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Effect of Cotton Leafs Extracts on Some Selected Fungi

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Abstract: *This study was aimed at determining the antifungal properties of cotton leaves extract. Leaves were dried and antifungal metabolites were extracted. The extract was subjected to antifungal susceptibility test by agar well diffusion method. The extract was found to be effective against the two fungi which are Aspergillus and Penicillium species, Aspergillus was most inhibited by test extract. The activity of the extract showed 300mg /ml as the minimum inhibitory concentration on Aspergillus species with a zone of inhibition of 12mm while in the case of Penicillium, 200mg/ml of extract at 16mg/ml was observed.*

Keyword: *Aspergillus, Penicillium, Antifungal properties, Extract.*

Introduction

Cotton (*Gossypium spp*) is currently the leading plant fibre crop worldwide and is grown commercially in the temperature and tropical region of more than 50 countries (Smith 1999), with a total coverage of 34 million ha. The cotton seed coat extends into tabular fibre and is sun into yarn. Specific areas of production include countries such as U.S.A, Indian, China and the Middle East and Australia, where climatic condition suit the natural growth requirements of cottons including periods of hot and dry weather, and where adequate moisture is available often obtained through irrigation. More than 90% of the worlds cotton areas is covered by tetraploids (Smith, 2000). However diploid cottons are cultivated in Asia and the Middle East. India is the only country where all the cultivated species and some of their hybrid combinations are commercially grown (Frixell, 1979; Rajitha *et al*, 2022)

The work of Sir George Watt entitled the wild and cultivated cotton plant of the taxonomic studies. The cytological studies of Zait Zew (1928) cited in the paper. A contribution to the classification of genus *Gossypium* was a land mark in cotton classification. Kohel (1973) has addressed the description of genetic mutants based on the rule of the international committee on genetic symbols and nomenclature. Systematic taxonomic study of cotton started with the description of *Gossypium* by Linneen (1953).

Cotton is a well-known and wide infectious due to its anti-microbial properties (Desegha and Teyor, 2014). The cotton is believed to passes antioxidant, antiallergenic and anti-inflammatory properties (Ajla; *et al;* 2010). Several reports on antimicrobial activities of cotton extracts or it phytochemicals are available (Hussain *et al.,* 2010). Phytochemical isolated from cotton *(Gossypium spp*) leaves, at various concentrations, have been reported to have significant growth suppression on five fungal namely alernaria alternate (fr) Keisselers Aspergillus furnigatus fresemas, Aspergillus nigeran Tieghem, macrophamina phaspolina (Tassi) Goid and penicillium citrii (Hussain *et al;* 2010).

Aspergillus species are implicated in aspergilloses and in diverse mycoses, especially in man, with disastrous consequences (Cheesebrough, 2010, Mitchell, 2007). The natural abundance of plants in tropical countries such as Nigeria gives an advantage in the uses of these natural resources. These have drawn the attention of researchers as well as environmental scientist to be concerned with converting plant to various utilizable forms, especially in the rapentic and prophylactic medicines, nutritional season, deodorization and in preventing spolage or food (Okigbo and Igwe 2007).

The recurring infections association with fungi cannot be overemphasized aspergillus niger is implicated in plant pathological conditions (Abbey, 2007) as well as human diseases as opportunistic infections causing ear infections (Schuster et al, known to cuase aspergillus is also produces a toxin (aflatoxin) whichis oen of the aetiolgoical agents for hepatoceullular carcinoma (Klich, 2007: Goucalves, *et al,* 2013) a flavus sometimes causes losses in Silkwom hatcheries (Crowford, 2005).

Cotton (*Gossypium spp*) is naturally a perennial plant that is now commercially cultivated as an annual plant in many parts of the world. Cotton is one of the most important fibre and cash crop of India and plays a dominant role in the industrial and agricultural economy of the country. It provides the basic raw material (cotton fibre) to cotton textile livelihood to 6 million farmers and about 40 – 50 million people are employed in cotton trade and it's processing (Zaitzer 1928).

. The plant is shrub that is native to tropical and subtropical regions around the world, including the Americans, Africa and India. The greatest diversity of wild cotton species is found in Mexico, followed by Australia and Africa. There are four (4) cultivated species of cotton viz*. gossypium arboretum*, *Gossypium herbaceum*, *Gossypium hirsutum, Gossypium barbadeuse*. Eh first two species are diploid (Zn = 26) and are naïve to old world they are also known as Abiatoic cottons because they are grown in Asia. The last two speices are tetrafloid (zn = 52) and are also referred to as new world cotton. *Gossypium hirsutum* is also known as American cotton or uplant cotton and *Gossypium burbadense* s egyptnum cotton or sea island cotton or Peruvians cotton or Tanguish cotton or quality cotton. (Banso, *et al,* 1979). *Gossypium hirsutum* is the predominant species which alone contributes about 90% to the global production. Perhaps, India is the only country in eh world where all the four cultivated species are grown on commercial scale. Cotton is said to be a gift of the India subcontinents to human civilization. (Abril et, al 2008) Indian farming community was five millions ahead in growing cotton as compared to other countries. Even today, despite been competition from technologically more advanced countries. India cotton textiles, yarn, raw cotton and other cotton based products are in great demand from many countries of the western and eastern

hemisphere and are highly valued for their beauty, durability and quality. That is why India is regarded as the cradle of the cotton industry and ancient people who visited India had christen the cotton as vegetable lamp (Kohel, 1974).

Fungi

Fungi is any member of the group of eukaryotol organisms that includes microorganisms such as yeasts and mold as well as the more families mushroom these organism are classified as a kingdom fungi, which is separate from the other eukayyotic life kingdoms of plant and animals (Harris *et, al*; 2001).

Pathogenic fungi are the main infection agents in plants, causing alteration during developmental stage including post-harvest. In fruit and vegetables, there is a wide variety of fungal genera causing quality problem related to aspect, nutritional value, organoleptic characteristic and limited shelf life (Agrios, 2004). In addition, in some cases fungi are indirectly responsible for allergic ortexic disorders among consumes because of the production of mycotoxins or allergens.

Generally, phytopathogenic fungi are controlled by synthetic fungicides however the use of these is increasingly restricted due to the harmful effects of pesticides on human health and the environment (Harris *et, al;* 2001). The increasing demands of production and regulations on the use of agro chemicals and the emergence of pathogens resistant to the products employed justifies the search for novel active molecules and new control strategies. In recent years, antimicrobial properties of plant extracts have been reported with increasing frequency from different portsof the world (Cowan, 1999).

Parts used medicinally; seeds, leaves, flowers, root and root back (Al-Snafi, 2016).

Leaves root and seeds of *Gossypium herbaceum* were used to argument labour, in retention of placents and as emmenagogues. In Senegal a root maceration was given to new born babies and sickly or rachitic children to strengthen them. The root was chewed in case of a snake bite and the powered fruit was applied on the lead for the treatment of fungal infections. The seed oil contain vitamin E and so is used in the cosmetic industry as this vitamin helps retain the elasticity of ageing skin and helps to prevent wrinkles. Boil cotton leaves on the eyes and bandage hem to get relief from eye pains. Modern medical science has found that pars of the cotton plant may have potential use in the treatment of HIV and cancer. The root back has been used by woman for centuries to induce abortion, useful after being raped by cotton farmers, to promote menstruation and to ease child birth and menopansol symptoms. However it is not as healthy as some other plants oils notably olive oil, and there are concerns about its effect on male fertility. (Dr. Christopher, 2004).

Cotton seed is a valuable food stuff for cattle as it combine high energy, high fibre and high protein (Ensminger *et, al;* 1990b). It is generally difficult to maintain both high fibre content for milk fat percentage and high energy density for maximum milk production (Palmaquisk & Jenkisha 1980). In G, *hirsutum* seed, the fibre is composed of linters (approximately 10% by weight of the seed) which is nearly pure cellulose and highly digestible. (Coppock, *et, al;* 1989).

Aspergillus funigatus is a fungus of the genus Aspergillus and is one of the most common Aspergillus species to cause disease in individuals with an immunodeficiency (O'Gorman, 2008). In immno compromised individuals such as organ transplant recipients and people with AIDS or leukaemia, the fungus becomes pathogenic, overrunning the host's weakened defences and causing a range of diseases generally termed aspergillosis which includes chronic pulmonary infectious (feldmesser, 2007, segal, 2009; Ben-Ami *et, al;* 2010).

Many fungi are pathogens of plants that are grown for food shelter or clothing a smaller number are agents of disease in animals, including man. Many saprotrophic fungi attack and degrade raw or manufactured materials of various kinds, such as food stuffs, timber, textiles and leather the economic loss.

The recurring infections association with fungi cannot be overemphasized Aspergillus niger is implicated in plant pathological conditions (Abbey, 2007) as well as human diseases as opportunistic infectious causing ear infections (Schuster et, al; 2002: Denning et al, 2016).

The seed also contains oil, which gives it a high energy value (Coppock *et, al*; 1985). Cattle and sheep may also be fed cotton seed hulls, which are an important source of roughage. Gin trash is also fed to ruminants, and is thought to have approximately 90% of the food value of cotton seed hulls. (Enswinger *et, al*; 1990a) leaf extracts from G, barbadense have been used in traditional medicine in Inagua (Bahama, U.S.A) to cure proud flesh (swollen tissue around a womd) and for nausea during pregnancy (Sawyer, 1955).

Antifungal activity of cotton microorganisms can attach and grow on materials resulting in biokilm formation and corresponding biodeterioration under appropriate condition cotton fabric biodeterioration by microorganisms is considered harmful to human health especially in health care centers where acquired infections are one of the leading causes of death. In this regard, there is a great interest in the development of antimicrobial textiles and polymers that are able to protect against all major pathogens. As a result, several compounds have been studied due to their antimicrobial activity particle based on metals, such as Ag, Cu, Zn and Au among others have been used as coating in different materials, granting promising antimicrobial properties (Suriati, et, al; 1927) several method have been used toproduce Ag nanoparticles which are incorporated into matrices for specific application (Marambio Jone, et al; 2010).

Phytochemical compound of cotton

Traditional therapeutic practices plans provoked scientists to find new horizon in the field of pharmaceuticals for the use of medical plants in the treatment of infections and diseases replacing synthetic medicine. (Tiwarip, *et al,* 2011) Aerva javanica, a member of the family (Amaranthaceae), is commonly known as desert cotton and frequently found in sandy and calcareous soil of dry areas of Pakistan. It has great nutritional and medicinal importance. It has been used as stuff for pillows, fodder for cattle, fuel for household utilities and medicinal remedies for the treatment of infections and remedies for the treatment of infectious diseases in humans and veterinary. It has been reported to constitute various biochemical, phytochemical and antioxidant compounds such as carbohydrates, proteins, fibre, fats, steroids, triterpenes, flavonoids, tannins, saponins, alkaloids, sulphates and

glycosides, phytochemicals are the non-nutritional components of plants which are known to posses antioxidant properties. (El – hadi, et, al; 2010).

Methodology

Sample Collection

The cotton leafs was purchased at Maiduguri Monday Market and transported to Science Laboratory Department Ramat Polytechnic. For extraction the extract was prepared locally in the lab by crushing the cotton leafs in a sterile universal bottle containing distilled water and the saturated solution was then sieved and a clear extract was obtained.

Antifungal Activity of Cotton Leafs Extract on Some Selected Fungi

Fungal samples were collected from Science Laboratory Department, Ramat Polytechnic A portion of the Aspergillus and Penicillium was subcultured using spread method on to a freshly prepared SDA with a sterile wire loop. The antagonist was introduced at different concentration into the inoculated plates and incubated at room temperature over night. The presence or absence of growth around the antagonist shows an indirect measure of the extract to inhibit the growth of organisms.

Results

Table 1; Antifungal sensitivity against selected fungi

S/N	Organisms	Antifungal sensitivity
1	Aspergillus spp	+
2	Penicillium spp	+

Key: + stand for sensitive

Table 2: Antifungal activity of cotton leafs against Aspergillus & Penicillium species respectively using different concentration.

S/N	Organisms	Mg/ML	Zone of inhibition
1	Aspergillus specie	300mg/ml	12mm
2	Penicillium specie	200mg/ml	16mm

Key; the result is presented in the table above and the zone of inhibition is measured in millimeters (mm)

Discussion

The table 1 above, shows that the extract of cotton leaves has antifungal activity properties affect of Aspergillus species and Penicillium species. The extract showed different zones of inhibition in mg/ml on different fungal species, 300mg/ml (Aspergillus) and 200mg/ml

(Penicillium). The extract showed the maximum zone of inhibition of 12mm on Aspergillus and a maximum zone of inhibition of 16mm on Penicillium.

It is vitally important to know about the cell lysis mechanisms of cotton extracts on fungal cell so that further development of disease treatment can be conducted accordingly. A study of the morphological change of the cell induce by these extract would therefore be the preliminary in understanding the lysis mechanism. Cotton leafs extract was used as an example to study the shape change of aspergillus and penicillium species cells using an electron microscope (Kumar, 2011).

The antimicrobial activity of the extract showed 300mg/ml as the minimum inhibitory concentration on Aspergillus specie with zone of inhibition of 14mm while the case of Penicillium 200mg/ml of extract at 16mm was observed.

In conclusion, the leafs extract of cotton is effective on the growth organism "Penicillium, Aspergillus species" the extract is more effective on Aspergillus species with a zone of inhibition of 14mm and Penicillium species which the extract is less effective on the cotton leafs in the case of Penicillium specie 200mg/ml of extract at 16 mm. However, further investigation evaluates the antifungal activity of leaf extract of cotton infected with Aspergillus species and Penicillium species.

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