Smt Guman Devi Verma Memorial Best Woman Scientist Award Paper

Morphometric and Molecular Approaches for the Identification of *Chaetomium* Species

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Abstract

The genus *Chaetomium* Kunze is large in the family *Chaetomiaceae* and identified by hairy perithecia. They play a major role in degradation of cellulolytic and other organic materials. Some species act as potential biocontrol agents against various plant pathogens. Bioactive molecules from *Chaetomium* species are found to exhibit broad spectrum antifungal activity. However, *Chaetomium* is also an invasive pathogen in immunocompromised patients. Thus, proper identification of *Chaetomium* at species level by applying morphological and molecular tools is necessary to explore this fungus for agriculture and industrial use. Therefore, our study was intended to know the relatedness of morphology with molecular marker based identification. Fifty three isolates of *Chaetomium* comprises of 18 species were examined morphologically based on taxonomical features *viz.*, terminal hair character, structure of perithecia, size and shape of ascospores and type of asci. Further, the suitability of molecular marker for the identification of *Chaetomium* species were assessed by using URP (Universal Rice Primers) and ITS primers. DNA from seventeen isolates was subjected for URP-PCR amplification to obtain polymorphic banding pattern. Among the 4 URP primers (2R, 4R, 6R, and 17R) tested, URP -17R primer was found to be useful for species level identification of *Chaetomium.* Subsequently, analysis of sequence data from ITS region of rDNA clearly separated twenty one isolates of *Chaetomium* into 11 different valid species. Comprehensively, the results of our study demonstrate the use of URP and ITS primers for phylogenetic grouping, identification and delimitation of *Chaetomium* at species level. The morphological characters of asci, ascospores are found to be genetically reliable rather than the terminal hair characters for identification and phylogenetic grouping of species in genus *Chaetomium.*

Key words: *Chaetomium,* genetic relatedness of morphological characters, ITS primers, morphological characterization, molecular taxonomy, morphological keys for identification, phylogenetic grouping, URP-RAPD primers

Citation: Maheswari C Uma, Nallathambi P and Prabakaran N. 2015. Morphometric and molecular approaches for the identification of *Chaetomium* species. *J Mycol Pl Pathol* 45(3): 223-238.

Research Article

Elite Chickpea Entries-Their Disease and Pest Reaction

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Abstract

A set of 29 entries of desi chickpea, 20 germplasm lines and 36 promising F-3 segregating materials of chickpea (*Cicer arietinum* L) emanating from different pathological programme of the Country under All India Coordinated Research Projects against wilt disease in *Rabi* 2005-06. Among the 20 germplasm lines, CSJ-427 recorded moderate resistance and while out of 36 F-3 segregating materials, F3-7 showed moderate resistance with wilt incidence of 11.1 per cent. Only entries GPF-2 and IPC-2K2-003 showed resistance with less than 10 per cent plant mortality. Grain yield corresponded with the wilt incidence *i.e.* lower the incidence, higher the yield & *vice versa.* Few promising chickpea entries recommended for North – West Plain Zone (NWPZ) from IIPR-Kanpur were also screened against *Helicoverpa armigera* a serious threat of chickpea in this region. Among the ten late sown entries, except GNG 1488 (36.2% pod damage) all the entries recorded pod damage higher than those of the local check, PBG 1053 (37.7% pod damage). Per cent pod damage in all the kabuli entries were at par with the local check L 550 (47.9%), except HK 98-155 (38.5%). Likewise, the rainfed entries, H 99-265 and PDG 84-16 showed slightly less pod damage as compared to the check, C-235 (54.9%). Further, all the late sown as well as rainfed entries recorded significantly higher wilt affected plants as compared to their respective checks. Kabuli entries, H 00-299 (14.2%) and BG 1053 (10.7%) were at par with the check, L550 (18.64%). Grain yield was very poor in all the test entries on account of heavy wilt as well as pod borer incidence, except the late sown entry, H 82-2 (920.0 kg ha^{-1}).

Key words: Chickpea, elite entries, *Helicoverpa armigera,* wilt

Citation: Singh SK, Reena and Singh Bikram. 2015. Elite chickpea entries-their disease and pest reaction. *J Mycol Pl Pathol* 45 (3): 239-243.

Research Article

Pathogenic Variability Among Isolates of *Sclerotinia sclerotiorum* Infecting Indian Mustard

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Abstract

Study was conducted to evaluate the pathogenic variability among fourteen isolates of *Sclerotinia sclerotiorum* (Lib.) de Bary obtained from different mustard growing regions of India. Significant differences in pathogenicity were observed among the isolates on selected rapeseed-mustard genotypes in relation to the per cent disease intensity. However, non-significant variation was observed among the isolates in relation to incubation period (days). The average disease intensity of different isolates varied between 28.7 to 53.1 per cent on all the genotypes. Noteworthy, isolates HSR and FTH were the most pathogenic with mean disease intensity of more than 50 per cent, while isolate ALW was least pathogenic with disease intensity less than 30 per cent. Isolates varied in their per cent disease intensity on different rapeseed-mustard genotypes, which was significant with host × pathogen interactions.

Key words: *Brassica juncea,* genotypes, pathogenic variability, *Sclerotinia sclerotiorum*

Citation: Kumar P, Rathi AS, Kumar A and Singh D. 2015. Pathogenic variability among isolates of *Sclerotinia sclerotiorum* infecting Indian mustard. *J Mycol Pl Pathol*. 45 (3): 244-250.

Research Article

Succession of Mycotoxigenic Fungi and Biochemical Changes in Paddy Stored in Different Storage Structures

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Abstract

Succession of mycotoxigenic fungi on the seed surface of paddy (MTU-1010) during one year storage (November-2012 to October-2013) was investigated. In all 35 fungal species representing 20 genera were recorded. Fungal composition of stored paddy changed significantly both qualitatively and quantitatively both with the time of storage and storage structure. In general, fungal infestation of paddy was more in seeds stored in earthen pot and least on seeds stored in polythene bag. Significant biochemical changes in seeds during their storage was recorded. Protein content increased while reducing sugars decreased with the progress of storage period. Among the moulds present on paddy seed surface, variety of mycotoxigenic fungi were observed. Aflatoxins, ochratoxin A, zearalenone, nivalenol, DON, citrinin and CPA were elaborated by more number of strains of respective fungi.

Key words: Fungal infestation, mycotoxins, paddy and storage structures

Citation: Kiran S, Surekha M and Reddy SM. 2015**.** Succession of mycotoxigenic fungi and biochemical changes in paddy stored in different storage structures. *J Mycol Pl Pathol*. 45 (3): 251-256

Research Article

Expression Profiling of Mycoparasitic Genes in *Trichoderma koningii* IABT1252 during its Interaction with *Sclerotium rolfsii*

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Abstract

Trichoderma is one of the biocontrol agents which parasitise most of the phytopathogenic fungi. The key components involved in mycoparasitism are production of various antagonistic enzymes, proteins and metabolites. The expression of genes involved in mycoparasitisation process determines the ability of the *Trichoderma* isolates in inhibiting the pathogen attack and preventing the disease incidence. In this study expression of chitinase, exo-*β*, D-glucosaminidase, cellobiohydrolase-2, aminoacid transporter, hydrophobin, bZIP transcription factor and exo-chitinase gene in a most potent *Trichoderma* isolate (*T. koningii* IABT1252) was studied during its confrontation with a major soil borne fungus, *Sclerotium rolfsii*. The expression level of all the genes were significantly high in *T. koningii* IABT1252 during its interaction with *S. rolfsii* compared to non-interacting *T. koningii* IABT1252. Of all the seven genes studied, expression level of gene coding for chitinase showed 1.9 fold higher expression after contact with *T. koningii* IABT1252 compared to non interacting *T. koningii* IABT1252. However, expression of gene coding for hydrophobin showed 1.571 fold high in prior to contact and its expression decreased after contact.

Key words : Hydrolytic enzymes, mycoparasitism, qRT PCR, *Trichoderma,* volatile metabolites

Citation: Rabinal Chidanand A and Sumangala Bhat. 2015. Expression profiling of mycoparasitic genes in *Trichoderma koningii* IABT1252 during its interaction with *Sclerotium rolfsii. J Mycol Pl Pathol.* 45 (3): 257-262

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Research Article

Management of Anthracnose in Black Gram Caused by *Colletotrichum lindemuthianum*

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Abstract

The experiment was conducted to assess the efficacy of different fungicides and botanicals against anthracnose disease of black gram during *kharif* 2013 at RCA Udaipur. Among four fungicides *viz;* tebuconazole, SAAF, carbendazim and mancozeb tested, Tebuconazole was found most effective against the three isolates (MVL (Mavli), UDR (Udaipur), and FN (Fateh Nagar)) of *Colletotrichum lindemuthianum* followed by SAAF, carbendazim and mancozeb in *in vitro*. Azadirachtin was found most effective than neem oil in *in vitro*. Among different fungicides and botanicals combinations, tebuconazole+ azadirachtin was found to be most effective against most virulent isolate (MVL) of *C. lindemuthianum* in pot culture condition.

Key words: Azadirachtin, *Colletotrichum lindemuthianum,* mancozeb, SAAF, tebuconazole

Citation: Aggarwal SK, Mali BL and Rawal P. 2015. Management of anthracnose in black gram caused by *Colletotrichum lindemuthianum. J Mycol Pl Pathol* 45 (3): 263-266.

Research Article

Production of *Pleurotus ostreatus* Grown in Different Substrates and Evaluation of Spent Substrate as Organic Manure for Growth Improvement of *Capsicum chinense* Jacq.

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Abstract

Pleurotus ostreatus is one of the most popular oyster mushrooms largely cultivated in North Bengal. Paddy straw and wheat straw is very commonly found in this area and thus it is being used as the main substrates for the cultivation and some time saw dust is also used as an added supplement. Different combinations of substrates are assessed for their effect on the growth, yield and it was found that the paddy straw and wheat straw combined substrates showed faster growth and higher yield in comparison to the other substrates. Spent mushroom substrates of different combinations were further applied on *Capsicum chinense* a variety of chili commonly grown in the hill region of North Bengal. The application of spent mushroom substrate showed significantly better result in terms of growth and yield. It enhances the uptake of soil phosphate to leaf through root. Spent mushroom substrate of paddy straw with saw dust showed better result than the other substrates in increasing the chlorophyll content of leaves. Spent mushroom substrate also helps to increase the total protein content as well as the carotenoid content in fruit.

Key words: *Capsicum chinense, Pleurotus ostreatus*, Spent mushroom substrate (SMS).

Citation: Roy S, Barman S, Chakraborty U and Chakraborty BN. 2015. Production of *Pleurotus ostreatus* Grown in different substrates and evaluation of spent substrate as organic manure for growth improvement of *Capsicum chinense* Jacq. *J Mycol Pl Pathol.* 45 (3): 267-272

Research Article

Arbuscular Mycorrhizal (AM) Community Analysis from Different Agri-Horti Systems in Dry Temperate Regions of Kinnaur, Himachal Pradesh

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Abstract

Unique geographical and climatic condition of Kinnaur makes it suitable for good quality apple production besides its own type of agro-hortisystem of traditional climate resilient crops, poor soil strata and frequent fluctuation of diurnal temperature in the district. In nutrient deficient-poor soils of the dry temperate region plants are ecologically dependent on arbuscular mycorrhizal fungi for their nutrient and water uptake. Therefore, it is important to study the biodiversity of arbuscular mycorrhizal fungi as this can improve understanding of dry temperate agro-hortisystem functioning, plant succession and re-establishment in nutrient deficient soil and ameliorate other abiotic stresses. In the present study, we have analyzed AM community and found species of six dominant genera *viz.*, Glomus, Gigaspora, Acaulospora, Scutellospora, Sclerocystis and Entrophospora from three blocks of district Kinnaur. Chemical profiling of the soils of the three blocks indicated high phosphorus, organic carbon and organic matter content after nutrient analysis with varying degree of pH, nitrogen and potassium content which enable us to know their functioning in nutrient depleted soil. There is strict need to identify AM fungi upto species level so that AM fungi can be incorporated for sustainable fruit production.

Key words: Apple, AM fungi (-arbuscular mycorrhizal fungi), agro-hortisystem, buckwheat, organic matter, pearl millet, rhizosphere

Citation: Prashad D, Chandel RS, Gupta P, Kumar R, Singh G and Dhiman S. 2015. Arbuscular mycorrhizal (AM) community analysis from different agri-horti systems in dry temperate regions of Kinnaur, Himachal Pradesh. *J Mycol Pl Pathol.* 45 (3): 273-279.

Research Article

Assessment of *Casuarina equisetifolia* Forst. Clones against Blister Bark Disease Resistance

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Abstract

Blister bark disease, a serious disease that usually found in young plantations of *Casuarina equisetifolia* Forst. caused by *Trichosporium vesiculosum* Butl. In this study, 250 clones of *C. equisetifolia* have been screened to identify the blister bark disease resistance. The clones were vegetatively propagated and inoculated with the pathogen. The inoculated clones were assessed for disease resistance through a disease severity score under nursery conditions. Totally 37 clones are showed resistant and 55 clones showed moderately resistant. Rest of the other clones showed reaction to the disease. Analysis of total phenols for all the 250 clones was performed and found that total phenol content was directly related to disease resistance. The resistant clones of *C. equisetifolia* showed higher content of Phenols (20 to 26 ml g^{-1}), whereas the moderate resistant clones showed lower phenol content (11 to 18 ml g^{-1}) than resistant clones. The resistant clones showed higher phenol content that influenced the disease resistance against blister bark disease.

Key words: Blister bark, *Casuarina equisetifolia*, disease resistance, total phenols, *Trichosporium vesiculosum*

Citation: *Karthikeyan A.* 2015. Assessment of *Casuarina equisetifolia* Forst. clones against blister bark disease resistance. *J Mycol Pl Pathol.* 45 (3): 280-284.

Research Article

Assessment of Losses and Identification of Slow Blighting Genotypes against Sheath Blight of Rice

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Abstract

Rice (*Oryza sativa* L) is an important cereal crop which is grown over a large area especially in Asian countries. Amongst the various diseases occurring on rice, sheath blight caused by *Rhizoctonia solani* Kuhn is one of the major fungal diseases in India. The present investigations have revealed that the losses in grain yield at more or less same disease severity differed with cultivars. There was no significant reduction in grain yield of plots inoculated at 60 (stem elongation) and 75 days after transplanting (booting) when vertical disease spread ranged between 38.43 to 49.78 per cent in Basmati CSR 30, while there was 11.11and 4.04 per cent reduction in grain yield with a vertical disease spread of 51.54 and 37.05 per cent in non-scented variety HKR 127. Out of fifty scented and non-scented rice genotypes evaluated, five genotypes viz. N-22 (Acc. 6264), N-22 (Acc. 4819), HKR 05-476, Tetep and N-22 (Acc. 19379) exhibited slow blighting against sheath blight as the disease progress was significantly reduced. The apparent infection rate and area under disease progress curve was considerably lower in these genotypes. Moreover, in most of these genotypes, the incubation period was delayed and there was no sclerotia formation till maturity of the plants. Comparison of scented and non-scented rice genotypes with respect to sheath blight development showed that the vertical disease spread was more in non-scented high yielding rice genotypes/cultivars with high tillering ability than the tall scented cultivars with fewer tillers. It might be attributed to production of closed canopy and a favourable microclimate for disease development much earlier in short statured cultivars than the tall ones. The apparent infection rate (r) and AUDPC were also found to be considerably higher in non-scented genotypes vis-à-vis scented genotypes. Based on these observations, it could be inferred that slow blighting trait against sheath blight is more common among scented rice genotypes then non-scented ones.

Key words: Rice, sheath blight*, Rhizoctonia solani*, slow blighting, yield loss

Citation: Bhukal Nitesh, Singh Ram and Mehta Naresh. 2015. Assessment of losses and identification of slow blighting genotypes against sheath blight of rice. *J Mycol Pl Pathol*. 45 (3): 285-292

Research Article

Influence of Soil Water Saturation on the Incidence and Systemic Spread of *Botrytis cinerea*

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Abstract

Stress has enormous implications on plant survival by lowering defensive mechanisms which predisposed the plant to attack by pathogenic micro-organisms. The effects of stress caused by soil water saturation on the spread of systemic *Botrytis cinerea* Pears (Teleomorph: *Botryotinia fuckeliana*) was investigated at University of Reading UK using model plant lettuce (*Lactuca sativa* L) variety Tom Thumb. Soil water saturation at 25, 50, 75 and control 100 per cent was imposed for seven weeks starting from three weeks after germination. Chlorophyll fluorescence (Fv/F/m) which is the measure of plant stress decreases significantly with increased water stress ($F_{3,79}$ =55.93, P< 0.001). There was a significant decrease in the rate of photosynthesis with raised water stress ($F_{3,79}$ =204.01, P < 0.001) and also between stress and control plants ($F_{1,39}$ = 10.79, P< 0.001). Root weight determined after harvest showed a significant reduction in the root weight with raised water stress ($F_{3,79}$ =204.011, P= 0.001) also stress plants showed a significant deceases in the root weight than the control plants ($F_{3,39}$ = 10.79, P < 0.001). This confirmed that susceptibility to expression of *B. cinerea* infection by the host plant increases with increasing water stress. Under normal conditions systemically infected plants may appear physically healthy. However, water stress may weaken the host plant and decrease the plant's ability to synthesise defensive chemicals by enhancing the multiplication and spread of systemic pathogen.

Key words: *Botrytis cinerea*, Chlorophyll fluorescence, photosynthesis, stress, systemic infection

Citation: Yahaya, S M. 2015. Influence of soil water saturation on the incidence and systemic spread of *Botrytis cinerea. J Mycol Pl Pathol* 45 (3): 293-298.

Research Article

Linear Regression for Disease Prediction, Suitable Cultivars, Disease progress and Fungicidal Management of *Taphrina* Leaf Blotch of Turmeric (*Curcuma longa* L.)

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Abstract

The pooled yield of four years (2008-09 to 2011-12) variety Suranjana was found maximum yielder (21.80t/ha) followed by BSR-2 (18.29 t/ha) and Narendra Haldi-1 (16.36 t/ha). The rhizome treated with carbendazim + mancozeb (1:1)(0.1%) + foliar spray of 0.1% on 45 and 90 DAP found minimum disease intensity16.63 percent and maximum yield 13.34 t/ha followed by foliar spray of carbendazim+ mancozeb (1:1) (0.1%) + foliar spray of (0.1%) on 45 and 90 DAP found disease intensity 23.38 percent. The R^2 value in the regression equations are ranged (0.82-0.89)

Key words: Genotype × Environment interaction, multiple regressions, turmeric, Taphrina

Citation: Singh AK 2015. Linear regression for disease prediction, suitable cultivars, disease progress and fungicidal management of *Taphrina* leaf blotch of turmeric (*Curcuma longa* L) *J Mycol Pl Pathol* 45 (3): 299-303.

Research Article

Morphological, Cultural and Pathogenic Variability among the Isolates of *Alternaria brassicicola* (Schwein) Wiltshire causing Leaf Spots of Cabbage

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Abstract

The investigation was undertaken to study the morphological, cultural and pathogenic variability in four isolates of (*Alternaria brassicicola* (Schwein) Wiltshire) causal agent of leaf spots of cabbage. The isolates were procured from cabbage growing districts, Udaipur, Jaipur, Bundi and Ajmer of Rajasthan. Isolates exhibited considerable variations in cultural and morphological characteristics. Pathogenic variability with inoculation on pot-grown plants of cabbage cultivars, Golden acre, Gayatri, Supper Gayatri, Kank and Vilina resulted in 68.0 to 88.05, 64.02 to 84.08, 48.0 to 52, 47.0 to 64.02 and 7.98 to 31.99 PDI, respectively. The isolates also exhibited significant variations in symptoms and latent period. Based on the disease severity, the four isolates were distinguished into pathogenic groups, where isolate of Udaipur district was found most virulent and predominant causing the typical leaf spot symptoms with shortest latent period and maximum disease severity. All the isolates caused susceptible (S) reaction on two cultivar (Supper Gayatri and Kanak), moderately susceptible reaction (MS) and moderately resistant reaction (MR) on one cultivar (Vilina).

Key words: *Alternaria brassicicola* (Schwein) Wiltshire*,* cabbage, cultural, leaf spots, morphological, pathogenic variability

Citation: Singh K and Rawal P. 2015. Morphological, cultural and pathogenic variability among the isolates of *Alternaria brassicicola (*Schwein) Wiltshire causing leaf spots of cabbage *J Mycol Pl Pathol* 45 (3): 303-308.

Short Communication

Integrated Disease Management of Collar Rot in Elephant Foot Yam (EFY) caused by *Sclerotium rolfsii* Sacc.

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Key words: Chemical control, IDM, inter crop, *Sclerotium rolfsii*, soil amendment

Citation: Lal HC, Kumar P, Sengupta S, Ekka S and Kumar N. 2015. Integrated disease management of collar rot in elephant foot yam (EFY) caused by *Sclerotium rolfsii* Sacc. *J Mycol Pl Pathol.* 45(3): 309-313.

Short Communication

First Report of *Corynespora cassicola* (Berk & M A Curtis C T Wei) causing Leaf Spot on Cowpea (*Vigna ungiculata* L.) in West Bengal, India

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Key words: *Corynespora cassicola,* Cowpea, Leaf spot, Pathogenecity

Citation: Roy Sanchari, Ravat V K and Basu Amitava. 2015. First report of *Corynespora cassicola* (Berk & M A Curtis) C T Wei) causing leaf spot on cowpea (*Vigna ungiculata* L.) *J Mycol Pl Pathol* 45 (3) 314-315.

Book Review

Diseases of Edible Oilseed Crops

C Chattopadhyay, SJ Kolte and F Waliyar: CRC Press, Boca Raton, Florida, USA, 2015. xxvii + 455 p.

The book ***Diseases of Edible Oilseed Crops*** presents an unprecedentedly thorough collection of information on the basic and strategic research of diseases of cultivated annual oilseed crops, *viz.,* peanut, rapeseed-mustard, sesame, soybean, sunflower and safflower, their management. This book is a result of pressing need and demand from researchers, teachers and students and interest by the publishers (CRC Press) to update the information in the previously published three-volume book of Dr Kolte in 1984-85. It covers and integrates worldwide literature in the field for the last 30 years up to 2014, setting it apart from other books that are only of regional importance. By compiling decades of information from previously scattered research into a single globally-minded volume, ***Diseases of Edible Oilseed Crops*** provides these much-needed updates and enhancements. The book, foreword written by Dr William D Dar (DG, ICRISAT), priced at $149.95 / £95.00, could be considered and recommended for institute / University libraries, personal collection for teaching and researching Edible Oilseeds Pathology.

Chirantan Chattopadhyay is currently the Director of the ICAR: National Research Centre for Integrated Pest Management (NCIPM) at New Delhi, India. He holds a doctorate in Plant Pathology from the Indian Agricultural Research Institute, New Delhi, and is a fellow of the Indian National Academy of Agricultural Sciences. He has more than 25 years of experience in oilseed crop disease management research and has significantly contributed in the area of understanding the host-pathogen interactions, epidemiology, and integrated disease management in sunflower, safflower, sesame, peanut, and rapeseed-mustard crops. He has published more than 80 peer-reviewed full research papers and four books. He has won several academic awards and holds one patent.

SJ Kolte has 36 years of experience in teaching both undergraduate and postgraduate courses in the Department of Plant Pathology, GB Pant University of Agriculture and Technology, Pantnagar, India. He has contributed outstanding research work in the area of oilseed crop pathology, including work on induced host resistance, genetics of host resistance, and development of a new concept of the Divya Mustard ideotype. He has published eight books, 125 research papers, and several review articles and book chapters. He has received several awards, including the Lifetime Achievement Award by the Society for Rapeseed-Mustard Research, the YL Nene Outstanding Best Teacher award by the Indian Society of Mycology and Plant Pathology, and the IPS Recognition Award by the Indian Phytopathological Society.

Farid Waliyar is a principal scientist of Plant Pathology at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). He is currently ICRISAT director for West and Central Africa. He holds a PhD in Plant Pathology from the University of Paris M&C, where he specialized in the area of research on the role of *Aspergillus flavus,* safety measures for aflatoxin contamination, other soil fungi on peanuts and their evolution during the cropping season in Senegal. He has 30 years of experience in strategic and basic research related to the development of integrated crop disease management, particularly in peanut crops. He has produced more than 200 publications, supervised and examined several undergraduate, MSc, and PhD students, and received several awards.

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