Current Botany 2012, 3(2): 21-23
ISSN: 2220-4822
Available Online: http://currentbotany.org/

Seed borne *Alternaria* species: A review

Sulochana Rathod

Department of Botany, Government Art's and Science College, Aurangabad (M.S.), India

Abstract
Species of *Alternaria* cause range of diseases with great economic importance on large variety of commercially cultivated tropical crop plants which include cereals, legumes, oil seeds and large number of post harvest crops. *Alternaria* species causing early blight disease to the plants are known to cause wild spread damage in tropical crops.

Keywords: *Alternaria*, seed, fungi, cereals, legumes, oil seeds, vegetables seeds

INTRODUCTION

In agriculture seeds of many crops are known to carry various types of pathogenic and non-pathogenic fungi which are commonly known as seed mycoflora or seed-borne fungi. Depending upon the presence of fungi either on seed coat or in the seed it is further called as external seed-borne fungi and internal seed-borne fungi.

It is observed from the literature on seed pathology and seed biodeteioration that due to association of seed-borne fungi several abnormalities occurred on seeds such seeds are toxic and poor in quality for consumption as well as for seed industry.

Neergaard (1973) [1] reported several types of abnormalities occurred to the seeds, which mainly include seed discoloration, necrosis, seed abortion, seed toxification, seed rotting, etc. He further reported that these types of abnormalities occur due to dominate fungi like *Aspergillus, Curvularia, Drechslera, Fusarium, Penicillium, Rhizoctonia, Verticilastum* and *Alternaria.*

Alternaria species associated with jowar (*Sorghum vulgare* Pers.) seed

Sorghum is one of the most important cereals. It is a dietary staple in central India and in countries of Central America. The first systematic work on seed health testing of Jowar has been made by Leukel and Martin (1943) [2] where they have reported that among the mycoflora, species of *Alternaria* are dominated. Similarly, Basuchaudhary (1973) [3] isolated few fungi and three actinomycetes in which *Alternaria tenuis* was in maximum count. Doupnik (1974) [4] observed the discolouration of seeds due to *Alternaria.* Similarly Panchal (1984) [5] isolated species of *Alternaria* which cause discolouration to the five local varieties cultivated in Marathwada region of Maharashtra state.

Navi et al. (1999) [6] reported some new moulds of *Alternaria longipes* and *A. longissima,* on Jowar grains in India. Whereas Patil and Pandule (2000) [7] isolated *Alternaria alternata* from grey discoloured seeds. Similarly Chavan, and Mukadam (2001) [8] also noted discolouration of seeds caused by species of *Alternaria.* Recently Magar et al. (2005) [9] found *Alternaria alternata* in sorghum grains.

Alternaria species associated with rice (*Oryza sativa* L.) seed

The first ever recorded report on seed discolouration in rice was by Hemmi et al. (1931) [10]. Whereas Singh et al. (1987) [11] noted that *A. padwickii* infected rice grains which reduced carbohydrates of the grains while, Misra and Dharamvir (1988) [12] isolated many fungi responsible for seed discolouration in the field. These fungi were prominently *Alternaria alternata* and *A. padwickii.* Similarly, Jayaweera et al. (1988) [13] isolated and identified seed-borne fungi from seeds of *Oryza sativa* and found *Alternaria padwickii* as dominant. Agrawal et al. (1989) [14] studied the seed-borne diseases and seed health testing of rice and found seeds infected by a number of fungi such as *Alternaria alternata* and *A. padwickii* which caused brown discolouration in rice seeds. Mathur et al. (1972) [15] noted *Alternaria padwickii* caused decay of rice seed and resulting in the death of seedlings.

Alternaria species associated with wheat (*Triticum aestivum* L.) seed

Conner (1987) [16] observed black point caused by *Alternaria alternata* in wheat increased after irrigation during the milky stage, whereas, Singh et al. (2001) [17] found *Alternaria alternate* on grain storage.

Alternaria species associated with black gram (*Phaseolus mungo* L.) seed

Suhag and Suryanarayana (1976) [18] found the maximum association of *Alternaria tenuis* from black gram seeds. Similarly Bhikane (1988) [19] detected *Alternaria alternata* and *A. tenuis.* Reddy and Subbaya (1981) [20] isolated *Alternaria tenuis* with other fungi on black gram seeds variety Pant U-30. Recently Gachande (2001) [21] reported dominant association of fungi like *Alternaria alternata, Aspergillus flavus, A. niger, Curvularia* and *Trichoderma* etc. on black gram.

Received: April 05, 2012; Revised: May 18, 2012; Accepted: June 25, 2012.
*Corresponding Author

Sulochana Rathod
Department of Botany, Government Art's and Science College, Aurangabad (M.S.), India

Email: sulochanar@gmail.com

Alternaria species associated with mustard (*Brassica compestris* Prain) seed

It has been reported by Gupta and Basuchaudhary (1994) [22] that range of infection of seed-borne fungi from different seed samples of Mustard seeds and they found that *Alternaria alternata* is the most common pathogen along with the presence of *Alternaria brassicicola.* Chatterjee and Biswas (2002) [23] found *Alternaria blight* caused by *A. brassicae, A. brassicicola, A. raphani.* Patni et al. (2006) [24] reported *Alternaria* blight of mustard. *Alternaria* blight caused by *Alternaria brassicae* and *A. brassicicola* and *A. raphani* isolates from mustard. Similarly, Kumar and Kolte (2006) [25] studied *Alternaria* blight of mustard.

Alternaria species associated with cotton (*Gossypium hirsutum* L.) seed

Cotton seeds are also used as a oil seed, Templetion et al. (1967) [26] reported *Alternaria alternata* from seed coat of cotton. Similarly, Padaganur (1979) [27] found *Alternaria macrospora* on cotton seeds. Gawade et al. (2006) [28] reported *Alternaria macrospora* from cotton seeds.

Alternaria species associated with brinjal (*Solanum melongena* L.) seed

Tyagi and Chauhan (1985) [29] showed infection of brinjal seeds by *Alternaria solani.* Whereas Patil et al. (2000) [30] reported *Alternaria* species from seed sample of different varieties of brinjal. Saha et al. (2006) [31] reported *Alternaria porri.*

Alternaria species associated with chilli (*Capsicum annum* L.) seed

It forms a part of Indian diet. The fruits are used in daily food. Suryanarayana and Bhombe (1961) [32] isolated the fungal flora of crop and observed the dominant seed mycoflora with *Alternaria* species. Similarly Sanz and Hermilia (1970) [33] identified 30 – 40 % loss in the crop due to the seed-borne pathogen i.e. *Alternaria* alternate. Whereas Deena and Basuchaudhary (1984) [34] noted that *Alternaria alternata* was the seed-borne fungi and causes the fruit rotting, discolouration, losses in seed viability and seedling mortality in nursery bed. Whereas Sujathabai (1992) [35] recorded the presence of *Alternaria tenuis* from fruit rots of chilli. Vijayalaxmi et al. (2001) [36] reported incidence of *Alternaria* on chillies.

Alternaria species associated with cabbage (*Brassica oleracea*) seed

Neergaard (1941) [37] reported *Alternaria brassicicola* on cabbage, while Domsch (1957) [38] studied fungi known to penetrate through the ovary wall and seed coat are *Alternaria brassicae* and *A. brassicicola* in cabbage. Sharma (1989) [39] studied the endosperm is a common site of infection by seed-borne fungi *Alternaria.*

Alternaria species associated with onion (*Allium cepa* L.) seed

Onion is a most important vegetable. The seeds cannot be stored safely for longer period due to loss in viability within a short period of time. It suffers from several micro organisms which were studied by several workers. Gupta and Shrivastava (1981) [40] revealed the presence of fungi like *Alternaria alternata.* Similarly Thind and Jhooty (1982) [41] showed the *Alternaria porri* with purple blotch infection on onion plants.

CONCLUSION

It can be concluded that *Alternaria* species are dominant seed borne fungi and these species are responsible for changes in physical properties of seeds.

REFERENCES

[1] Neergaard Paul. 1973. Detection of seed borne pathogen by culture tests. *Seed Sci. and technol.* 1: 217-254.

[2] Leukel, R.W. and Mortin, J.H. 1943. Seed rot and seedling blight of sorghum. Tech. Bull. U.S. Dept. Agric. 839: 36.

[3] Basuchaudhary, K.C. 1973. An Antagonistic Actinomycete Associated with sorghum. *Indian Phytopathology*. 26: 107-110.

[4] Doupnik, B. 1974. Fungi associated with preharvest discolouration in grain sorghum. *Proc. Am. Phytopathol. Soc.* 1: 103.

[5] Panchal, V.H. 1984. Studies on seed-borne fungi of sorghum. Ph.D. Thesis, Marathwada University, Auranagabd (M.S.).

[6] Navi, S.S., Bandyopadhyay, R. Hadges, R. and Hall, A. 1999. Grain mould fungi of sorghum under various storage conditions. *Ab. Int. Conf. on Frontiers in fungal Biotechnology and Plant pathogens relations*, pp. 50.

[7] Patil, P.J. and Pandule, D.N. 2000. Effects of grain mould fungi on seed germination and seedlings vigour index of sorghum seeds. Var. (SH.9) in Western Maharashtra. *Seed.Res.* 28(2): 190-192.

[8] Chavan, A.M. and Mukadam, D.S. 2001. Role of fungal pigments in seed discolouration. *Recent Advanced Myco. Plant Path. And Biotech*.pp. 38.

[9] Magar Sunita, Kurundkar, J. Khillari, B.P. and Anuradha, R.A. Thombre, P. 2005. Effectof sorghum grain mold on physical and chemical properties of sorghum grains. *Indian Phytopathology.* 58(3): 352.

[10] Hemmi, T.F., Seto and Ikeya, J. 1931. Studies on bakanae disease of the rice plant – II on the infection of rice by Lisea fujikurai sawada and Gibberella saubibetii (Mont) Sacc. In the flowering period. Forschn. Geb. Pflkrankh. Kyoto,.1: 99-110.

[11] Singh, S.N., Agarwal, S.C. and Khare, M.N. 1987. Seed-borne mycoflora of safflower their significance and control. *Seed Research*. 15(2):190-194.

[12] Misra, A.K. and Dharomvir. 1988. Fungi associated with discoloured paddy seeds. Proc. 5th Internat. Congra. Plant Pathology, Kyota, Japan, pp. 408.

[13] Jayaweera, K.R., Wijesuandera, R.L.C. and Medis, J.A. 1988. Seed borne fungi of Oryza sativa, *Indian Phytopath.* 41 (3): 355-358.

[14] Agarwal, P.C., Mortensen, C.M. and Mathur, S.B. 1989. Seed-borne diseases and seed health testing of rice. Danish Govt. Inst. Of seed path. Denmark (Tech. Bulletin No. 37 and CMI

O.K.).

[15] Mathur, S.B., Mallya, J.I. and Neergaard, P. 1972. Seed borne infection of *Trichomis padwickii* in rice, distribution and damage to seed and seedlings. Pathology by Agarwal.

[16] Conner, R.L. 1987. Influence of irrigation timing on black point incidence in soft white spring wheat. *Can. J. Plant. Path.* 9: 301.

[17] Singh, D.P., Kumar, J. and Saharan, M.S. 2001. Effect of some diseases on quality of grain and seed in wheat and approaches to tackle these – a review, Directorate of wheat research, Post Box No. 158, Karnal, 132001.

[18] Suhag, L.S. and Suryanarayana, D. 1976. Some aspects of seed health testing with respect to seed borne fungi of pulse crops in Haryana. *Indian J. Mycol. Pl. Path.* 6: 34-35.

[19] Bhikane, J.S. 1988. Studies on seed pathology of some legumes. Ph.D. Thesis, Dr. B.A.M.U. Aurangabad (M.S.).

[20] Reddy, M. Ramsubha and Subbaya, J. 1981. Evaluation of fungicides against seed-borne fungi of blackgram (*Phaseolus mungo* L.). *Seeds and farms.* 7(2): 17-19.

[21] Gachande, B.D. 2001. Studies on protease enzymes and toxins in seed-borne fungi on legumes. Ph.D. Thesis, Dr. B.A.M.U. Aurangabad (M.S.).

[22] Gupta, D.K. and Basuchaudhary, K.C.1994. Seed mycoflora of vegetable mustard (*B. Juncea coss* var. Rugosa (Roxb). *Ind. Phytopath*. 47: 422-423.

[23] Chatterjee, S.C. and Biswas. 2002. Survivability of soil inoculum of *Alternaria brassicae. Indian Phytopath*. 55(3): 375.

[24] Patni, C.S., Bhatiya, B.S. Kolte, S.J. and Awasthi, R.P. 2006. Pathogenic variability of *Alternaria brassicae* causing *Alternaria* blight of Mustard. *Indian Phytopath.* 58(5): 545.

[25] Kumar Brajesh and Kolte, S.J. 2006. Development of *Alternaria* blight in genotypes of Indian mustard (*Brassica juncea* (L.) Czern & Cross) under field. *Indian Phytopath*. 39(3): 314-317.

[26] Templeton, G.E., Grable, C.E., Fulton, MIO. and Meyer, W.L. 1967. Tentoxin from Alternaria tenuis; with isolation and characterization, In: Proceedings of Mycotoxin Research Seminar Washington, D.C. USDA – ARE Washington, D.C.

[27] Padaganu, G.M. 1979. The seed-borne nature of *Alternaria macrospora* Zimm. In cotton, *Madras Agric. J.* 66: 325.

[28] Gawade, S.B., Padule, D.N. Game, B.C. and Dumbre, A.D.2006. Detection of pathogenic fungi and bacteria in cotton seeds and their impact on seed quality. *Nat. semi on New Frontiers in Plt. Path.* 28-30.

[29] Tyagi, V.K. and Chauhan, S.K. 1985. Influence of leaf surface microorganisms of chilli and Brinjal by their pollen with reference to *Alternaria solani* infection. *IndianPhytopath.* 38: 732-734.

[30] Patil, C.V. Prachi Asalmol and Giri, G.K.2000. Seed mycoflora from different varieties of Brinjal. *Seed Technology:* 37.

[31] Saha, D., Isha, M. , Barman, H.K. Dahar, G. , Purakayastha and Saha, A. 2006.

[32] Pathogenicity of *Colletotrichum gloeosporioides* (Penzig) saccardocausing anthracnose in different brinjal varieties and disease control using botanicals and antagonists. *Indian Phytopath*. 59(3): 377.

[33] Suryanarayana, D. and Bhombe, B. 1961. Studies on fungal flora of some vegetable seeds. *Indian Phytopath.*14: 30-41.

[34] Sanz, B.M. and Hermilia. 1970. *Alternaria alternata* on fruit of capsicum. *Agricultural Tech.* 30(4): 219-221.

[35] Deena, E. and Basuchaudhary, K.C. 1984. Studies on seed-borne mycoflora of chilli. *Indian Phytopath.* 37(1): 151-153.

[36] Sujathabai, E. 1992. Studies on fruit rot of chilli (*Capsicum annum* L.) caused by *Alternaria tenuis* Nees.M.sc. (Ag) thesis, Tamil Nadu Agri. Univ. Coimbatore, India, pp.173.

[37] Vijayalaxmi, M., Srivalli, T. and Lakshmi, N. 2001. Seed fungi of chillies and their phytotoxic effects, Recent Advance in Myc. *Plt. Path. And Bio.Tech*. 6:21.

[38] Neergaard, P. 1941. Kan. Svampes Levetid forlaenges ved. Lysbehandling Arsberetning, J.E. *Ohlsens Enkes Plant Path. Lab*. Pp-6,9.

[39] Domsch, K.H. 1957. Die Raps and Kohlschotenschwarzee Z. Pflanzenkr. *Pflanzensch*. 64-65.

[40] Sharma, J. 1989. Studies on seed-borne disease of Rape and Mustard Grown in Rajasthan. Ph.D. Thesis. Univ. Rajasthan, Jaipur,pp- 209.

[41] Gupta, J.S. and Srivastava, R.N. 1981. Seed mycoflora from Indian seed lots of cosmos bipinnatus and their control. *Ind. Phytopath*. 34: 383-385.

[42] Thind, T.S. and Jhooty, J.S. 1982. Association of thrips with purple blotch infection on onion plants caused by *Alternaria porri. Indian Phytopath*. 35: 696-698.