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Fungal Contamination of Medicinal Plant Parts during Commercial Storage in Maharashtra

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ABSTRACT

Maharashtra has a variety of medicinal plant resources.Major supply of medicinal plants is wild plant collection rather than cultivation. Usually plant parts and their products are stored under unhygienic conditions,preservation of crude drugs needs sound knowledge of their physical and chemical properties. A good quality of the drugs can be maintained or preserved properly. All the drugs should not be preserved in well closed containers. A number of drugs absorb moisture during their storage and become susceptible to the microbial growth. The environmental conditions like relative humidity, temperature, moisture and storage conditions have been reported to affect establishment of drug mycoflora, their role on biodeterioration and mycotoxin contamination.

Key words: Medicinal plants, storage condition, fungi.

INTRODUCTION

Medicinal plant parts are used to prevent and treat diseases as a drug or ingredients,drug plants for curing diseases, protecting their lives and sustaining for a longer period as noted in Vedas. Medicinal plants are found growing widely in Maharashtra with varied climatic conditions. The cultivation of medicinal plants is of great importance in the national economy and their potential for the rapid growth of phyto-pharmaceuticals and other allied industries in Maharashtra. It is necessary that more and more medicinal plants found in wild conditions rather than commercially cultivation. At present, bulk of the raw material is obtained from wild sources, whereas only a few are under systematic cultivation of drug plants in Maharshtra.The medicinal plants have great value in the medicinal science. The leaves, roots, stems, fruits and seeds yield good quality of phytochemicals. Thus it is necessary to study the nature of the important diseases of these important medicinal plants to protect them. During a survey of phytopathogenic fungi cause severe attack to different medicinal plants. The disease caused extensive damage to plant parts.

The differentmedicinal plants and plant parts reported to be affected by different microbial origin. These are transported without any proper packing.Usually plant and plant products are stored in tin, plastic, jute, boxes and sacs. Mostly jute and polythene bags are used for packaging during the transportation. Enormous amount of plant and their parts are either spoiled or contaminated by microorganisms especially fungi due to improper packing. Among them, the fungal pathogens have been found to affect and damage severely the medicinal plant parts both in field at different developmental stages as well as in raw drug materials stored in the store houses, godowns and ayurvedic shops. This may result in the qualitative and quantitative loss of medicinal plants and plant parts. Quality of the herbs is influenced by thestorage conditions **(Snowden, 1992; Lisiewska *et al*.,1997).** If such infected or contaminated herbal parts are used for preparation of medicines, the quality of the resulting medicine is likely to be adversely affected and the medicine may be come hazardous rather than curative, Hence some microbial standardization work may be carried out to check the sterility of the Indian medicinal drugs **(Hamsaveni Gopal, 1980)**. Considering the importance of the fact, the present studies on the fungal diseases of medicinal plants and stored herbal parts used in ayurvedic medicines were started as a first step to fill up this major lacuna in the field of ayurvedic medicines. The main objective of this study was to collect information about the marketing and possible fungal constraints of medicinal plants for promotion of herbal trade in the country.

MATERIAL AND METHOD

Collection of medicinal plant parts samples :
Medicinal plant parts samples were collected at regular intervals from fields, store houses and ayurvedic shops of various localities of Maharashtra.The roots, rhizomes, and fruits of different plant species, were evaluated in order to assess thepredominant mycoflora and the extent of fungal contamination.The samples were chosen on the basis of their commercialavailability and popularity of use and were obtained from different suppliers. The collected samples were kept separately in pre-sterilized polyethene bags and brought into the laboratory.

Detection of mycoflora from different medicinal plant partssamples :
The mycoflora of different parts of medicinal plants such as roots, rhizomes, fruits and seeds were isolated by using Agar Plate Methods (APM) as recommended by International seed Testing Association (ISTA, 1966) and Neergard (1973).

Agar Plate Method (APM) :-
In this method, presterilized corning glass petriplates of 10 cm diameter were poured with 15 ml of autoclaved Potato Dextrose Agar (PDA) medium on cooling the medium, seeds, root and rhizome pieces were placed in separate Petriplate at equal distance aseptically.Incubation conditions and these plates were incubated at 25 ± 2 ^{0}C under diurnal conditions for seven days. In order to isolate only internal root, rhizome, fruit and seed borne mycoflora, these plant parts were pretreated with 0.1 percent solution of mercuric chloride for 2 minute and subsequently thoroughly washed thrice with sterilized distilled water and placed on solid agar plates. These plates were incubated at 25 ± 2 ^{0}C for 7 days.

Composition of Potato Dextrose Agar (PDA) media :
Peeled potato – 200 g, Dextrose – 20 g, Agar- 15 g and distilled water 1000 ml, pH 5.6. Peeled potatoes were boiled until soft and passed through muslin cloth. Then dextrose was added in it and final volume of solution was made up to 1000 ml. In this solution agar was added, pH was adjusted.

Isolation and Identification of fungi :-
The fungi occurring on each and every diseased tissue portion in the plates were identified preliminary on the basis of sporulation characters like asexual or sexual spores and fruiting structures with the help of stereoscopic binocular microscope. The identification and further confirmation of the fungi was made by preparing slides of the fungal growth and observing them under compound microscope (Mukadam D.S.et al 2006). Pure cultures of these fungi prepared and maintained on potato dextrose agar slants.

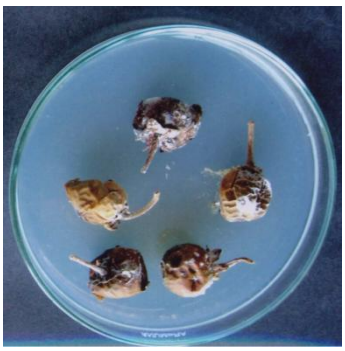
RESULTS AND DISCUSSION

INCIDENCE OF MYCOFLORA ON DIFFERENT MEDICINAL PLANT PARTS (AGAR PLATE METHOD)

Asparagus racemosus **(Root)**

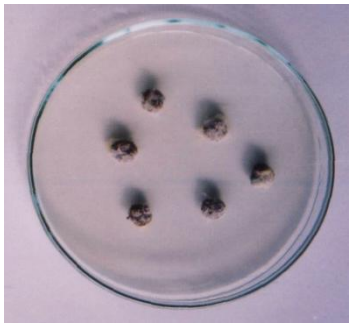
Chlorophytum borivilianum **(Root)**

***Emblica officinalis*(Fruit)**



***Solanum viarum* (Fruit)**

***Rauwolfia serpentina* (Root)**



Withania somnifera (Fruit)

***Piper longum* (Fruit)**

***Glycyrrhiza glabra* (Rhizome)**

Table 01: Incidence of fungi on different medicinal plant parts during storage

Fungi	Medicinal plant parts						
	***Asparagus* root**	***Rauwolfia* root**	***Glycyrrhiz* arhizome**	***Emblicaf* ruit**	***Piper* fruit**	***Solanum*fr uit**	***Strychnos* seed**
Aspergillusflavus	+	+	+	-	-	+	+
Aspergillusterreus	+	+	+	-	-	+	+
Aspergillus niger	+	-	-	+	-	-	+
Curvalaria lunata	+	-	+	-	-	-	-
Fusarium moniliforme	-	-	-	-	+	-	-
Fusariumoxysporum	-	+	-	-	-	-	-
Phytopthorasp	-	-	-	-	-	+	-
Penicilliumcitrinum	+	+	+	+	-	+	+
Rhizopusstolonifer	+	+	-	-	+	+	-
Rhizoctoniasolani	+	-	+	+	-	-	-
Alternariaalternata	-	+	+	-	-	-	+

+ Fungus present -Fungus absent.

Incidence of fungi on different parts of medicinal plants was assessed during storage. The results are summarized in table 01.From the results given in table 01 it is indicated that, A*spergillus flavus Aspergillus terreus*, and *Penicillium citrinum* was present on all parts of medicinal plants during storage and it caused damages on plant parts. *Fusarium oxysporum,Phytopthora sp.* was restricted only on *Rauwolfia* root and *Solanum* fruit. The maximum incidence of fungi was found on the plant parts of *Asparagus, Rauwolfia* roots and *Glycyrrhiza* rhizome. The minimum incidence of fungi was found in *Emblica, Piper and Solanum* fruits.

It is clear from the results that, the qualitative composition of mycoflora of all the medicinal plant parts was found to be more or less similar.The roots, rhizomes and fruits of different medicinal plants yielded totally eleven fungal species belonging to eight different genera. In case of all the drug plants *Aspergillus flavus, Aspergillus terreus, Aspergillus niger, Fusarium moniliforme, Fusarium oxysporum, Rhizopus stolonifer,* and *Alternaria alternata* were dominant among the total mycoflora.

CONCLUSION

Totally eleven fungi were isolated from different medicinal plant parts during storage. The roots and rhizomes of drug plants yielded maximum number of fungi in open and gunny bags storage. Incidence of fungi during transport and storage were mainly *Aspergillusflavus, A terreus, A niger, Curvularialunata,Fusariummoniliforme, Fusariumoxysporum, Phytopthora sp. Penicilliumcitrinum, Rhizopusstolonifer, Rhizoctoniasoloni,* and*Alternariaalternata.*Among the total mycoflora of medicinal plant parts *Aspergillus species* were dominating followed by *Fusarium sp.*Agar plate method was found to be more favorable for isolation of maximum number of fungi of all the drug plant parts.

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