ACTA MYCOLOGICA
VOL. XIII (1) : 145—149
1977

Comparison of mycoflora associated with certain crop and weed seeds

R.R. MISHRA, V.B. SRIVASTAVA*

Department of Botany, University of Gorakhpur, Gorakhpur, U.P., India

R.R. Mishra, V.B. Srivastava, *Comparison of mycoflora associated with certain crop and weed seeds*, Acta Mycol. XIII (1): 145-149, 1977.

Fungal populations associated with seeds of certain crops and weeds were compared. The dominant fungal species were of varied nature in the two types of seeds.

INTRODUCTION

Prior to our understanding of the seed borne diseases, their causal agents and mode of infection, the old agriculturist in the past who had no mycological background realised that few plant diseases are associated with the seeds. However, they were unaware of the magnitude of loss the seeds were put to by the microorganism while the seeds were stored up for future use. Later on with the advent of scientific knowledge and the invention of modern equipment to study the plant diseases in more precise and accurate ways, this field of investigation attracted the attention of mycologists and plant pathologists. Most of the investigations carried out are concern seeds of economic importance.

In the present investigation an effort has been made to study fungal flora associated with seeds of certain crops and weeds. The seeds selected under two categories differ to some extent morphologically and physiologically.

---

* Present address: Pilot Plant Laboratories, Indian Drugs and Pharmaceuticals Ltd., Virbhadra, Rishikesh, U.P., India.

MATERIALS AND METHODS

The fresh seeds of the following crops and weeds were collected for the present investigation:

Crop seeds: *Triticum aestivum* L., *Hordeum vulgare* L., *Zea mays* L., *Brassica nigra* Koch var. *sarson.* Weed seeds: *Tephrosia purpurea* Pers., *Cassia tora* L., *Psoralea corylifolia* DC., *Abutilon indicum* G. Den., *Trianthema monogyna* L., *Sida acuta* Burm., *Triumfetta neglecta* W. and A.

The above seeds were examined for their fungal flora by the following three methods:

The seeds were washed separately in sterilized distilled water by shaking them thoroughly and the washings were inoculated using one ml per each Petri-plate containing modified Martin's medium.

Five seeds were inoculated per plate containing the above — mentioned nutrient medium.

Seeds were kept on sterilized moist filter paper for 4-5 days and the fungal species growing around the seeds were recorded.

In all the above sets, the Petri-plates were incubated for 5-6 days at 25 ±1°C. The experiments were repeated for 5 times in each case. (Tables 1 and 2).

Table 1

Fungal species associated with seeds of crop plants

Isolates	*T. aestivum*	*H. vulgare*	*Z. mays*	*B. nigra*	*Var. sarson*
Mucor hiemalis Wehmer	—	+	—	+	
Rhizopus nigricans Ehrenb.	++	++	++	++	
Aspergillus nidulans (Eidam) Winter	—	—	—	+	
A. niger van Tieghem	+	+	++	+	
A. flavus Link	—	++	++	++	
A. terreus Thom	—	—	—	+	
Penicillium humicola Oud.	—	—	—	++	
P. javanicum van Boyma	—	+	—	—	
P. citrinum Thom	—	+	—	+	
Monilia geophila Oud.	+	—	—	+	
Alternaria spp.	+	+	—	+	
Curvularia spp.	++	—	—	—	
Cladosporium spp.	+	+	—	+	
Fusarium spp.	+	+	+	+	
Hyaline sterile colonies	—	—	—	+	

++ Dominant; + Present; — Absent

Table 2

Fungal species associated with different weed seeds

Isolates	*T. purpurea*	*C. tora*	*P. coryfolia*	*A. indicum*	*T. monogyna*	*S. acuta*	*T. neglecta*
Mucor luteus L.	−	−	−	+	+	−	−
Rhizopus nigricans Ehrenb.	+	+	+	−	−	+	−
Chaetomium indicum Corda	−	−	−	−	−	++	−
Aspergillus nidulans (Eidam) Winter	−	−	−	−	−	−	+
A. niger van Tieghem	−	−	++	−	+	−	−
A. flavus Link	+	−	++	++	+	+	+
A. ochraceus Wilhelm	−	+	+	+	−	−	+
A. tamarii Kita	−	−	−	−	−	−	+
A sydowi (Bainier et Sartory) Thom et Church	−	−	+	−	−	−	−
Penicillium oxalicum Thom	+	−	+	−	−	−	−
P. brefeldianum Dodge	−	−	+	−	−	+	+
P. restrictum Gilman et Abbott	+	−	−	−	−	+	−
Verticillium albo-atrum Reinke et Berthold	+	−	−	−	−	−	−
Alternaria spp.	+	++	+	++	+	++	++
Curvularia spp.	+	−	−	−	−	−	−
Cladosporium spp.	++	+	−	−	−	−	−
Papulospora sp.	−	−	−	−	+	−	−
Fusarium spp.	++	−	−	++	++	+	+
Yellow sterile colonies	+	−	−	−	−	−	−

RESULTS AND DISCUSSION

Fungal population associated with crop seeds

Eight fungal species were obtained from the seeds of *Tritiçum aestivum*, *Rhizopus nigricans* and *Curvularia* spp. being dominants. *Hordeum vulgare* seeds were associated with 9 species and in this case *Rhizopus nigricans* and *Aspergillus flavus* were dominants. 4 forms were associated with *Zea mays* amongst which *Rhizopus nigricans*, *Aspergillus niger* and *A. flavus* were dominants and only *Fusarium* was isolated with low frequently of occurrence. The maximum fungal species i.e. 13 were isolated from the seeds of *Brassica nigra* var. *sarson*. *Rhizopus nigricans* along with *Aspergillus flavus* and *Penicillium humicola* were dominants in this case.

From Table 1 it is evident that *Rhizopus* was dominantly associated with seeds of all the four crop species, followed by *A. flavus* which was present in three cases and other three codominants, viz., *Curvularia, Aspergillus niger* and *Penicillium humicola* were restricted to one or other crop seeds.

Fungal species associated with weed seeds

The maximum number of fungal species i.e. 9 was obtained from the seeds of *Tephrosia purpurea* and the least from *Cassia tora. Alternaria* was associated as dominant with seeds of 4 weeds, viz., *Cassia tora, Abutilon indicum, Sida acuta* and *Triumfetta neglecta. Fusarium* was codominant with *Tephrosia purpurea, Abutilon indicum* and *Trianthema monogyna. Aspergillus flavus*, the other codominant, was obtained from the seeds of *Psoralea corylifolia* and *Abutilon indicum.* Other codominants, viz., *Aspergillus niger, Chaetomium indicum* and *Cladosporium* were specific to particular seeds (Table 2).

Alternaria, besides being dominantly associated with the seeds of four weeds, was isolated from remaining three weed seeds also but with low frequency. Similarly, *Aspergillus flavus* and *Fusarium* were also of wide prevalence and were recorded from 6 and 5 different weed seeds respectively. Other forms were rare and infrequently isolated from one or more seeds (Table 2).

The fungal species associated with seeds may be present under favorable condition in actively growing from deriving nutrition from the seeds and thus causing damage to them. Under unfavourable conditions the fungi are generally present in adormant stage in the form of resting spores, chlamydospores or thick-walled mycelium which under favorable conditions particularly moisture and temperature germinate and multiply while still on seeds. The fungal population in the form of spores or mycelium may be found either closely adhering to the seed coats or else is present with the soil or other vegetable detritus accompanyig the seeds. In extreme case the fungin may be internally seed borne and they remain in dormant phase but grow with the plant growth and cause damage at suitable time (i.e. loose smut of wheat). Muskett 1950 in his presidential address remarked, "it is by no means unnatural that fungi and bacteria of many and diverse types should be present in a living state in such an environment. Normally, fungi and bacteria will be found with any dead or decrepit matter, upon which they depend for their livelihood, and where even such material exists, together with moisture and oxygen when necessary, there will be found specimens of mycological and bacteriological interest".

From the results obtained in the present investigation it is evident that most of the fungal species isolated belong to saprophytic group and spore heavily. The source of infection in these cases is naturally either soil, air or dead plant material itself with which the seeds are intimately related. During agricultural operations the soil fungal spores get themselves mixed with the seeds and they form a part of the seed stock. The seeds of the crops under investigation except those of *Brassica nigra* are provided with glumes, kernals, scale and hilum, the places where the fungal spores find a suitable niche for abode in dormant stage in unfavorable conditions. A sugar-decomposing form, *Rhizopus nigricans* was widely dominant with crop seeds with other cellulose decomposers as codominants. Starchrich seeds of the crops provide ample opportunity for the dominance of *Rhizopus* which possibly changes the starch to sugar by means of its enzyme action.

The conditions an somewhat different in weed seeds and *Brassica nigra*, where the seed content is either proteinaeous or fatty. Besides this, these seeds are smooth walled and devoid of external manifestations for lodging the fungal spores. Dominant forms found these seeds therefore, differ from those present in the crop seeds.

The autors are grateful to Prof. K.S. Bhargava, Head of the Department of Botany, University of Gorakhpur, Gorakhpur, U.P., India for providing laboratory facilities.

REFERENCES

Muskett A.E., 1950, Seed borne fungi and their significance. Trans. Brit. Mycol. Soc. 33 (1 and 2): 1-12.

Porównanie mikoflory towarzyszącej nasionom niektórych zbóż i roślin

STRESZCZENIE

Porównano populacje grzybów związane z nasionami zbóż i roślin zielnych. Dominujące gatunki grzybów okazały się różne dla obu typów nasion.