

ISOLATION AND IDENTIFICATION OF SPOILAGE FUNGI ASSOCIATED WITH CANNED TOMATO (*Solanum lycopersicum*)

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Abstract

The common fungi associated with spoilage of canned tomatoes were determined using three different brands of canned tomato (Gino, Derica and Taima). Seven species which belong to three fungi genera (*Aspergillus niger*, *A. parasiticus*, *A. flavus*, *A. fumigatus*, *Alternaria alternata*, *Penicillium species* and *A. ochraceus*) were isolated from the three brands. *Alternaria alternata* was the most prevalent fungal species. Members of *Aspergillus species* group represent 5/7th of all the identified species. All the species identified were the type that may potentially produce mycotoxin.

Key words: Canned tomato, *Aspergillus*, *Alternaria*, *Penicillium species* and mycotoxin

Introduction

Canned tomatoes are made from raw tomatoes peeled and sealed into can after heat processing and are considered to be important world wide (Robinson *et al.*, 1994). In Nigeria, tomato paste is the most important because of its wide spread use for preparation of various menu. It contains on average about 6.4% total solids, of which 3.5% is invert sugar, 0.5% citric acids, 0.6% ash, 0.9% protein, 0.53% crude fibre and about 0.05% fat and vitamins which support the growth of microorganism such as fungi and bacteria, which produce enzymes that degrades these nutrients (Maddox, 1998). Various species of microorganism can alter adversely the nutritional quality of tomatoes. Safety measures need to be taken because imperfectly canned tomato can lead to exposure of it which could cause food poisoning (Herson *et al.*, 1980). However, this research work aimed at isolating and identifying the fungi associated with spoilage of canned Tomato (*Solanum lycopersicum*).

Materials and Methods

Study Area

The study was carried out at Oyo state college of Agriculture and Technology which is located in Igboora, within 7°5 North and 3°30 east of the equator with an average annual rainfall of 1278mm and average annual temperature 27°C (Sanusi 2011).

Sample collection

Three different canned tomato (Gino, Taima and Derica) were bought from Abeokuta market in Ogun State. The samples were taken to the Department of Science Laboratory Technology of the Oyo State College of Agriculture and Technology, Igboora where the samples (tomatoes) were opened and exposed for few days

to develop sign of spoilage which include off odour and off colour.

Microbiological Analysis of Tomato Samples

Isolation and enumeration of fungi as well as pure culture of fungi isolates were performed with the method of Ajayi (2012).

Results and Discussion.

Different species of fungi isolated the exposed canned tomato were *Aspergillus flavus*, *Aspergillus niger*, *Aspergillus fumigatus*, *Alternaria alternata*, *Aspergillus parasiticus*, *Penicillium species*, *Aspergillus ochraceus* (table 1).

Table 2 shows the frequency of occurrence of the spoilage fungi isolated from the spoiled canned tomato. Members of *Aspergillus species* represents 5/7th of all the identified species of fungi and with *Aspergillus niger* group being the most common and easily identifiable species of the genus *Aspergillus*, with its white to yellow mat later bearing black conidia as observed by Gocmen (2001).

In all the canned tomato, the most frequently observed species were *Alternaria alternata* this agrees with the research carried out by Faith *et al.*, (2005) who reported similar observation in his findings.

The seven fungi species isolated are the type that may potentially generate mycotoxins. Most of the species and the mycotoxin they generate are: *Aspergillus flavus* (aflatoxin, sterigmatistatin and derivatives), *A. Parasiticus* (aflatoxin), *A. fumigatus* (fumitremorgen), *Alternaria alternata* (tenuazonic acid), *A. niger* (ochratoxin A), *A. Ochraceus* (ochratoxin A).

Thus taking these into consideration mycotoxin may be introduced into food chain through spoiled canned tomato.

Table 1: Morphological characteristics of Fungi Isolated from Exposed Spoiled Canned Tomato.

Mycelia appearance on plate	Colony pigmentation	Appearance of the conidia/conidiophores	Probable organisms
Granular velvety colonies	Yellow- dirty green	Dense felt conidiophores	<i>Aspergillusflavus</i>
Smooth or spines colonies	Smoky gray- green	Smooth walled conidiophores often tinted greenish	<i>Aspergillusfumigatus</i>
Velvety colonies	Dark green	Dense conidia in mass with dark green head	<i>Aspergillus parasiticus</i>
Flat, filamentous velvety in texture	Initially white and became blue -green, gray green	The conidiophore were branched at the tip and at the end of each branched was a cluste r of spores of spore producing cells called Phialides	<i>Penicilliumspecies</i>
Smooth to verruculose surface	Pale brown to light brown	Individual conidiophore arise from substrate forming bushy heads 4 -8 catenate conidia chains	<i>Alternaria alternata</i>
Very rough Olfralugerri	Black spotted densely packed colonies	Conidia were radiate initially splitting into column at maturity	<i>Aspergillusniger</i>
Fluffy mycelia growth	Light yellow colonies	Conidia are near wheat to light yellow	<i>Aspergillusorchraeus</i>

Table 2: Frequency of Occurrence of the Spoilage Fungi Isolated from Spoilt Tomatoes of Different Brands.

Organisms	Derica freq. (%)	Gino freq. (%)	Taima freq. (%)
<i>Aspergillusflavus</i>	+ 22	+ 23	+ 22
<i>Aspergillusniger</i>	+ 17	+ 19	+ 18
<i>Aspergillusfumigatus</i>	- 0	+ 9	+ 5
<i>Alternaria alternata</i>	+ 42	+ 40	+ 40
<i>Aspergillus parasiticus</i>	+ 10	- 0	+ 5
<i>Penicilliumspecies</i>	+ 9	- 0	+ 10
<i>Aspergillusochraceus</i>	- 0	+ 9	- 0

Key: + = found - = Not found

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