Short Communication

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MYCOFLORA AND MYCOTOXINS OF COCONUT (COPRA) COLLECTED FROM ANDHRA PRADESH

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Mycoflora of coconut (*Cocos nucifera* L.) collected from different geographical regions of Andhra Pradesh was analysed by blotter technique and dilution plate method. The mycoflora varied with the sample and geographical conditions. *Aspergillus flavus, A. fumigatus, A. ochraceus, A. ustus, Chaetomium globosum,* species of *Fusarium, Penicillium citrinum* and *P. Chrysogenum* were dominant mycotoxigenic fungi. The percentage of toxigenicity not only varied with the fungus but also with the sample and geographical conditions.

Key Words : Coconut, mycoflora, mycotoxin, frequency, detection.

Bilgrami *et al.* (1980) feel that most of the food products and agricultural commodities form suitable substratum for fungal growth and mycotoxin elaboration under natural conditions. Bilgrami (1985) isolated many mycotoxin producing fungi from dry fruits and spices. Though the natural incidence of mycotoxins in coconut copra was reported by Anjana Singh (1983), comparatively limited information is available on the fungi associated with it (Kulkarni *et al.,* 1986). In this communication the mycoflora of coconut copra in relation to mycotoxin production from different geographical regions of Andhra Pradesh state is discussed. Samples of coconut (*Cocos nucifera* L.) were collected from different regions of A.P. in sterilized polythene bags and brought to the laboratory. Condition of the samples and details of storage place was carefully recorded. The seed mycoflora was analysed by employing humid chamber method and dilution plate method (Waksman, 1922). The fungi associated with coconut were isolated and identified (Barnett and Hunter 1982; Ellis, 1971; Domesch, 1984). The percentage of frequency and abundance of each fungus was calculated. The fungi isolated were screened for their mycotoxin producing potential by TLC as suggested by Scott *et al.* (1970), Udagawa *et al.* (1970), and Rao *et al.* (1985).

It is evident from Table 1 that mould infestation of coconut was fairly high in terms of percent mould infestation positive samples from Andhra (100%) Telangagana (93.75%) and Rayalaseema (75%) region. The most frequent fungi in different samples comprised of species of *Aspergillus, Curvularia* and *Penicillium* and *Rhizopus stolonifer.* It is apparant that copra forms a suitable substratum for many fungi. *A. flavus* and *A. fumigatus* were recorded on most of the samples followed by *A. niger,* species of *Fusarium* and *Penicillium* (Table 2). The percentage of mycotoxigenic fungi positive samples was relatively high in Andhra region and low in Telangana region. This may be attributed to the favourable environmental conditions of Andhra region. A total of 51 fungal species representing 21 genera were associated with coconut samples of different geographical regions of A.P. The mycotoxin producing potential of *A. flavus* for aflatoxins was highest followed by *A. fumigatus* for gliotoxin and *A. ochraceus* for ochratoxin A.

It is matter of great concern that many species of toxigenic fungi were isolated from coconut samples during storage conditions. The dry copra are extensively used in different food preparations and consumed by people of all ages. They may be exposed to these mycotoxins. Coconut especially collected

Table 1: Areas surveyed and percentage of mould infested samples.

Region	Number of districts	Number of samples collected	Number of +ve samples	% of mouldy samples	% of toxigenic fungi infested samples
Andhra	8	23	23	100.0	82.60
Telangana	8	16	15	93.75	68.75
Rayalaseema	3	4	3	75.00	50.00

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Table 2: Mycoflora and Mycotoxins of Cocount Copra

Name of the fungus	% of frequency	Number of strains screened	Number of toxin producing strains	Mycotoxin
Aspergillus flavus	86.66	43	21	Aflatoxin B_1
			8	Aflatoxin B_2
A. fumigatus	88.88	44	18	Gliotoxin
			3	Sterigmatocystin
A. nidulans	8.88	4	-	-
A. ochraceus	48.88	24	8	Ochratoxin A
			3	Ochratoxin B
A. parasiticus	6.66	3	-	-
A. terreus	22.20	11	3	Terreic acid
			2	Patulin
A. ustus	22.20	11	4	Ustic acid
A. versicolor	26.24	13	-	-
Chaetomiam globosum	26.66	13	2	Chaetoglobosin
Cladosporium Spp	44.40	23	1	Cladosporin
Curvularia lunata	13.32	10	-	-
Fusarium Spp	44.40			
F. equiseti		6	1	Deoxynivalenol
			2	T-2 toxin
			1	Zearalenone
F. moniliforme		8	2	Ze, DAS
			1	T-2 toxin
F. oxysporum		14	4	Zearalenone
			1	T-2, DAS
Myrothecium roridum	17.76	8	2	Roridin
Penicillium	55.55			
P. Chrysogenum		4	1	Cyclopazonic acid
			1	Och. A.
P. citrinum		9	3	Citrin
			1	Citriovaridin
			1	Och. A.
P. expansum		3	1	Och. A.
P. oxalicum		4	-	-

% of frequency of other fungi :
Absidia corymbifera, (4.44), *Acremonium terricola* (6.66) *Alternaria dianthi* (8.88), *A. dianthicola* (6.66), *A. raphani* (4.44), *Aspergillus candidus* (6.66), *A. chevalieri* (22.2), *A. flavipes* (13.32). *A. japonicus* (17.76), *A. niger* (77.77), *A. ornatus* (4.44), *A. restrictus* (6.66), *A. sydowii* (11.10), ... *wentii* (4.44), *Aspergillus* Sp. (55.55), *Beltraniella humicola* (2.22), *Chaetomium brasiliensis* (8.88), *Cladosporium cladosporioides* (33.33), *C. herbarum* (4.44) *C. oxysporum* (11.10), *Curvularia lunata* var *aeria* *8.88), *C. pallescens* (8.88), *Drechslera halodes* (8.88), *D. hawaiensis* (4.44), *D. rostrata* (6.66), *Gliocladium roseum* (4.44), *Mucor Circinelloides* (2.22), *M. varians* (19.98), *Paecilomges varioti* (11.10), *Rhizopus stolonifer* (24.44), *Scopulariopsis brevicaulis* (20.0), *Byncephalastrum racemosum* (15.55), *Verticillium albo-atrum* (8.88), *V. roseum* (4.44), *Sterile mycelia* (1.05).

from warm and humid climates of A.P. may be of high risk because of aflatoxin B_1, gliotoxin and ochratoxin A. Acute mycotoxicosis is rare, but chronic poisoning may be common and this chronic exposure to mycotoxins through coconut copra intake may predispose the man to several diseases. The tendency of these toxins to occur in comparatively low concentration remain undetected and the problem may be further exaggragated by the potential occurence of more than one mycotoxins on the copra due to high lipid content. Thus copra is a most potential substratum for mycotoxigenic fungi and contamination commodity of man.

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REFERENCES

Anjana Singh 1983 Mycotoxin contamination in dry fruits and spices. *In Mycotoxins in Food and Feed* (Bilgrami K S ed) Applied Press Bhagalpur p 55-68.

Barnett H L & B B Hunter 1972 *Illustrated Genera of Imperfect Fungi,* Burgess Publishing Co, USA.

Bilgrami K S 1985 *Mycotoxins in Dry Fruits and Spices,* Bhagalpur University, Bhagalpur p 79.

Domesch K, W Gams & T H Anderson 1980 *Compendium of Soil Fungi.* Academic Press, New York.

Ellis M B 1971 *Dematiaceous Hyphomycetes.* Commonwealth Mycological Institute, Kew, Surrey, England.

Kulkarni J R, D N Padule P A Shinde & D K Salunkhe 1986 Aflatoxins in copra. *J of Maharastra Agric Uni* **11** 199-201.

Rao G V, P S Rao S Girisham & S M Reddy 1985 A novel spray reagent for chromatographic detection of trichothecene toxin. *Curr Sci* **54** 507-509.

Scott P M, J W Lawrence & W Van Walbeck 1980 Detection of mycotoxins by thin layer chromatography Application to screening of Fungal extracts. *Appl. Microbiol* **19** 839-842.

Udagawa S, T Muroi, H Kurata, S Sekita K Yoshihira S Natori & M Umeda 1978 The production of Chaetoglobosins, Sterigmatocystin, O-methyl Sterigmatocystin and Chaetocin by *Chaetomium* sp. related fungi. *Can J Microbiol* **25** 170-177.

Waksman S A 1922 A method of counting the number of fungi in the soil. *J Bect* **7** 339-341.