, the mycelium remains exclusively in the xylem vessels and produce microconidia (asexual spores). The microconidia are able to enter into the sap stream and are transported upward. Wherever the flow of the sap stops the microconidia germinate. Eventually the spores and the mycelia plug the vascular vessels which prevent the plant from up-taking and translo]cating nutrients. In the end the plant transpires more than it can transport, the stomata close, the leaves wilt, and the plant dies. After the plant dies the fungus invades all tissues, sporulates, and continue to infect neighboring plants [3].

The fungal pathogen Fusarium oxysporum affects a wide variety of hosts of any age. Eggplant, Tomato, tobacco, legumes, cucurbits, sweet potatoes and banana are a few of the most susceptible plants, but it will also infect other herbaceous plants. *Fusarium oxysporum* generally produces symptoms such as wilting, chlorosis, necrosis, and premature leaf drop, browning of the vascular system, stunting, and damping-off [3]. The Objective of this work was to survey the incidence of Fusarium wilt on *Solanum melongena* (garden egg) grown at Imawa village of Kura Local Government and to isolate wilt pathogen of *Solanum melogena* from the soil sample.

MATERIALS AND METHODS

StudyArea

This survey was carried out at Imawa village of Kura Local Government Area, located in the south eastern part of Kano state lies on N11^{o}47'56.8" and E08^{o}27'33.7". People in this area are Hausa and Fulani and most of them are irrigation farmers mostly cultivating Cucumber, Water melon, Sugar cane, Garden egg, Tomato, Pepper and Spinach.

The survey

The survey was carried out between the months of December, 2012 to February, 2013. During the surveys, farmers' fields were visited on weekly basis, at each location four fields were were randomly selected and surveyed. Each field served as replicate recommended by [4]. Symptoms of diseases were carefully observed from 35 egg plants (*Solanum melongena*). Sample collection was done in an X pattern across each farm until the plants were collected and diseases were identified as recommended by [5].

The disease incidence was calculated using the formula below;

$$D.I\ (\%) = \frac{\text{Number of diseased plants}}{\text{Total Number of plants consulted}} \times 100$$ [6]

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Isolation and Identification of wilt causing fungi associated with garden egg

For this purpose, 10-20g of soil from the depth of 2-4cm near the roots of both healthy and infected egg plants was collected using sterile spoon or spatula and stored in a sterile polyethene bag. A composite mixture was made by mixing the soil samples from the fields. 1g of the soil sample was mixed with 9ml of distilled water and shaken vigorously for 15mins, 1ml of the mixture was transferred to 9ml of distilled water to make 10^{-2}, and it was repeated until 10^{-4} was made and 1ml was poured in to a prepared media of P.D.A and incubated for 7 days as recommended by [7].

For the identification of the fungal isolate, cotton blue in lactophenol stain was used, the identification was achieved by placing a drop of the stain on a clean slide with the aid of a mountain needle where a small portion of the mycelium from the fungal culture was removed and placed in a drop of the lactophenol. The mycelium was spread very well on the slide with the help of needle. A cover slip was gently applied with little pressure to remove air bubble. The slide was then mounted and observed under ×40 objective lens [8].

RESULTS AND DISCUSSION

The results obtained from the survey is shown in table 1 below;.

Table 1.Number of diseased plants per plot from week 1 to 8 of the Survey in 2012.

Plot	Number1	of 2	weeks 3	of the 4	survey 5	6	7	8
A	34	29	28	33	0	0	0	0
B	24	20	23	35	31	28	31	33
C	0	7	6	7	3	3	3	5
D	2	11	29	20	22	20	20	29
Mean	15	16.75	24	23.75	14	12.75	13.5	16.75
L.S.D	37.56	22.07	23.99	29.24	33.82	30.26	32.89	37.48
S.E	16.69	9.81	10.66	13.00	14.94	13.45	14.62	16.66

Table 2. Weekly Disease Incidence (D.I. %) per plot during the survey 2012.

PLOT	G P S	Number 1	Of weeks 2	3	4	5	6	7	8
A	N11^{O}48’04.6” E008^{O}27’41.7”	100.00	82.85	80.00	94.28	0	0	0	0
B	N11^{O}48’14.6” E008^{O}27’45.4”	70.58	57.14	91.66	97.22	88.57	77.77	86.11	94.29
C	N11^{O}48’30.9” E008^{O}27’30.7”	00.00	20.00	17.64	08.57	08.57	08.33	13.88	14.28
D	N11^{O}48’31.4” E008^{P}27’31.6”	05.88	31.42	85.29	85.71	62.85	55.55	55.55	92.85

Table 3.Wilt Pathogen Isolated from Composite Soil sample of Imawa during the Survey 2012

NAME OF ISOLATE	NO. OF ISOLATE	% ABUNDANCE
Fusarium oxysporum	4	50
Rhizopus stolonifer	2	25
Aspergillus niger	2	25
Mean	**2.66**	**33.33**

Table 1 shows that the garden egg grown at Imawa shows symptoms of Fusarium wilt, the symptoms includes wilting, chlorosis, necrosis, premature leaf drop, browning of the vascular system, this is also in line with the findings of [9] and [5].
Also in table 2, Plot B was found to have higher incidence of the disease this is due to the fact that the disease become more severe between the blossoming and fruit mature stages as stated by [10].
In table 3, the isolation result shows result of the fungal isolate from the soil sample of the plots visited, *F. oxysporum* was found to have the higher abundance with 50%, *R. stolonifer* having 25% and A. niger also having 25%, respectively, this confirmed that *F. oxysporum* cause fusarium wilt of garden egg (*S. melongena*). So the Hypothesis is rejected due to the fact that R. stolonifer causes postharvest fruit rot [7], while *A. niger* was known to cause fruit rot on certain vegetables [11].
Fusarium oxysporum was found to be causing fusarial wilt of Solanum melongena (garden egg) at Imawa village of Kura local government Kano, the disease symptoms include leaf chlorosis, stunting, and leaf drop. It is transmitted through the soil and through vascular wounds in plant mate vein clearing on the younger leaves and drooping of the older lower leaves, followed by stunting of the plant, yellowing of the lower leaves, defoliation, marginal necrosis and death of the plant. On older plants, symptoms are more distinct between the blossoming and fruit maturation stages. The disease cause huge economic loss and death of the whole plants in severe cases.

RECOMMENDATIONS

Based on these results above the following recommendations could be suggested

- Farmers should use sterile planting materials to avoid transmission of disease through planting materials
- Crop rotation with non-susceptible host to starve the wilt pathogen
- Use of resistant varieties
- Avoid planting the plant when temperature is favorable for the pathogen
- Use of chemicals on the soil before planting i.e incorporating the chemicals in the soil before planting.
- Farmers should not frequently use chemicals so as not to cause heavy metals accumulation in the plants.
- Further research on fusarium wilt diseases is also recommended.

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