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RESEARCH ARTICLE

Seed mycoflora of rajmash [*Phaseolus vulgaris* (L.)] in relation to different coloured seed coat

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SUMMARY

Rajmash, the principal legume of population and is also the residence of several seed borne pathogen. Many fungal species affect on the quality and reduce the quantity of seed usable by the forming community after storage. Seed samples of different cultivars of rajmash having different seed coat colour, collected from framers and seed stores were subjected to incubation by using standard blotter and agar plate method for observing of mycoflora. Significant variation in the mycoflora was recorded on different colored seeds. Dark coloured varieties (black maroon. purple) harbored less mycoflora as compared to white and brown coloured varieties. Both field and storage fungi were recorded on unsterilized samples, however, surface sterilized seed samples possessed only pathogenic fungi. Role of seed coat colour in development of mycoflora may be attributed to specific inhibitors and certain phenolic compounds in the seed coats.

Key Words : Mycoflora, Rajmash

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French bean or rajmash *(Phaseolus vagaris* L.) belong to family leguminoceae and also knows as common bean, kidney bean, dwarf bean, navy bean, dry bean and snap bean, string bean, garden bean, and edible bean in different part of India. It is most commonly grown bean and can be consumed as vegetable when pod are immature or as dry pulse after maturity. Its important legume are characterized by the high protein content (22.9%) and nutritive value of their seed. In addition to the root possessing nodules containing rizobia *(Rhizobium paseoli)* that are capable of fixing nitrogen. French bean also cultivated for green managing and erosion control through out the world.

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The primary centre of origin of French bean is South Mexico and Central America. In India French bean growing states are J& K, H.P., Uttarakhand, U.P. and Bihar. In Jammu & Kashmir, Rajmash one of main *Kharif* season crops but some new genotype has been grown in *Rabi* season too.

Rajmash are grown winter crop in plains, while it can be grown all through the year except winter, in hills. It cannot withstand drought as well as very near rainfall and frost. Even though, many of the cultivars are photo-insensitive, certain cultivar develops floral buds only during short days but would abscise during long days. For best growth and yield, the optimum soil temperature is 25-30^{0}C. For pole types the maximum and minimum temperatures for seed germination and growth are 25^{0}C, and 18-20^{0}C, respectively, while the temperatures below 13-14^{0}C (minimum) and above 25^{0}C (maximum) are limiting. However, in mid-hills of North-Eastern region, particularly in Meghalaya, pole beans are grown from March through December when highest summer temperature reaches up to 32^{0}C.

Seed mycoflora are carried either on the surface of with in itself. Different microorganism colonizes the rajmash (seed) during maturation, harvesting and storage. (Christensen and Kaufmann, 1955 and Neergaard, 1977). Role of infected seeds

as primary inoculums for seed rot, various foliar and root rot diseases is well documented (Dhingra, 1978 and Dhyani *et al.,* 1989). There exists a high degree of variability in seed coat colour of rajmash varieties which could influence the development of microflora of seed. Dhar and Gurha (1988) reported variable mycoflora in relation to different seed coat colour of French bean. Most of the seed inhabiting fungi are of common recurrence in different rajmash growing areas and some of them cause considerable damage to crop and also reduced the yield quantitatively and qualitatively. Therefore, present investigation role seed colour in relation to mycolora development in local and improved varieties of rajmash. The result is reported in this paper.

MATERIALS AND METHODS

Twelve samples of local and improved varieties of rajmash having variously coloured seed coat were collected from farmers store and also seed stores. One hundred seeds of each sample, both unsterilized and sterilized treated with surface disinfectant sodium hypochloride. 1per cent for five minutes prior to incubation were analyzed for the occurrence of seed borne mycoflora by employing agar plate method (Malt Extract Agar, MEA) (Neergaard, 1977). Ten unsterilized and surface sterilized seeds were plated separately in each Petriplate equidistantly of medium supplemented with 100ppm streptocycline to avoid bacterial contamination. These plates were incubated 25±1^{0}C in BOD incubator with 12 hours alternating cycles of light and dark for 8 days. Incubated seeds were examined visually and under stereoscopic binocular microscope for the associated mycoflora on 3rd 6th and 9th day of incubation by counting the number of seeds colonized by a particular fungus under stereoscopic binocular microscope (ISTA, 1985). Isolations of mycoflora were made on MEA from each fungal colony and single spore cultures were obtained for confirming the identity of different fungi.

RESULTS AND DISCUSSION

Seventeen species of fungi belonging to eight genera were recorded on all the samples. Seed lots having purple maroon and maroon striated seed coats were free of any fungal infestation whereas. White to brown colored seeds harbored highest mycoflora. Majority of seed samples contained storage fungi. Mainly *Rhizopus* and species of *Aspergillus* and *Penicillium* along with some pathogenic fungi like *Colletotrichum lindemuthianum* and *Rhizoctonia solani.* Unsterilized seeds showed the presence 17 species of fungi belonging to eight genera majority being of storage fungi dominated by *Aspergillus. penicillium and Rhizopus.* However, number of fungal species observed on surface sterilized samples of these varieties was low (0-4 species/ sample) though dominated by pathogenic fungi like *C.lindemuthianun* and *R.solani.* Therefore, indicating their internally seed borne nature. Relatively low occurrence of *Aspergillus* spp was observed on seed surface in those samples.

These studies revealed that varieties having dark seed coat colour (black. maroon. purple) harbored less mycoflora as compared to white and brown seed coat colored varieties. Among unsterilized seeds both field and storage fungi were observed but in surface sterilized seeds majority of the samples possessed pathogenic fungi. (Table 1 and 2). These finding are in confirmation with those of Dhar and Gurha. (1988) who recorded 15 fungi on white seeded variety HUR-15. Whereas, PDR 14 (deep red with striations) and HUR 87

Table 1 : Effect of different seed coat colour on the occurrence of mycoflora on unsterilised rajmash (Seeds)

Seed coat colour	Per cent frequency of mycoflora*																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Black	42	-	-	-	-	-	-	-	-	-	50	-	-	-	-	63	-
Black with brown striations	-	-	-	-	-	5	-	-	-	9	-	50	-	-	5	-	-
Black with right striations	30	25	-	-	-	-	-	-	-	-	-	-	-	-	-	51	-
White	-	-	-	-	-	49	-	-	-	15	22	9	9	35	-	63	-
Light brown	-	-	-	13	-	-	-	15	-	-	-	13	-	-	-	67	15
Yello wish brown	-	-	-	47	-	36	-	-	-	20	23	-	16	43	-	-	53
Orange brown	-	35	15	-	15	-	-	23	-	-	9	-	-	13	-	47	-
Maroon	-	-	5	-	-	6	-	-	-	-	23	-	-	-	-	-	-
Reddish maroon	-	-	-	-	-	-	-	43	-	13	-	-	-	-	-	63	-
Purple maroon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maroon with dark striations	-	-	-	-	22	-	5	-	-	-	-	-	-	-	-	-	-
Maroon with light striations	-	-	-	-	-	5	5	-	24	-	-	19	11	-	-	82	-

1*=*Aspergillus flavus*, 2* =*A. fumigatus*, 3* =A. *niger*, 4* =*A. ochraceous*, 5* =A. *sulphurious*, 6* = *Colletotrichum lindlmuthianum*, 7* =*Curbularia* .
8* = *Fusarium* spp., 9* = *F. oxysporum*, 10* = *F. solani*, 11* = *Penicillium capsulatum* 12* = *P. griseo-fulvum,* 13* =*P. simplicissimum*,
14* = *P. perpuragenum*, 15* = *Rhizoctonia solani*, 15* = *Rhizopus Stolonifer*, 17* = *Trichoderma* spp.

Table 2 : Effect of different seed coat color on the occurrence of mycoflora on surface sterilised rajmash (Seeds)

Seed coat colour	Per cent frequency of mycoflora*											
	1	2	3	4	5	6	7	8	9	10	11	Total mycoflora
Black	-	15	-	42	13	-	-	-	-	23	-	4
Black with brown striations	-	-	5	-	4	15	-	-	-	-	22	4
Black with light striations	-	-	-	-	-	-	-	-	-	-	-	0
White	-	-	12	-	22	9	-	20	-	-	22	5
Light brown	25	-	-	-	5	4	-	15	-	-	24	5
Yellowish brown	-	-	2	-	-	26	-	9	-	-	-	3
Orange brown	-	5	-	-	23	32	-	-	-	12	35	5
Maroon	-	5	-	-	-	-	-	-	-	-	-	1
Reddish maroon	-	-	-	-	-	-	-	-	-	-	-	0
Purple maroon	-	-	-	-	5	-	19	-	55	-	-	3
Maroon with dark striations	-	-	-	-	-	-	-	-	-	-	-	0
Maroon with light striations	-	-	5	-	-	-	-	-	-	-	26	2

1*=*Alternaria* spp., 2* = *Aspergillus flavus,* 3* =*Aspergillus niger,* 4* =*Cephalosporium sp.*, 5* =*Colletotrichum lindimuthianum,* 6* =*Fusarium oxysporum,* 7* = *F. solani*, 8* = *Heterosporium sp*., 9*=*Monosporium sp.*, 10* = *Phymatotrichum sp.*, 11* =*Rhizoctonia solani*

(black coat) were colonized by 10 and 7 fungi, respectively, of these *Alternaria alternata. Aspergillus flavus, Fusarium oxysporum, Macrophomina phaseolina* and *Cladosporium* were predominant. However, some species of fungi like *Cephalosporim, Heterosporium, Monosporium* and *Phymatortichum* observed during these studies were not recorded by earlier workers. *Collectotrichum lindemuthianum, Sclerotinia sclerotiorum, Sclerotium rolfsii* and *Rhizotonia solani* are serious seed pathogens and causing deterioration during storage (Gupta *et al.*, 2000 and Gupta *et al.,* 1992)

Shukla and Bhargava (1976) reported species of *Aspergillus, Botrytis, Curbularia, Chaectonium, Colletotrichum, Cercospora, Drechslera, Fusarium, Belmintosporium, Macrophomina, Mucor, Myrothecium, Penicillium, Phoma, Pleospora* and *Verticillium* are associated with black colour seed coat of *Vigna mungo* and green colour seed coat of *Vigna radiata*. Malgorzota and Prusinski (2000) found higher colonization of white and yellow lupin seeds with more than 18 fungi consisting of both saprophytic and pathogenic fungi. Results indicated that seed coat colour had a definite role in occurrence of seed mycoflora and this selectivity may be attributed to presence of some kind of specific inhibitors and certain phenolic compounds in the seed coat. However, exact reason for fungal selectivity needs further investigation.

REFERENCES

Christensen, C.M. and Kaufmann, H.H. (1955). Loss of viability in storage micro flora. *Seed Sci. & Technol.,* **1**: 547-562.

Dhar, V. and Gurha, S.N. (1988). Seed mycoflora of French bean in relation to the seed coat colour. *Indian J. Pulses Res.,* **4**: 141-143.

Dhingra, P.D. (1978). Internally seed borne *Fusarium semitectum* and *Phomopsis* affecting dry and snap bean seed quality. *Plant Disease Reporter*, **62**: 509-512.

Dhyani, A.P., Sati, M.C. and Khulbe, R.D. (1989). Phoma medicaginis Malbr. And Roum, a new record of fungi from bean crop of Kumaun Himalaya. *Madras Agric. J.,* **76**: 717-718.

Gupta, S.K., Mathew, K.A. and Shyam, K.R. (2000). Seed transmission of *Rhizoetonia solani* in French bean cultivars. *Plant Dis.ease Res.,* **15**: 83-84.

Gupta, S.K., Shyam, K.R. and Dohroo, N.P. (1992). Addition to seed mycoflora of French bean [*Phaseolus vulgarisa* (L.)]. *Plant Dis. Res.,* **7**: 101.

ISTA (1985). International Rules for seed testing, Rules 1985. *Seed Sci.& Technol.*, **13:** 299-355.

Malgorzata, J. and Prusinski, J. (2000). Impact of dinetiphine. Ekphon and Diquat on health status of white lupin seeds [*Lupinus albus* (L.)] *J. Agron. & Crop Sci.*, **4**: 1-10.

Neergaard, P. (1977). *Seed Pathology*. Vol. I The Macmillon Press. London, 741pp.

Shukla, D.N. and Bhargava, S.N. (1976). Fungi isolated from seed of pulses. *Pro. Nat. Acad. Sci*., **46 B** :453-455.

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