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Phytochemical Components and Fungi Flora of Water Yam (Dioscorea alata)

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ABSTRACT

The study on the phytochemical and fungal flora of were carried out in the Department of Plant Science and Biotechnology, Rivers State University. The phytochemical screening of the sample was carried out using standard laboratory method described by Association of Official Analytical Chemist (. The cultural laboratory technique was used for fungi isolation, characterization and identification. The quantitative screening for phytochemicals revealed that the plant contains Tannins (2.87±0.52mg/100g), Phylate (9.8±1.23mg/100g), Oxalate (0.57±0.22mg/100g), Flavonoid (14.1±2.7mg/100g), Phenol (34.51±0.72mg/100g) and Alkaloid (9.65±0.75mg/100g). Two fungi isolates mucor species and candida species at 30% and 70% incidence respectively were isolated and implicated to be responsible for the spoilage of water yam. Generally, the plant is rich in phytochemical and the presence of fungal organisms give more concern for proper hygienic measures in handling it.

Keywords: Water yam, phytochemicals and fungi.

INTRODUCTION

Plants are endowed with many phytochemicals such as terpenoids, flavonoids , saponins, tannis, phenolics, alkaloids, amines (Zheng, 2001) and have also been a source of proteins, carbohydrates, fat, etc.

Water yam (Dioscorea Alata), also known as "Greater Yam", was never found in the wild and its hybridization with other Dioscorea species is unknown, although two Asian species (D. hamiltonii and D. persimilis) could be part of its origins (1960). Water yam is believed to be a true cultigen derived from wild forms through human selection, although there is no concrete evidence to support this claim (Hahn, 1995). Tubers from this species are known for their high nutritional content, with crude protein content, starch content, and vitamin C content. Due to high starch content of the tubers, D. alata provides a good source of dietary carbohydrates in tropical and subtropical regions (Osagie, 1992).

Water yam (*Dioscorea Alata*), also known as "Greater Yam", was never found in the wild and its hybridization with other Dioscorea species is unknown, although two Asian species could be part of its origin(Egesi; 2006).Water yam is believed to be a true cultigen derived from wild forms through human selection, although there is no concrete evidence to support this claim. Tubers from this species are known for their high nutritional content, with crude protein content, starch content, and vitamin C content. Due to high starch content of the tubers, water yam provides a good source of dietary carbohydrates in tropical and subtropical regions.

MATERIALS AND METHOD

Collection and identification of plant

The plant *D. alata* was bought from town market, Port Harcourt, Rivers state. The plant was identified at the Department of f Plant Science and Biotechnology, Rivers State University, Nkpolu-Oroworukwo, Port Harcourt, Rivers State and identified by a taxonomist.

Preparation of mycological cultural medium.

Sterilization of conical flask, slides, petric dishes and all the equipment needed for the experiment was carried out in the laboratory. The glass wares were sterilized in the oven at 120°C for an hour after washing with soap, while other equipment were surfaced sterilized with 70% ethanol to reduce microbial contamination (Chuku, 2009). Inoculating loops and scalpels were sterilized by

dipping for 20 seconds in 70% ethanol and flamed to red hot. The culture medium used was Sabouraud Dextrose Agar prepared in a conical flask using the standard method. The mouth of the flask was plugged with non-absorbent cotton wool and wrapped with aluminum foil. Cheesebrough, 2000.The conical flask containing the culture medium was later heated on Bunsen burner and later autoclaved and dispensed into the petric dishes.

RESULTS

In this study, macroscopic examination revealed colonies with a small circular, convex, undulate, smooth opaque and creamy while the microscopic examination revealed budding, spherical to enlongate cells forming pseudomycelium. And Isolate A showed an organism of Candida sp with 70% Incidence.

In Isolate B, the macroscopic examination showed that growth rate is rapid and texture of colonies are powdery and produced a radial fissures in the agar. Surface colony colour was initially white becoming black. The microscopic examination showed that Hyphae are septate and hyaline and conidial heads are radiate and subglobose with metulae that supports the phialides. And Isolate B showed 30% incidence of aspergillus niger.

In Isolate C, macroscopic examination revealed Distinctive green colony colour with granular surface, radial rugae and white apron at the periphery while in the Microscopic examination, it revealed Filamentous and septate with erect conidiophores terminating in whorls of phailides. And Isolate C showed 20% incidence of penicillium sp.

In the Qualitative Screening of the plant species studied, Tannins recorded (2.87±0.52mg/100g), Phylate (9.8±1.23mg/100g), Oxalate (0.57±0.22mg/100g), Flavonoid (14.1±2.7mg/100g), Phenol (34.51±0.72mg/100g) and Alkaloid (9.65±0.75mg/100g).

phytochemical composition of water yam (mgl1000g)

Parameter	Specie
Tanin	2.87±0.52
Phylate	9.8±1.23mg
Phenol	34.51±0.72mg
Flauonoids	14.1±2.7mg
Oxalate	(0.57±0.22mg
Alkanoids	9.65±0.75mg
P-value	< 0.001

Fungal isolates the result of fungal isolate presented revealed a total of three fungal organisms

(Fusarium species, Aspergillus niger and mucor species) to be associated with spoilage of cymbopogon citratus. Fusarium SP was recorded 10% incidence and A niger was recorded 10% incidence while mucor species recorded 80% incidence respectively

Table 4.2.1 Fungal Isolate from lemon grass and its percentage incidence (%)

Fungal isolate	Lemon grass leave
Adpergillus niger	10%
Fusarium SP	10%

Mucor SP 80%

RESULTS

Table: FUNGAL CHARACTERIZATION OF WATER YAM

Fungal isolate	**Macroscopic Examination**	**Macroscopic examination**	**Probable organism**
Isolate A	**Colonies are Floccose whitish**	**Filamentous and Separate form of conidia that are spindle shape and short branched conidiophores.**	**Fusarium Sp**	**fealty and hyphae with micro**
Isolate B	**Growth rate is texture and hyaline and produced a radial Surface colony color was initially white becoming black.**	**Hyphae are separate of colonies are with medullae that fissure in the ager.**	**conidial heads are powdery and support the phial-ides.**	**Aspergillus Niger rapid and radiate and sub-globose**

The isolation of these fungi from water yam is inline with the work of earlier researchers (Okogbule,2021).

Phytochemical properties of water yam

The study was focused on investigating the fungi isolate and phytochemicals present in the plant species studied. The results of fungal isolates shows that candida and mucur specie were present and also different phytochemicals were also present.

DISCUSSION

The results from this study show that *D. alata* could be diverse and exploited for use in products that require the unique characteristics of the species such as low dry matter, high amylose and high dietary contents. *D. alata* varieties with higher amylose and total dietary contents could particularly be of significance in diets of diabetics and other health conscious individuals. These varieties could also be exploited in diet formulations to optimally tap their associated health benefits. Moreover, the mineral composition and balance (high in Mn, Zn, K and Ca but low in sodium) of the test varieties indicate their potential to significantly contribute to the total nutrient intake of consumers especially, those in communities where water yam is a staple.(Arnau,2915).

Phytochemicals are non-nutritive chemicals found in plants, having protective

characteristics from diseases which have been considered to be useful and

beneficial to the health of humans.

Based on the present study, this phytochemical content in the plant species

indicates that the plant is of medicinal values as reported by other researchers,

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Alkaloid (9.65±0.75mg/100g)

Fungi Isolation

The fungi associated with the spoilage of water yam sold in Mile 3 Market, port

Harcourt, Rivers State, Nigeria were studied and the result revealed the presence of

a teeming population of fungi. In this study the highest colony count was Candida sp

60% followed by 20% of Aspergillus niger and 20% of Penicillium sp.

Phytochemical Screening

The phytochemical study of the Water yam revealed the presence of different

bioactive compounds such as alkaloids, flavonoids, phenols, and tannins. Bioactive

compounds stored in plant possess biological and antibacterial activities that have

nutritional value. These compounds have been reported to bestow resistance in

opposition to microbial pathogens and this could be accountable for the exhibition of

antibacterial activity by both extracts in this present study (Otegbayo et al, 2017).

Also, secondary metabolites like terpenoids have been reported to have anti-

inflammatory, antimalarial, antibacterial, and antiviral activities and reported to

inhibit cholesterol synthesis (Wanasundera et al, 2011.). Alkaloids are believed to have a

broad range

Conclusion

This study has revealed the presence of several phytochemicals in water yam and also the associated fungal flora. It is therefore importance that considering the usefulness of these phytochemicals, more work should be done to further harness the potentials of this plant. It is also important to be careful during the harvesting of this crop to reduce the fungal load which may be detrimental to human health when consumed.

Recommendations

I recommend that extensive studies should be done on the plant species to help ascertain other phytochemicals and nutritive compositions present in the plant and their effectiveness in the production of pharmaceuticals beneficial to the human's health.

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