

# 2<sup>nd</sup> International Conference on Agricultural & Horticultural Sciences

Radisson Blu Plaza Hotel, Hyderabad, India February 03-05, 2014

## Studies on seedborne fungi of soybean and its management

T Venugopal Rao

Acharya N. G. Ranga Agricultural University, India

Charcoal rot/dry root rot caused by *Macrophomina phaseolina* is an economically important seed and soil borne disease causing significant yield losses in soybean. The pathogen causes charcoal rot, seedling blight, dry root rot, ashy stem blight and dry wilt diseases. Annual loss due to charcoal rot in soybean was to an extent of 30-50%. Disease free quality seed production in soybean is utmost important to sustain the productivity and maintain the quality of the crop. Keeping this in view, detailed investigations were carried out to study the implication of seedborne fungi of soybean on seed quality parameters and to find out suitable detection methods for seedborne *M. phaseolina*. Studies on seed to seedling transmission of the pathogen and its management through seed treatments using fungicides, bioagents, botanicals and irradiations were made using soybean cv. JS-335.

A total of one hundred and twenty (120) seed samples comprising of soybean cv. JS-335 were collected from major soybean growing districts of Andhra Pradesh i.e., Nizamabad (60 Nos) and Adilabad (60 Nos) during *kharif* 2012 - 2013. The seed samples were analysed for seed health by standard blotter, 2, 4-D blotter, deep freeze blotter and agar plate methods as per ISTA (1996). Significant differences in occurrence of total number of fungal colonies due to location and source of seed samples were observed. Total per cent occurrence of seed mycoflora in Nizamabad and Adilabad districts of Andhra Pradesh was ranged from 30 to 49.2% and 23.6 to 45.0% by blotter method, 14.8 to 28.1% and 11.6 to 22.1% by 2, 4 - D blotter method, 11.8 to 19.3% and 9.5 to 16.2% by deep freeze blotter method, 13.1 to 37% and 15.4 to 26.4% by agar plate methods, respectively. A total of nine fungal species belonging to eight genera were detected in all the seed samples tested in four detection methods. Nine fungal flora viz., *Macrophomina phaseolina*, *Colletotrichum dematium*, *Aspergillus flavus*, *Aspergillus niger*, *Rhizopus*, *Curvularia sp. Alternaria*, *Cladosporium* and *Fusarium sp.* were observed. Among them, pathogenic fungi viz., *Macrophomina phaseolina*, *Colletotrichum dematium*, *Curvularia sp. Alternaria*, *Cladosporium* and *Fusarium sp.* and storage/saprophytic fungi like *Aspergillus flavus*, *Aspergillus niger* and *Rhizopus* were observed.

Of the four detection methods adopted for isolation of seed mycoflora in soybean, standard blotter method was found superior in recording more number of total fungal colonies in addition to predominant seedborne *M. phaseolina* over agar plate method, 2, 4 - D blotter and deep freeze blotter methods. Out of nine fungal species, *M. phaseolina* was found predominant in the seed samples analysed (8.5 to 28.5%) in Nizamabad and Adilabad districts. The pathogen appeared as greyish mycelial growth on the incubated seeds. Pathogenicity of seedborne *M. phaseolina* was proved by seed inoculation method using soybean cv. JS-335. The pathogen was reisolated and compared with the original isolate.

The mycoflora associated with soybean seed samples were found to reduced seed quality parameters. Significant differences in mean seed germination (70.4 to 73.1%), mean seed vigour index I (1697 - 1821) and mean seed vigour index II (68.8 - 82.2) was recorded. Among different Mandals, Ditchpally Mandal of Nizamabad district and Kubeer Mandal of Adilabad district recorded low seed germination (65.3% and 67%), seed vigour I (1394 - 1470) and seed vigour II (57.0 - 65.2) with increased seed rot (19.2% and 14.1%) and seedling blights (17.3% and 12.5%). Seedborne fungi present in soybean produced seed rots, seedling blights and decreased quality and quantity of soybean besides causing germination failures.

Seed transmission of *M. phaseolina* in apparently healthy soybean seeds (cv. JS 335) was 6% and 8% and in artificially inoculated soybean seeds (38.5% and 49%) and in naturally infected soybean seeds (32% and 43.1%). Germination in the above seed samples ranged from 75% to 72%, 55% to 46% and 59.3% to 50.5% in test tube water agar method (*in vitro*) and in glasshouse conditions.

The efficacy of seed treatments against seedborne *M. phaseolina* were evaluated under glasshouse conditions. The results indicated that soybean seeds treated with thiram + carbendazim at 3 g kg<sup>-1</sup> or vitavax power 200 at 2.5 g kg<sup>-1</sup> improved seed germination (91%, 89%) and reduced seed rot (5.7%, 6.7%) and seedling blights (4.0% and 5.2%). Seed treatment with *T. viride* at 10 g kg<sup>-1</sup> was also found on par with fungicide seed treatments in improving seed germination of 88% and reducing seed rot and seedling blight of 7.3% and 6.3%, respectively. Seed treatment with bioagent (*P. fluorescens*), botanicals (neem seed kernel extract at 5% and neem leaf powder at 5 g kg<sup>-1</sup>) and irradiations (1.5 k Gy and 2.5 k Gy) were also effective in improving seed germination and reducing seedling mortality as compared to untreated seeds (74%, 20.7% and 15.0%) and pathogen treated seeds (60%, 26.3% and 25.7%), respectively in soybean cv. JS-335.

venuseedtech@gmail.com