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Association of mycoflora of soybean and its impact on seed quality

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Abstract
The present investigation was carried out in laboratory of National Seed Project (Crops) and Department of Seed Science and Technology, College of Agriculture, University of Agricultural Sciences, Dharwad. The seeds collected from major soybean growing areas of northern Karnataka are tested for the association of mycoflora and seed quality parameters. The mycoflora associated with soybean are *Colletotrichum trunchatum, Cercospora kikuchii, Fusarium oxysporum, Rhizoctonia solani, Rhizopus stolonifer* and saprophytic fungi are *Aspergillus flavus, Aspergillus niger* and *Penicillium* spp. *Alternaria* spp. *Cercospora kikuchii, Fusarium* spp. *Penicillium* spp. lead to quality problems, deterioration and germination failure of soybean seeds (Gally, 2006). The seeds collected from Bidar region recorded higher seed germination (84.87%), root length (20.51 cm), shoot length (14.67 cm), seedling vigour (2986) and lower electrical conductivity (0.275 dS m^{-1}) and seed infection (14.00%).

Keywords: Mycoflora, soybean, seed quality and Northern Karnataka

Introduction
Micro-organisms play an important role in affecting the quality of seed, of which fungi are the largest group. These pathogens are disastrous as they reduce seed vigour and weaken the plant at its initial growth stages. Seed-borne fungal diseases are the most limiting factor. Fungi form a major group of pathogens that can be seed-borne or transmitted through seeds. Seed-borne diseases caused by fungi are relatively difficult to control as the fungal hyphae get established and become dormant. Seeds are regarded as highly effective means for transporting plant pathogens over long distances. (Medic-Pap *et al.*, 2007) [6]. Isolated pathogen fungi genera *Diaporthe*, *Fusarium* and facultative parasites, *Alternaria*, *Aspergillus* and *Penicillium* on soybean seeds. Seed-borne diseases have been found to affect the growth and productivity of crop plants. A seed-borne pathogen may be present externally or internally or associated with the seed as contaminant and may cause seed abortion, seed rot, seed necrosis, reduction or elimination of germination capacity as well as seedling damage resulting in development of disease at later stages of plant growth by systemic or local infection. Seeds are regarded as highly effective means for transporting plant pathogens over long distances. The loss of more than 7 m. t. of soybean in world is documented due to diseases alone. The soybean, area is increasing every year especially in northern Karnataka. The seed production area has also enhanced in this region to a considerable extent. Some of the seed lots are discarded due to low germination which is influenced by biotic factors. Hence, it is necessary to know the seed borne mycoflora present in prominent seed production areas. However, the records regarding the mycoflora coupled with soybean seed is scarce. Therefore, it was thought ideal to inspect on assessment of seed mycoflora related to soybean seed produced in various potential locations of northern Karnataka, so as to find out the most suitable areas for disease free quality seed production. Studies were carried out to study the association of seed borne mycoflora occurring in soybean.

Materials and Methods
The experiment consists of two varieties of soybean seeds collected from five locations *viz.*, V_1: JS 335, V_2: DSb 21, L_1: Bagalkot, L_2: Belagavi, L_3: Bidar, L_4: Dharwad and L_5: Haveri. The present study was undertaken to know the mycoflora associated with soybean seeds in different major soybean growing areas. Laboratory experiments were carried out at National Seed Project (crops), Dharwad and Department of Plant Pathology, UAS, Dharwad.

Results and Discussion

The germination percentage, root length, shoot length, seedling vigour index, electrical conductivity and seed infection was non-significant between the two varieties tested. Significantly maximum germination, root length, shoot length, seedling vigour index was noticed in case of DSb 21 (83.14%, 19.37 cm, 14.13 cm, 2785) and least germination, root length, shoot length, seedling vigour index was recorded in JS 335 (82.62%, 19.17 cm, 13.75 cm, 2722) (Table 1). Lower electrical conductivity and seed infection was recorded in DSb 21 (0.290 dS m^{-1}, 17.8%).

Significantly higher germination, root length, shoot length and seedling vigour index was recorded in seed samples collected from Bidar district (84.87%, 20.51 cm, 14.67 cm and 2986) and minimum was recorded in seed samples collected from Bagalkot district (80.23%, 18.27 cm, 12.49 cm and 2469). Interaction among varieties and locations was non-significant for germination, root length, shoot length and seedling vigour index.

(Khare *et al.*, 1971) [5] isolated eighteen fungi from soybean seed varieties in Madhya Pradesh on Bragg and Clark-63. Among these mycoflora *C. truncatum* caused the greatest pre- and post-emergence losses of 84 per cent and 88 per cent respectively in both varieties as a result of plant infection with *C. truncatum.* The existence of seed-borne fungi also adversely impacted germination. (Sinclair, 1978) [10];, (Fulco *et al.*, 1979) [3]; (Agarwal *et al.*, 1990) [1] and (Ahammed *et al.*, 2006) [2] revealed similar results decreased soybean seed germination loss and vigor by fungal pathogen.

Table 1: Effect of provenance and cultivars on seed quality in soybean

Varieties	Germination (%)	Root Length (cm)	Shoot Length (cm)	Seedling vigour index - I	Electrical conductivity (dS m^{-1})	Seed infection (%)
V_1	82.62(65.36)*	19.17	13.75	2722	0.300	18.53(25.43*)
V_2	83.14(65.76)	19.37	14.13	2785	0.290	17.8(24.90)
S. Em±	0.11	0.234	0.234	28.90	0.003	0.26
C. D. @ (1%)	NS	NS	NS	NS	NS	NS
Locations						
L_1	80.23(63.58)	18.27	12.49	2469	0.327	20.66(27.02)
L_2	83.50(66.00)	20.35	14.48	2909	0.280	17.00(24.34)
L_3	84.87(67.08)	20.51	14.67	2986	0.275	14.00(21.95)
L_4	83.16(65.75)	18.66	14.21	2729	0.288	19.17(25.95)
L_5	82.67(65.37)	18.54	13.84	2676	0.306	20.00(26.54)
S. Em±	0.17	0.37	0.37	45.70	0.005	0.41
C. D. @ (1%)	0.68	1.49	1.49	183.90	0.02	1.64
Interactions						
V_1L_1	79.93(63.36)*	18.32	12.19	2439	0.330	21.00(27.26*)
V_1L_2	83.33(65.88)	20.11	14.27	2865	0.283	17.33(24.59)
V_1L_3	84.47(66.77)	20.31	14.43	2935	0.283	14.33(22.22)
V_1L_4	82.87(65.52)	18.58	14.15	2712	0.293	19.67(26.31)
V_1L_5	82.53(65.27)	18.52	13.71	2660	0.313	20.33(26.77)
V_2L_1	80.53(63.79)	18.23	12.80	2499	0.323	20.33(26.79)
V_2L_2	83.67(66.14)	20.61	14.70	2954	0.277	16.67(24.08)
V_2L_3	85.27(67.41)	20.71	14.91	3036	0.267	13.67(21.68)
V_2L_4	83.47(65.98)	18.73	14.29	2747	0.283	18.67(25.59)
V_2L_5	82.80(65.48)	18.56	13.97	2693	0.300	19.67(26.31)
Mean	82.88(65.53)	19.27	13.94	2754	0.295	18.17(25.22)
S. Em±	0.24	0.524	0.524	64.63	0.007	0.43
C. D. @ (1%)	NS	NS	NS	NS	NS	NS

The results of the present investigation showed the dominance of *Cercospora kikuchii* (8.42%), followed by *Colletotrichum truncatum* (8.32%), *Rhizoctonia bataticola* (7.66%) and *Rhizophus stolonifer* (4.50%). Other saprophytic mycoflora are *Aspergillus flavus* (1.13%) and *A. niger* (0.67%) (Fig: 1). (Sanjeesh *et al.*, 2012) [9] isolated *Rhizoctonia bataticola, Cercospora kikuchii, Fusarium* spp. and *Colletotrichum truncatum, Asprgillus flavus, A. niger* from the soybean seed samples gathered from various regions of northern Karnataka (Ramesh *et al.*, 2013) [8] noticed *Macrophomina phaseolinuma, Fusarium oxysporum, Aspergillus flavus, A. niger, Phoma* spp. and *Sclerotium sclerotiorum, F. solani, F. moniliformae, Rhizophus* spp. *Botrytis cinerea* and *C. kikuchii* from northeastern parts of Karnataka.

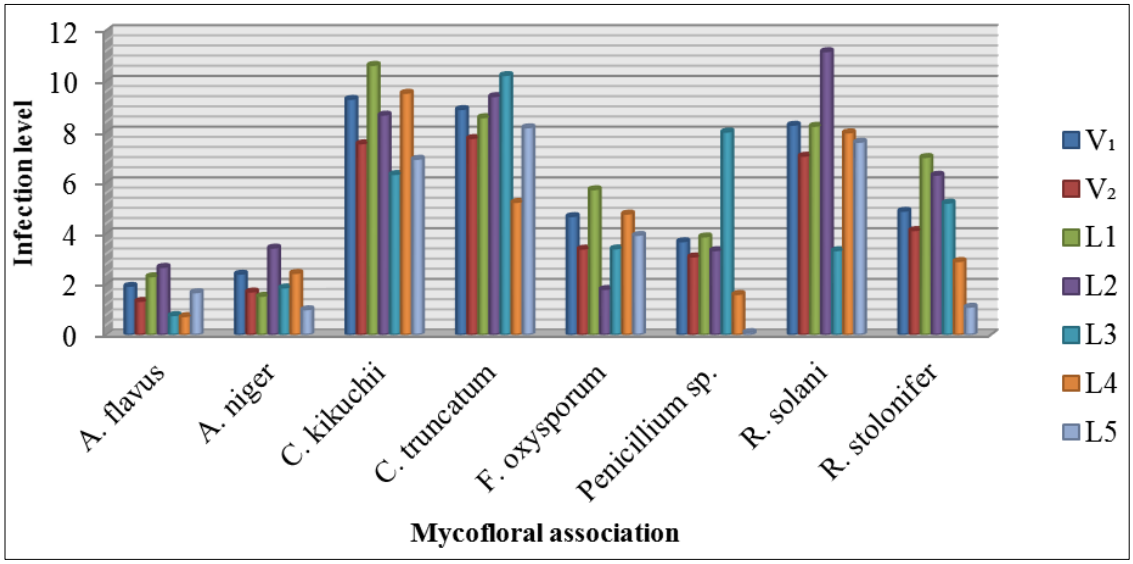

Fig 1: Seed borne mycoflora isolated from soybean seeds

Among seed samples of JS 335 and DSb 21 cultivars tested from different places, DSb 21 cultivar shows lower incidence of *Cercospora kikuchii* (7.54%), *Colletotrichum truncatum* (7.75%), *Rhizoctonia solani* (7.05%), *Rhizophus stolonifer* (4.12%), *Pencillium* spp. (3.08%), *Aspergillus flavus* (1.33%), *A. niger* (1.70%) and *Fusarium oxysporum* (3.39%) than JS 335. Significantly higher incidence of *Cercospora kikuchii* (10.63%), *Fusarium oxysporum* (5.73%) and *Rhizophus stolonifer* (7.00%) was recorded in Bagalkot region tested sample. The higher incidence of *Rhizoctonia solani* (11.17%), *Aspergillus flavus* (2.67%) and *A. niger* (3.43%) was recorded in seed samples tested from Belagavi region. Bidar region seed samples recorded higher incidence of *Colletotrichum truncatum* (10.23%) and *Pencillium* spp. (8.00%). *Rhizoctonia solani* (7.05%), *Rhizophus stolonifer* (4.12%), *Pencillium* spp. (3.08%), *Aspergillus flavus* (1.33%), *A. niger* (1.70%) and *Fusarium oxysporum* (3.39%) than JS 335. Significantly higher incidence of *Cercospora kikuchii* (10.63%), *Fusarium oxysporum* (5.73%) and *Rhizophus stolonifer* (7.00%) was recorded in Bagalkot region tested sample. The higher incidence of *Rhizoctonia solani* (11.17 %), *Aspergillus flavus* (2.67%) and *A. niger* (3.43%) was recorded in seed samples tested from Belagavi region. Bidar region seed samples recorded higher incidence of *Colletotrichum truncatum* (10.23%) and *Pencillium* spp. (8.00%).

The association of higher seed mycoflora is mainly associated with location and type of cultivation practice, type of storage followed by different farmers. In the areas where the crop is caught in rain during pod development resulted in maximum seed mycoflora when compared to other region. This effect is likely due to fungi that caused more rotting of seeds and abnormal seedlings. (Patil, 1999) [7], who conducted extensive surveys during *kharif* 1998 and *rabi* 1998-99 in the southern areas of Karnataka to obtain accurate data on the incidence and intensity of leaf blight on garlic, also noted such locational variations in severity.

Conclusion

The mycoflora associated with soybean seeds are *Cercospora kikuchii, Colletotrichum trunchatum, Fusarium oxysporum, Rhizoctonia solani, Rhizopus stolonifer* and saprophytic fungi are *Aspergillus flavus, Aspergillus niger*. The higher seed germination, seedling dry weight, vigour index and lower seed infection was recorded in seed samples collected from Bidar region.

References

1. Agarwal PC, Mujumdar A, Usha, Ramnath D, Khetrapal RK. Seed borne fungi of quarantine importance in exotic germplasm of soybean (*Glycine max*). Indian Journal of Agricultural Sciences. 1990; 60: 361-363.
2. Ahammed SK, Anandam RJ, Babu GP, Munikrishnaiah M, Gopal K. Studies on seed mycoflora of soybean and its effect on seed and seedling quality characters. Legume Research. 2006; 29(3):186-190.
3. Fulco WS, Lehman PS, Crespo AT. Harvesting time of soybean as a factor influencing seed quality. Fitopatologia Brasileira. 1979; 4:25-39.
4. Gally T. Soybean seed diseases in Argentina. Manejo Integrado de Plagas; Agroecologia. 2006; 78:86-90.
5. Khare MN, Sharma HC, Kumar SM, Chaurasia RK. Current plant pathological problems of soybean and their possible control. Paper presented at Fourth Research Workshop/ Conference on Soybean held at U. P Agricultural University, Pantnagar on 23-25 Feb, 1971, 55-67.
6. Medic-Pap S, Milosevic M, Jasnic S. Soybean seed-borne fungi in the Vojvodina province. Phytopathology Polonica. 2007; 45:55-65.
7. Patil SB. Leaf blight of garlic (*Allium sativum*) caused by *Alternaria* spp., M. Sc. (Agri.) Thesis, University of Agricultural Sciences, Dharwad, (Karnataka) India, 1999.
8. Ramesh BV, Hiremath SV, Naik MK, Amaresh YS, Lokesh BK, Vasudevan SN. Study of seed mycoflora of soybean from north eastern Karnataka, Karnataka Journal of Agricultural Sciences. 2013; 26(1):58-62.
9. Sanjeesh PK. Studies on seed borne fungal diseases of soybean *Glycine max* (L.) merrill in northern Karnataka. M. Sc. (Agri.) Thesis, Univ. Agric. Sci., Dharwad, (Karnataka) India, 2012.
10. Sinclair JB. The seed borne nature of some soybean pathogens; the effect of *Phomopsis* spp. and *Bacillus subtilis* on germination and their occurrence in soybean produced in Illinois. Seed Science and Technology. 1978; 6:957-964.