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Studies on seed mycoflora of spices

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SUMMARY

India, despite being largest producer of spices, there is great potential for increasing export of Indian spices. To realize this potential there must be improvement and productivity enhanced quality as per international standards, India does not export more than 10% of its production due to lack of number of improved seed varieties to suit different agro- climatic situations and proper adoption of package practices, control measure for diseases, pests and post harvest pathogens. Pathogens adversely affect on production and quality of spices. The seed -borne pathogens are one of the major cause of serious diseases in growing crops because of poor health and quality of seeds. To realize this aspect the study has been undertaken and observed that, among the tested spices the *Alternaria alternata, Aspergillus flavus, Aspergillus niger, Aspergillus ustus, Cladosporium cladosporidies, Curvularia lunata, Fusarium oxysporum, Fusarium roseum, Helmenthosporium tetramera and Trichoderma viride* had maximum incidence on Agar plate and *Alternaria alternata, Aspergillus flavus, Aspergillus niger, Aspergillus ustus* and *Helmenthosporium tetramera* had maximum incidence on Blotter plate.

Key words : Spices, Incidence, Fungi

Spices are cultivated in different parts of world, however, India is largest spice producing country. About 63 plants that yield spices are cultivated in country among which most are traded nationally and internationally in India. The spices are cultivated in Tamil Nadu, Kerala Andhra Pradesh, Karnataka, Rajasthan, Gujarat, Madhya Pradesh, Uttar Pradesh, Punjab, Kashmir etc. based on different agroclimatic conditions. Seeds play vital role in the transmission of pathogen and development of disease. The pathogen may be externally or internally seed borne. This takes place either in the field or in ill storage condition. The damage resulting in the development of disease at later stages of plant growth by systemic or local infections (Singh and Trivedi, 2000). Such contaminated seeds cause serious diseases in human beings.

Literature on seed mycoflora of spices revealed and observed by several workers. Manjari Rai and Jariwala (1996) Assessed mycoflora of spices collected from local markets of Varnasi after 12 months of storage in metallic containers and isolated 39 and 24 fungal species from unsterilized and surface sterilized stored seeds, respectively. Seema Keshri (2003) isolated 168 isolates of *Aspergillus flavus* from 14 spices including ammi and cardamom. Ayres *et al.* (1980) stated *Aspergillus* and *Penicillium* sp. as dominant among of spices including cardamom. The contamination of cardamom by fungi was reported by Lebai *et al.* (1985).

Regina and Raman (1988) reported 21 fungal spices of caraway. Gordana, R. Dimic *et al.* (2008) reported 11 genera and 23 species, where *Aspergillus* and *Penicillium* spices were dominant contaminants of caraway. Prasad (1986) reported infestation of *Aspergillus flavus, Aspergillus nidulans, Curvularia lunata, Curvularia pallescens, Cladosporium cladosporidies, Cladosporium oxysporium* and *Memnoniella echinata* in pre-storage stage of coriander and observed increase in values after 6 months. Rani, P *et al.* (1995) studied seed mycoflora of 5 spices including coriander in which species of *Alternaria, Curvularia, Aspergillus, Rhizopus* and *Mucor* sps. were most common. Jain and Jain (1995) isolated 32 fungal species from 4 spice crop including coriander where *Alternaria alternata* was found dominant. Hashmi and Ghaffar (1991) seed borne mycoflora of coriander from seed samples of 15 countries and isolated 24 fungal species belonging to 14 genera such as *Alternaria alternata, Fusarium moniliforme, Phoma spices, Fusarium semitectum, Fusarium solani, Fusarium eqiseti* etc. Rastogi (1993) found *Alternaria burnsii* to be a contaminant of black coloured seeds of cumin from 47 samples out of 105 samples from 16 districts of Rajasthan in blotter and agar plate technique. Gamal EI. Din *et al.* (1990) isolated 13 fungi in healthy as well as infected seed samples of cumin collected from six locations of

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upper Egypt where *Fusarium oxysporium* sp. *cumini*, *Fusarium solani* and *Alternaria alternata* were observed in higher percentages.

MATERIALS AND METHODS

Collection of samples and detection of seed mycoflora:

Collection of seed samples, the method described by Neergaard (1973) has been adopted. Accordingly random samples of different varieties of seeds were collected from fields, store houses market places and seed companies. A composite sample of each variety was prepared by mixing the individual samples together, preserved in cloth bags in laboratory condition at room temperature during the studies. The seed mycoflora was isolated by using standard moist blotter method (SMB) and agar plate method (APM) as recommended by ISTA (1966) and Neergaard (1973 and 1977). The identification of seed mycoflora was done as per Bessey (1950), De, Tempe (1970), Agarwal (1976), Dube (1990), Mukadam, (1997) and Mukadam *et al.* (2006).

RESULTS AND DISCUSSION

In order to know per cent incidence of seed mycoflora of five different spices, commonly cultivated in India. The 23 virulent fungal species were found on the test seeds of spices. The data given in Table 1, reveals that the incidence of *Aspergillus flavus, A. niger and Fusarium oxysporium and Helminthosporium tetramera* is highest on the seeds of ammi, coriander and caraway, respectively, results correlates Dimic *et al.* (2008). Agar plate method is proved to be superior for the highest incidence of fungi. The highest incidence of fungi were observed in ammi and coriander followed by cardamom, caraway and cumin, respectively as per Seema Keshri (2003). It is interesting to note that the species of *Alternaria alternata, Aspergillus flavus, A. niger, Cladosporium cladosporidies, Curvularia lunata, Fusarium oxysporum* and *Helminthosporium tetramera* have dominant association results supports Ayres, *et al.* (1980) and *Alternaria tetramera, Aspergillus rubrer, Fusarium equiseti, Fusarium roseum, Macrophomina phaseolina, Penicillium chrysogenum* and *Verticillium notatum* have minimum association on seeds of spices.

Table 1 : Incidence of fungi on different spices on Agar plate

Fungi	Ammi	Caraway	Cardamom	Coriander	Cumin
	% Incidence				
Alternaria alternata	30	20	10	20	30
Alternaria tetramera	10	--	20	--	--
Aspergillus flavus	40	20	20	30	20
Aspergillus glaucus	20	20	--	10	--
Aspergillus niger	20	30	20	40	30
Aspergillus rubrer	--	---	10	20	--
Aspergillus ustus	30	20	20	--	20
Botrytis cineria	10	--	--	10	20
Cladosporium cladosporidies	20	20	30	30	--
Curvularia lunata	30	--	30	--	20
Curvularia tetramera	--	20	--	10	--
Fusarium dimerum	10	--	10	--	--
Fusarium equiseti	--	--	20	--	--
Fusarium moniliforme	20	30	--	--	20
Fusarium oxysporum	30	40	--	10	--
Fusarium roseum	--	--	--	10	10
Helmenthosporium tetramera	30	40	20	20	30
Macrophomina phaseolina	--	--	--	15	--
Penicillium chrysogenum	--	--	20	--	--
Rhizoctonia bataticola	--	10	--	10	--
Trichoderma viride	20	--	--	20	30
Tubercularia vulgaris	20	20	10	--	10
Verticillium notatum	--	--	--	10	--

Table 2 : Incidence of fungi on different spices on Blotter paper

Fungi	Ammi	Caraway	Cardamom	Coriander	Cumin
	% incidence				
Alternaria alternata	20	15	--	20	20
Alternaria tetramera	--	--	10	--	--
Aspergillus flavus	30	20	10	10	20
Aspergillus fumigatus	--	--	--	--	10
Aspergillus niger	20	20	10	20	10
Aspergillus rubrer	--	--	--	10	--
Aspergillus ustus	20	10	20	--	--
Botrytis cineria	--	--	--	10	--
Cladosporium cladosporidies	--	10	--	--	10
Curvularia lunata	10	10	--	10	--
Curvularia tetramera	--	--	10	--	---
Fusarium moniliforme	10	10	--	--	10
Fusarium oxysporum	--	--	10	--	10
Fusarium roseum	--	10	--	10	--
Helmenthosporium tetramera	20	20	--	10	--
Trichoderma viride	--	--	--	10	--
Verticillium notatum	10	--	10	--	--

Seventeen different fungal species were isolate from blotter paper method from the test seeds of spices. As per data of Table 2 the maximum association of fungi observed in ammi, caraway and cumin. *Alternaria alternata, Aspergillus flavus, A. niger, A. ustus* and *Helminthosporium tetramera* have highest incidence on test seed spices and the incidence of *Aspergillus fumigatus* is observed on seeds of cumin only.

The overall result reveals that the agar method is more supporting media than blotter method for the isolation of fungi.

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