Research Article

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Fungal Species Isolation and Characterization from Spoilt Fruits at Utako Market, Abuja, Nigeria

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ABSTRACT

Background and Goals : Fruits are naturally contaminated by a wide variety of microorganisms, including diseases like fungus. This study looked into the many kinds of fungal flora that are connected to fruit rotting at the Utapo market in Abuja, Nigeria. Supplies and Procedures: One hundred fruits, thirty of which were healthy and seventy of which were spoiled, were brought to the lab after being gathered from the market. Using a sterilized blade, thin slices of the decaying fruits were cut and then infected onto PDA media. The incubation process took place for five days at 27 EC. Findings: The acquired result showed that seven distinct fungus species were present: Rhizopus stolonifer, Mucor mucedo, Alternaria sp., Aspergillus niger, A. flavus, A. fumigatus, and Aspergillus sp. Aspergillus niger, however Alternaria sp. was the least frequent species, and Aspergillus niger was the most prevalent. Nonetheless, Alternaria sp. had the lowest pathogenicity whereas Rhizopus stolonifer had the highest compared to the other isolated fungal species. In conclusion, it was determined that the degeneration of fruits in Utako market was caused by seven different types of fungi. Toxins produced by a few of these rare fungus species have the potential to cause serious food poisoning and other health risks.

Keywords : Rotten fruits, fungal flora, food poisoning, fungal species, pathenogenicity

INTRODUCTION

Ovaries that have been fertilized to produce fruits are essential sources of nutrition for humans. They provide the body with the proper amounts of vitamins, lipids, minerals, and oil needed for human growth.and development1. Nevertheless, despite the enormous advantages of fruits, a number of issues, including pests, fungal attacks, inadequate rainfall, and climate change, pose a threat to their survival. Fruits are very appealing to microbiological degradation because they have low pH values, high sugar and nutritional content, and both. These fruits are typically exposed to additional microbial infections in addition to those linked to the fruit surface and those from nearby sick fruits while being displayed for potential buyers in open markets on benches and in baskets until they are sold.2.3. Fruit spoilage pertains to Fruit deterioration refers to a variety of alterations that cause a fruit to lose its desirable texture, flavor, smell, or appearance.The kinds of microorganisms that cause agricultural crops to deteriorate are indicative of a number of microbial problems in those crops1. Since many toxic fungus have been discovered from ruined fruits, rotting microorganisms are typically regarded as toxic or pathogenic. Certain bacteria, such molds and other fungi, can produce different kinds of mycotoxins that are dangerous to people even when they are refrigerated4. These mycotoxins are produced by some fungal species and have a low molecular weight. They are hazardous secondary metabolites. Because of their great toxicity and heat resistance, they are hazardous even in little amounts5. Nonetheless, infections or allergies are brought on by harmful microbes6. Microorganisms that cause spoilage may be added to Microorganisms can be incorporated into the crop at the seed stage, throughout field crop growth, during harvesting and post-harvest processing, or during loading and unloading for storage and distribution. This source claims that the contamination of food goods with fungal toxins can result in acute or chronic intoxication, lower life expectancy, and worsen medical issues in people, which can entail a 40% loss in economic productivity5. Finding and isolating the fungi causing its spoiling has become more and more important over time. In order to provide firsthand knowledge on the potential risks connected with the eating of such fruits, this research set out to isolate and characterize the diverse fungal flora associated with fruit deterioration in Utako Market, Abuja, Nigeria.Culture media were prepared using Potato Dextrose Agar (PDA) supplemented with 30 mg of chloramphenicol mLG1. The Culture media were made in

accordance with the advice provided by the manufacturer. Weighing was done on the appropriate medium or base medium proportions. The weighed amount of the medium was then suspended in 400 mL of distilled water. Over a Bunsen flame, the media were brought to a boil until the agar melted. The melted agar medium was allowed to cool to 45 EC, and the manufacturer's recommended pH adjustment was made. The media were autoclaved for 15 minutes at 121 EC with a pressure of 15 Ibf/in2 after being cotton-plugged and wrapped in aluminum foil.Following sterilization, the medium were aseptically added to sterile Petri plates in 20 mL aliquots, and they were left to The medium were aseptically dispensed into sterile Petri dishes in 20 mL aliquots following sterilization, and they were then let to settle on the flat. The Petri dishes were properly labeled and kept in the refrigerator to be used at a later time.

Fungi isolation from spoiled fruits

Dashwood et al.'s aproach was used to isolate the mycological flora.and Balali & Associates 10. Cotton wool soaked in 0.1% mercury chloride (HgCl) for two minutes was used to surface sterilize the contaminated fruits. The cotton wool was then cleaned three times with distilled water. A tiny part of the tissue with both the healthy and the rotting portion was cut using a sterile blade and forceps to measure 3 mm in diameter. The tissue was then plated on potato dextrose agar (PDA) that had solidified and had 30 mg of chloramphenicol mLG1 to stop the growth of bacteria. For seven days, the infected plates were incubated at room temperature (25 EC). Different colonies found on the plates were identified based on cultural traits like colony size, form, color, and The homolytic properties and consistency as reported by Fawole and Oso11. To obtain pure isolates, the fungal isolates were subcultured on PDA slants.

MATERIALS AND METHODS

Fruit samples (orange, banana, pawpaw, pineapple, water melon, pumpkin, tomato) were collected, and slide culture techniques were used to examine the fruit samples' morphology, including colony growth pattern, conidial morphology, and pigmentation12.Using a sterile inoculating needle, a small portion of the aerial mycelia from the representative culture was removed. It was then inoculated on a slide that contained a portion of a prepared solidified potato dextrose agar and allowed to incubate for 48 hours. Following this, the slide was examined under a light microscope, first at a low resolution objective of x10 and then at a high resolution objective of x40, in order to detect spore, hyphae, and other unique structures, following the procedures outlined by Barnett13.The physical traits and visual attributes of the fungal isolates obtained from the rotting fruits utilized in this investigation were verified and verified with the aid of Domsch et al.'s mycological atlas 14.

RESULTS

Fungal flora characterization

shows the fungal flora characterization from fruits purchased from the Utako market. The outcome demonstrated the occurrence of Among the ruined fruits are seven distinct fungus species.Seven fruit-spoilage-causing fungus species were identified in this investigation, with Aspergillus niger being discovered in every fruit except orange and pawpaw. On the other hand, Aspergillus flavus is found in tomatoes, bananas, peppers, and pineapple.On the other hand, Mucor mucedo is found in only tomato and pawpaw, while Rhizopus stolonifer was found in pepper, tomato, watermelon, pumpkin, and pawpaw. The outcome also demonstrated that Aspergilus fumigatus was present in pineapple and pawpaw, while Alternaria sp. was exclusively found in oranges.

DISCUSSION

According to the study's findings, damaged fruits from the Utako market included seven distinct fungus species. It was established that these fungus species were agents responsible for the rotting. Considering the risk posed by fruit post-harvest spoiling caused by a variety of fungi, particularly in underdeveloped nations like Nigeria as documented by Droby16. Seven distinct fungus species were identified in this investigation as being related to fruit deterioration. The existence of The use of Rhizopus and Aspergillus species as fruit spoiling agents in this study was consistent with the conclusions made by Ewekeye et al.17 among the spoiled fruits being sold in a few certain Lagos markets. According to Mailafia et al. (18), Aspergillus niger was identified as the predominant mycological flora linked to fruit deterioration. This result also agreed with that of the Nigerian researchers Baiyewu et al. 2 and Chukwuka et al. 3, who separated A. niger and R. stolonifer from pawpaw. The results also agreed with those of Gadgile and Chavan19 about the separation of fungus pathogens from fruits that were kept and sold in stores.Moreover, A. niger was identified by Bali et al. 20 as the cause.In the field, niger was the reason for post-harvest deterioration in acid lime and sweet orange. A. niger, Alternaria species, Botryodiplodia theobromae, and Colletotrichumgloeosporioides were isolated from the spoiled mangoes, according to Okereke et al. 21.However, the value obtained for the prevalence of A. niger was higher than that reported by Mailafia et al. (18), who reported the highest occurrence of 38%. A. niger is known to cause black mold on certain fruits and to produce strong mycotoxins known as ochratoxins that can be harmful to humans and animals.

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The majority of the fungal species that were isolated during this study were quite important in inducing fruit deterioration. Rhizopus nigricans, A. flavus, A. niger, Fusarium spp., and Mucor spp. were reported in pawpaw by Chukwuka et al. 3. in pawpaw fruit rot from a Nigerian farm in Oyo state. Moreover, the presence of four distinct Aspergilus species Aspergilus fumigatus, Aspergilus niger, Aspergilus flavus, and Aspergilus spp.among the ruined fruits demonstrated the level of pathogenicity attributed by the Aspergillaceae family in causing fruit spoilage. This result was consistent with that of Bukar et al. 8 who showed that orange fruit soft rots in Nigeria were caused by Aspergillus species, Mucor, and Rhizopus spp. The pathogenicity tests revealed that the fungal isolates had an impact on every fruit, but more research is required to compare how the fungal isolates affected the sugar and nutritional value of the fruits. In light of the study's findings, a number of fungus were isolated and diverse Certain fungi have been isolated, and research has shown that these species are known to produce toxins that can lead to serious food poisoning and other health risks. As such, fruit vendors need to be properly trained on how to store fruits in a hygienic manner and how to wash them in saline water before eating them.

CONCLUSION

The rotting of fruits in the Utako market was shown to be caused by Aspergillus, Rhizopus, and Mucor. This implied a significant loss for the retailers and posed a clinical risk to the customers through severe food poisoning.

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