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INVESTIGATION AND MANAGEMENTS OF TOMATO PEST AND DISEASE IN ONDO STATE, NIGERIA

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Abstract: **Investigations of fungi associated with tomato spoilage were carried out on tomato collected from an experimental farm beside Meteorological station Oba kekere Federal University of Technology Akure. The studies were conducted on spoiled tomato samples which have been bruised. The most predominant pathogen associated with tomato rots was identified as *Colletotrichum coccoides*. Antifungal studies were carried out on tomato using some botanicals such as *M.myristica, H suaveojeus, A. congensis,* T.Tetrpleura and Xylopiaacthiopica and prepared in concentrations 25, 50, 75 arid 100% in vitro screening of the botanicals, were carried out in a completely randomized design in there replicates. It was observed that the four different concentrations of A. *congensis* completely inhibited radial growth of C. coccoides, while 75 and 100% of *M myristica*had a similar effect, while only 100% *of T. tetrapienra* completely prevented the fungal growth. Generally, .Xylopia*suaveogeus H.*showed antifungal properties but they could not completely inhibit mycelia growth of the fungal pathogen at any of the concentrations.**

Keywords: **Investigation, Managements, Tomato, Pest, and Disease.**

1. INTRODUCTION

Origin and Distribution

Tomato *(lycoperscicon esculentum L)* originated from South America in the Peril Ecuador Region, and was taken to the Philippines and Malaysia by 1650. it was not cultivated in the tropics until the 20th Centuy, but is now cultivated widely throughout the world. The main production areas are in USA, Italy and Mexico [1]. [2] recorded 1,333,570 tones tomato yield in Nigeria. Tomato belongs to the family of night shade and has about different cultivars among which are big beef, better boy, green zebra ,early girl ,Juliet, roma, gardener delight etc. the word tomato comes from Nahunta word tomato meaning “the swelling fruit”. It is a heart loving crop

Tomato has being in cultivation in Nigeria for a very long time Denton, Swap Annual Tomato cultivated farms in Nigeria was estimated at 25000ha with an annual production of 225 metric tons [3]. [4] Estimated the national yield average to be 114 tones/ha. The USC of irrigation water or bad handling practices can contaminate Tomato. According to [5], global Tomato production amounted to 27.6 million tons in 1961.Tomato is considered a moderately sensitive perishable vegetable. The Tomato is the second most consumed vegetable on a per capital basis followed by potato.(FAO, 1997). Tomato contains mineral and vitamin A or C. The fruit is used raw or cooked, made into soup sauce juice, ketchup, paste, purce or powder, canned and used unripe in chutneys [6]. Tomato (L. esculentum) grow for three to five months of frost free weather, the root, the shoot and the fruits are exposed to attack by microorganism, the various microorganisms associated with tomato in Nigeria include Septoriahycopersic, Alternaria, Solani, Xanthomofla, ScampestriS, Botrytiscincrea [7].

Anthracnose disease of Tomato

One of the major fungal disease of Tomato is anthracnose caused by *Colletorichum coccodes* which is present in all ecological region where tomato is produced . Anthracnose appears most commonly on overripe fruits. Affected plant dies early and produces few fruit. Fruit, spitted open and infected stem reveals brownish streaks extending up and down the

stem. Plants are susceptible at all stages of development but symptoms are most obvious after flowering. Anthracnose become visible on ripe or ripening fruit as small circular and indented spots in the skin. As these spots expand they develop dark centers or concentric rings of dark specks, which are the spore-producing bodies of the fungus. High moisture favors epidemic of the disease because the fungal spot are spread through rain splash warm, high humidity makes the symptoms to develop [8].

Fusarium wilt

This is caused by *Fusarium oxysporum.* Plant infected by this soil dwelling fungus show leaf yellowing and wilting that progress upward from the base of the stem. The Fungus causes vascular browning and causes wilting of leaves, yellowing of leaves and it also affects the stem. Chemical control measures have been tested and found effective in the control of plant disease. Resistant varieties may become infected but disease will not be as severe as with susceptible variety and a reasonable yield should still be obtained. In addition plant disease free seed or transplant in well drained, disease free soil rotate at least four years away from tomatoes to reduce population of fungus in soil, and remove destroy infected plant infected plant residue. In green house or seedbeds, disinfest soil by treating with steam [9]

Methods of control of losses due to post harvest disease of tomato

Losses may be reduced by application of some fungicides on tomato fiait to reduce post-harvest spoilage. These fungicides include azoxystrobin, chiorothala, copper products, nancozeb and maneb, Ziram, Kocide 4.5 LF. Fungicides are not the most desirable means of disease control for several important reasons. Fungicides are heavily regulated and vary from country to country in their use and registration [10]. They are also expensive and can cause pollution in the environment and may also induce pathogen resistance.

Propagation

Tomato is normally transplanted because much better results are gained when seedlings are raised in a nursery .Two methods of raising seedlings in nursery can be used;

1. Sowing in seedbed
2. Sowing in seedling tray (used by many farmers in South Asia)

Smaller quantity of seeds are needed ,the seedlings can be selected for growth and health before planting in the field, the plantlets can be well protected and the planting distance is more regular than sowing directly on the field. Tomato needs phosphorus after planting, it is better to apply nitrogen potash during the growing stage of the crop. Tomato plant is not resistant to drought. It is important to water the plants regularly especially during flowering and fruit formation [9].

Health benefits of Tomato

Tomato is one of the low calorie vegetables containing just 18 calories per 100 g. It is also very low in any fat contents and has zero cholesterol levels. Nonetheless, they are excellent sources of antioxidants, dietary fiber, minerals, and vitamins. Because of their all-round qualities, dieticians and nutritionists often recommend them to be included in cholesterol controlling and weight reduction programs [10].

- The antioxidants present in tomatoes are scientifically found to be protective against cancers including colon, prostate, breast, endometrial, lung, and pancreatic tumors.

- Lycopene, a flavonoid antioxidant which is the unique phytochemical present in the tomatoes. Redvarieties are especially concentrated in this antioxidant. Together with carotenoids, it has the abilityto protect cells and other structures in the body from harmful oxygen free radicals. Studies haveshown that lycopene prevents skin damage from ultra-violet (UV) rays and offers protection fromskin cancer [11].

- They contain moderate amounts of many vital B-complex vitamins such as foliates, thiamin, niacin, riboflavin as well some essential minerals like iron, calcium, manganese and other trace elements.

Constraints to Tomato Production

The problems militating against tomato production were identified to be high cost of fertilizer, pest and disease problems, and inefficient transportation network resulting in spoilage of output and inadequate credit facilities [12]. The higher incidence of insect pests in Oyo state in the south may be attributed to its relatively higher humidity (due to the rainy

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season) which supports the multiplication of pests and diseases, and vegetation diversity associated with humid zones (including various off-season alternative hosts of the pests' developmental stages) compared to the other states located in the savannah agro-ecology [13].

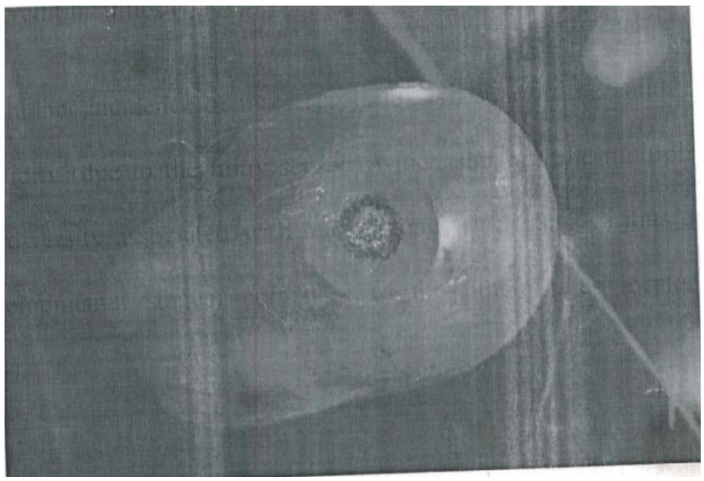

Plate 1: Anthracnose disease on tomato fruit

Diseases as a Problem of Tomato Production

Plant diseases are usually caused by pathogens including fungi, bacteria, nematode and viruses, among which fungi are the main pathogens causing great yield losses in numerous important crops which include tomato fruits. Tomato plants are susceptible to nematode and several fungi, bacteria and viruses. Fungi and Bacteria cause foliar fruit, stem or root diseases. A virus infection often leads to dwarfed growth and decreased production. Damage caused by diseases can cause considerable yield losses to farmers [14].

OBJECTIVE OF THE STUDY

1. To isolate and identify fungi involved in deterioration of tomato *L. esculentum;* and

2. To determine the effect of some botanicals on the mycelia growth of the causal organism of anthracnose disease of tomato.

2. MATERIALS AND METHODS

Collection of rotten tomato

Infected tomato fruits showing visible symptoms of anthrachnose disease were collected from Crop Soil and Pest Management experimental Farm located beside Meteorological Station Farm Oba- kekere, Federal University of Technology Akure. These samples were collected randomly and labeled accordingly. They were wrapped in sterilized polythene bags and sealed before they were brought to the laboratory. The equipment used for the experiments were washed and sterilized. About 5% sodium hypochlorite was used for surface sterilization of the tomatoes. Sterilization of glass wares and agar medium was carried out by autoclaving.

Preparation of Culture Media

The culture medium used was potato dextrose agar (PDA). Pure fungal isolate was maintained on the PDA throughout the experimental period. About 4% of PDA was weighed using Metter balance and dissolved in 200ml distilled water in a 250m1 conical flask and covered with cotton wool and wrapped with aluminum foil to prevent air borne microbes contamination. The suspension was stirred vigorously to dissolve the PDA and this was sterilized by autoclaving at 1200 e and I.lkgcm3 for l5minutes. The PDA was poured uniformly into the plate and allowed to solidify in the inoculating chamber for culturing. Streptomycin antibiotic was added to suppress all bacterial growth; sterile disposable Petri dishes were prepared for inoculating the pathogen. Fourteen Petri dishes were prepared at first and they were all labeled according to their location.

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The botanicals

Five plants *(Monodoramyristica Hyptissuaveojeus, Aistonia Congensis, Tetrapleura tetrapleuru. Kylopiaarcthiopica)* were collected from Oja Oba, Akure Ondo State. The extracts were obtained by adding 10, 20, 30 and 40g of the powder of each plant leaf to 100ml of sterile distilled water in 250m1 conical flask. Plates were treated each with the extract of each plant the control experiments had distilled water on place of plant extracts. The treatment and control were incubated for seven days at room temperature (27±30) °C.

Isolation of spoilage fungi from the exposed tissue of tomato

Pieces of tomato of different sizes (4x4mm) were cut with sterilized sepal and surface sterilized in 70% ethanol for 10 seconds, rinsed in 3 changes of distilled after, dried with sterile tissue paper and plated on solidified PDA which has been amended with strepiomYcil1. Three replicates from each of tomato pieces were platted on the PDA. The plates were incubated at room temp (27± 3.0°C) for 7days and fungal growth associated with spoilage of tomato was assessed.

Sub-Culturing

This involved sub-culturing a segment of the pathogen growth at the advancing stage in the previous plates into new PDA Petri dishes. After sub-culturing, the pure culture obtained was identified, this was done consecutively for a period of four weeks.

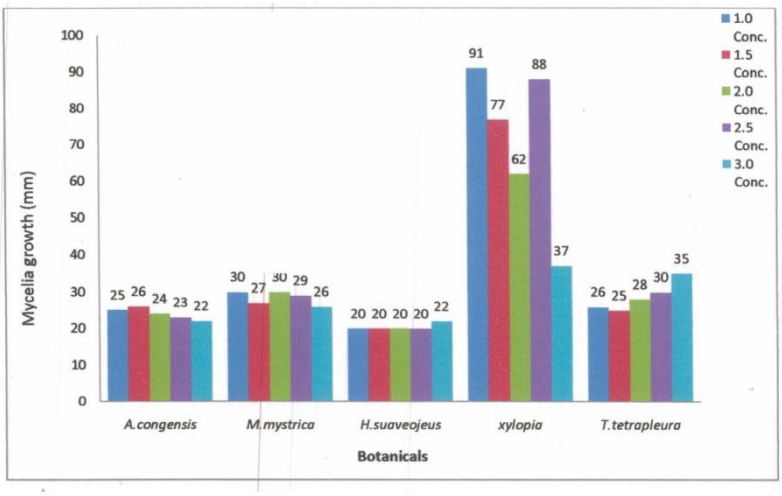
Bioassay of the botanicals on the fungal pathogen *(Colletotrichum coccoides)*

The antifungal effect of the five different extracts concentration (Four for each i.e aqueous) which was 25%, 50%, 75% and 100% were determined in-vitro. Exactly I ml of each plant extract concentration was dispensed per Petri-dish and PDA was added to prepare a PDA-extract mixture, after which they were rotated gently to enable the extract dispersed evenly. The agar-extract mixture was allowed to solidify and then inoculated with a 6mm diameter mycelia disc obtained from the colony of four-day old culture of the test fungi. The experimental design was completely randomized design (CRD) with three replicates. All plates were incubated at 27°C. The diameter of the radial growth of the fungus was measured at the end of incubation period.

3. RESULTS AND DISCUSSIONS

The results of aqueous plant extracts in PDA medium showed that radial growth of C. coccoides almost covered the Petri dishes of the control experiments at 7th day of incubation. It was also observed that M myristica A. congensiS, T.tetrapleura, H.suaveo!eUS, X acthiopica extracts were fungi-toxic to the fungal pathogen.

Astonia congensis was found to be the most fungi-toxic as exhibited by all concentration levels used. (Fig.l). Monodora myristica ranked second in anti-fungal attribute while T. tetrapleura is 3rd among the five tested plant. At 25% T. tetrapleura was significantly more antifungal than M myristica, aethiopicaand H. suaveojeus.With 50%, no difference inhibitory effect was observed between extracts of M. myristica, X. acthiopica and H. suaveojeuS. It was only at 100% that X. acthiopica was better than F. suaveofeus as shown in Fig.1 below.



The radial growth of C. coccoides almost covered the Petri — dishes of the control experiment at 7hh1 day of incubation. Fig. 1: Effects of aqueous extracts of some botanicals on the mycelial growth of Colletotrichum cocoides at 7 days after inoculation.

It was generally observed that among the botanicals assayed, X. aethiopica and H. suaveojeus showed better antifungal properties when compared to other botanicals and the control. However none of their tested extracts concentrations was able to completely cover the Petri dishes by the 7th day of incubation as exhibited by the control. This conforms with the previous work carried out by Olufolaji (2006) when he worked on botanicals to control red rot disease of sugarcane. The active ingredients in the botanicals are potent and can be developed to form fungicides for the control of anthracnose rot of tomato.

4. CONCLUSION AND RECOMMENDATIONS

It can be concluded that the fungus isolated above is widely distributed in various experimental farm in Federal University of Technology Akure, Ondo State. In general an environment where these funguses are not controlled, they will develop and grow vigorously and could result in drastic reduction of the farm produce due to the physiological process of the plant that fungi are liable to affect.

Prior to long-term storage and marketing tomato should be cleaned by scrapping off soil and other debris on the surface. A knife or piece of stick should be used. Water must not be used to clean tomato fruit before storage because of increased susceptibility to microbial infection and growth under ambient humid storage conditions.

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