Seed borne fungi of Bambara groundnut in Benue state, Nigeria

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Abstract

A field survey was conducted in 2015 to determine the seed borne fungi of Bambara groundnut in five local government areas (Kwande, Vandeikya, Gwer, Buruku and Makurdi) of Benue State, Nigeria. The agar plate method was used in the identification of the isolated fungi. The results obtained showed that a total of seven spp of fungi were isolated from Bambara groundnut in the five local government areas The isolated fungi are *Aspergillus flavus*, *A. acuelatus*, *A.niger*, *A.fumigatus*, *A.candidus*, *Penicillium and Rhizopus spp.* The genera Aspergillus were the most dominant. Some of the identified fungi are noted for the production of mycotoxins, Mycotoxins exert toxic effects on animals and humans, known as mycotoxicosis. Therefore, strict control of food quality, is necessary to avoid outbreak of mycotoxicoses.

1.0 Introduction

Bambara groundnut (*Vigna subterranea* (L.) Verdc.) is an important leguminous crop in Nigeria. It is believed to originate in several areas of Nigeria, notably that between Jos and Yola [9]. It is variously known as Gurjiya or Kwaruru (Hausa, Nigeria); Okpa (Igbo, Nigeria); Epa- Roro (Yoruba, Nigeria); izindlubu (Zulu, South Africa); Jugo beans (South Africa); Ntoyo cibemba (Zambia); Nyimo beans (Zimbabwe); etc. It is essentially cultivated for human consumption. The seed contains about 63% carbohydrate, 19% protein and 6.5% oil [8]. It is often crushed into flour, to prepare various dishes, including 'alele', 'alelen ganye', 'danwake', 'gauda', 'kosai', 'kunu', 'tuwo' and 'waina' [13]. The haulm is used for livestock feed. It is presently grown throughout Nigeria, with the exception of the riverine and swampy areas. The shift in cultivation of bambara groundnut from the drier to the wetter parts of the country has

subject the crop to more disease problem due to the prevalent high humidity. Seed-borne pathogens have major impact on seed production and agriculture industry because they can reduce seed germination, growth and crop productivity [2]; [18]; [26]; (ii) Cause seed and seedling diseases resulting in the development of localised or systemic infections [17]; [14]; [27]; [26]; (iii) they can reduce carbohydrate, protein and oil content in seeds or the increase of free fatty acid and moisture content as well as some other biochemical changes [2]; [10] and (iv) cause contamination of grains with mycotoxins that present a health risk to humans and animals [16]; [6]; [14]; [15]; [1]. Damages such as seed death, seedling and plant abnormalities or decreased seed vigour caused by seed-borne pathogens are not always recognised by users [19]. Many studies have been carried out on seed borne mycoflora of leguminous crops in Nigeria. However, studies on seed borne mycoflora of Bambara groundnut is scanty. The objective of present study was to determine the seed-borne mycoflora occurring on Bambara groundnut in Benue state, Nigeria.

MATERIALS AND METHODS

Naturally infected Bambara pods were obtained from farmers' field in 2015 from five Local Government Areas of Benue State (Vandeikya, Buruku, Kwande, Gwer and Makurdi) in southern guinea savannah area of Nigeria. Seeds were extracted from the pods and surface sterilized for 2 min in a 1.0% sodium hypochlorite solution to remove surface contaminant. Seeds were plated in petri dish containing Potato Dextrose Agar amended with streptomycin. It was incubated for seven days at ambient conditions of light and temperature. Fungal organisms were identified by preparing slides and viewing spores under compound microscope (X40-X 100 magnifications) for the presence of fungi. Isolated fungi were identified using reference manual [21]. Infection levels were recorded as the percentage of infected seeds in a sample.

Results and Disussion

Six fungi were isolated from the seeds of Bambara groundut in the five local government areas of Benue state Nigeria. The isolated fungi are: *Aspergillus acuelatus, A.niger, A.fumigatus, A.candidus, A. flavus*, Penicillium and Rhizopus. A.niger, A. fumigatus, A.flavus and Penicillium were reported in all the five local government areas, while Rhizopus had the least incidence, as it was only isolated in 3 local government areas. Seeds are the basic input in agriculture and it plays vital role in establishment of a healthy crop. Seed mycoflor greatly influences the germination and establishment of crop stand

Table 1

LG Areas	Fungi spp						
	A.acuelatus	*A. niger*	*A. fumigatus*	*A. candidus*	*A.flavus*	*Penicillium*	*Rhizopus*
Kwande	+	+	+	+	+	+	+
Vandeikya	+	+	+	+	+	+	+
Gwer	-	+	+	-	+	+	+
Buruku	+	+	+	+	+	+	-
Makurdi	+	+	+	-	+	+	-

+ = Present, - = absent

Table 2.

LG Areas	Fungi spp						
	A.acuelatus	*A. niger*	*A. fumigatus*	*A. candidus*	*A.flavus*	*Penicillium*	*Rhizopus*
Kwande	28.81	18.64	10.17	1.70	16.95	13.56	10.17
Vandeikya	3.33	18.33	21.66	13.33	26.66	1.66	15.00
Gwer	0.00	32.43	8.11	0.00	25.68	4.05	28.38
Buruku	12.00	17.33	28.00	6.67	28.00	8.00	0.00
Makurdi	2.00	4.00	72.00	0.00	14.00	8.00	0.00

The genus *Aspergillus* was the most predominant fungi isolated in all the local government areas (Table 2). It had the highest frequency of occurrence in all the local government areas. A. niger has the highest occurrence in Gwer (32.43), A. acuelatus was highest in kwande (28.81), A.fumigatus was highest in makurdi (72.00), while A.flavus was highest in Vandeikya (26.66). A. acuelatus and A. candidus were absence in Gwer, while Rhizopus was absent in Buruku and Makurdi. Penicilium had the least occurrence in Vandeikya and Gwer. Several works have been done on seed borne disease of many grain crops, but information on seed borne diseases of Bambara groundnut are very scanty. This may be because the crop is said to be relatively free of pest and diseases that plagued other grain crops like cowpea and groundnut. [4] mentioned that the crop is relatively pest and disease–free apart from weevil attack during storage. Gibbon and Pain [7] observed that no serious pest or diseases are reported for this crop but damage is sometimes caused by leaf hoppers *(Hilda patruelis]and Empoasca facialis)*. However, due to shift in cultivation of from the drier to the wetter parts of Nigeria; the crop has been subjected to more disease problem due to the prevalent high humidity. In this study, The genera Aspergillus were the most dominant fungi isolated from Bambara groundnut. Kumari and Karan [12] and Seresme (1991) previously reported A. flavus and A,niger as being responsible for the seed borne disease of Bambara groundnut and cowpea. [11] also reported Aspergillus as one of the dominant fungi isolated from Bambara groundnut. Most seed borne diseases caused by the fungi pathogens are disastrous as they may decrease seed germination, cause seed discolouration; produce toxins that may be injurious to man and domestic animals. A number of fungi isolated in the present study are known to produce mycotoxins which are harmful for human health. Mycotoxins can cause severe damage to liver, kidney and nervous system of man even in low dosages [24]. Aspergillus flavus produces aflatoxin B1, B2 , G1 G2 which are carcinogenic and produce liver cancer [23]; [3]; [22]. A. candidus also produces citrinin, which is harmful to kidney [5].

Conclusion

The study reveals the presence of various fungi associated with Bambara groundnut from five local government areas of Benue state, Nigeria. The genera Aspergillus were

the dominant fungi isolated from Bambara groundnut. Owing to the fact that Aspergillus produces mycotoxins which poses health risk to humans; measures aim at reducing their spread should be employed.

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