
Presidential Address



Mass Multiplication of Biopesticides at Farm Level

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Prof N Prasad Memorial Lecture**RB Somani****Revisiting the Genus *Fusarium* with special reference to *Fusarium oxysporum******RB Somani***Ex - Head, Dept. of plant Pathology, Head, Agro Product Development Research Centre and Dean Post Graduate Studies, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola-444 104, Maharashtra, India.**Email: rbsomani@yahoo.com*

* Presented at the 35th ISMPP conference, Dr PDKV, Akola, MS, Jan 8, 2014.

Mini Review**Role of Mycorrhizae: A Component of Integrated Disease Management Strategies****YP Sharma, Santosh Watpade and JS Thakur***Emeritus Scientist, Indian Agricultural Research Institute Regional Station, Amartara Cottage, Shimla-171004, Himachal Pradesh.
Email: yashiarishimla@gmail.com***Abstract**

Soil borne diseases are one of the important limiting factors for the commercial cultivation of various crops. The management of these diseases with chemical pesticides has exhibited numerous ill effects to biotic system and environment. The efficacy of pesticides in the soil system is restricted and an effective delivery system is cumbersome. To provide effective and durable protection to root system, the role of mycorrhiza against pathogenic population is well established. The benefits of these associations have been found to reduce the vulnerability of root system by decreasing abiotic stresses besides improving the ecological fitness of plant species in the soil environment. Balanced plant nutrition with macro/micro nutrients attributes to host endurance against different biotic and abiotic stresses. Plant species are benefited from mycorrhizal association because of greater efficiency in nutrient and water uptake. Abiotic stresses predispose the host to pathogenic infections. Some of the diseases are more in nutrient-poor or moisture-deficient soils. Mycorrhizal plants are often more competitive and better equipped to tolerate environmental stresses than the non-mycorrhizal plants. Several studies have proved that seedlings with symbiotic associations exhibit more resistance to the host system against pathogenic fungi/bacteria/nematodes with various mechanisms. Symbiotic fungi utilize surplus carbohydrates from the root exudates and transform the monosaccharide to less soluble sugars which discourages the germination of propagules and attractiveness of the roots to the pathogens. In case of ectomycorrhizae (EM) the presence of fungal mantle of varied thickness creates a physical barrier to prevent the entrance or spread of a pathogen/nematode. Mycorrhizosphere is the root region where interactions between plants and microorganisms are more intense leading to the production of different types of antibiotics /metabolites exhibiting inhibition to pathogenic organisms. Symbiotic associations have been found to enhance the concentration of these inhibitors many times greater than non symbiotic roots and protecting the plant species against infection. For artificial inoculation mass multiplication procedure of ectomycorrhizal fungi and Arbuscular mycorrhizal fungi (AMF) differ because of their growth characteristics. For large scale production of inoculum, EM fungi can be cultured on synthetic/natural media since these fungi rarely sporulate on these culture media, therefore a grain inocula (mycelium impregnated grain spawn) can be prepared by using locally available grains. AM fungi require living host to grow which are known as nurse host species. Fibrous roots of these nurse host species are utilized as inoculum alongwith chlamydospores produced in the mycorrhizosphere. A new AM fungus isolated from desert of Rajasthan (*Piriformospora indica*) has been successfully cultured and multiplied on synthetic media. Considering multiple benefits, mycorrhiza incorporation can be considered as one of the important component of integrated disease management strategies particularly for organic production systems.

Key words: Arbuscular mycorrhizal fungi, ectomycorrhiza, integrated disease management, organic production system, *Piriformospora indica*

Citation: Sharma YP, Watpade Santosh and Thakur JS. 2014. Role of mycorrhizae: a component of integrated disease management strategies. *J Mycol Pl Pathol* 44 (1): 12-20.

PP Singhal Memorial Pesticides Industries Award-I



Devendra Jain

Green Synthesis of Silver Nanoparticles and their Application in Plant Virus Inhibition*

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Abstract

A cost effective and environment friendly technique for green synthesis of silver nanoparticles using spore crystal mixture of *Bacillus thuringiensis* and their application in plant virus inhibition was standardized. Silver nanoparticles were successfully synthesized from 1mM AgNO₃ via a green synthesis process, and characterized using UV–VIS absorption spectroscopy, XRD and TEM. X-ray diffraction and TEM analysis showed the average particle size of 15 nm and mixed (cubic and hexagonal) structure. Spray application of 50 ppm aqueous solution of silver nanoparticles on cluster bean leaves inoculated with *sunhemp rosette virus* (SHRV) showed complete suppression of the disease, suggesting that silver nanoparticles are effective antiviral agent. Toxicity studies of silver nanoparticles on plant pathogens open the door for a new range of plant antimicrobial agents.

Keywords: Antiviral activity, *Bacillus thuringiensis*, spore crystal mixture

Citation: Jain Devendra and Kothari SL. 2014. Green synthesis of silver nanoparticles and their application in plant virus inhibition. *J Mycol Pl Pathol* 44 (1): 21-24.

PP Singhal Memorial Pesticides Industries Award-II



K Sunar

Harnessing Beneficial Microorganisms from Darjeeling Hills and Development of Strategies for their Utilization in Management of Root Diseases***K Sunar, U Chakraborty and BN Chakraborty***Immuno-Phytopathology Laboratory, Department of Botany, University of North Bengal, Siliguri -734013, Darjeeling, West Bengal, INDIA. Email: bncnbu@gmail.com***Abstract**

Effect of plant beneficial microorganisms on suppression of root diseases and growth promotion in cereals and pulses was investigated. Soil samples collected from various forest, riverine and plant rhizosphere from Darjeeling hills yielded 357 fungi and 135 bacteria. Among these, 75 fungal and 48 bacterial isolates showed phosphate solubilizing activities. These beneficial microorganisms were identified by analyzing ribosomal DNA sequences. Potential phosphate solubilizing fungal (PSF) isolates viz. *Aspergillus niger*, *A. clavatus*, *A. melleus*, and *Talaromyces flavus* were found to solubilize both rock and tricalcium phosphate more efficiently than the other fungal isolates, while some biocontrol agents (BCA) viz. *Trichoderma harzianum*, *T. asperellum* and *T. flavus* were found to suppress a wide range of fungal pathogens *in vitro*. Among the bacterial isolates, *Bacillus pumilus*, *B. altitudinis*, *B. methylotrophicus*, *B. aerophilus*, *Enterobacter cloacae*, *Paenibacillus polymyxa* and *Burkholderia* sp. were found to solubilize phosphate, produce siderophores, IAA, HCN and ACC deaminase, and were also able to inhibit fungal root pathogens *in vitro*. Biopriming of seeds with PGPR and soil amendments by PSF and BCA significantly enhanced germination, growth and biomass of tested crop plants either in green-house or field conditions. Following application of these microorganisms, soil P content decreased while root and leaf phosphate and soil phosphatase activities enhanced. The BCAs and PGPRs could inhibit root rot and sclerotial blight diseases of test crops caused by *Thanatephorus cucumeris* and *Sclerotium rolfsii* in pot conditions. These microorganisms elicited induced systemic resistance against the pathogens by enhancing key defense enzymes like chitinase, β -1-3 glucanase, peroxidase and phenylalanine ammonia lyase when applied prior to the pathogen challenge and the effect was more when they were applied in combinations.

Key words: BCA, disease management, plant growth, PGPR, PSF**Citation:** Sunar K, Chakraborty U and Chakraborty BN. 2014. Harnessing beneficial microorganisms from Darjeeling hills and development of strategies for their utilization in management of root diseases. *J Mycol Pl Pathol* 44 (1): 25-40.

*Presented at the 35th ISMPP Annual Conference at Dr PDKV, Akola, MS, 8-10 Jan 2014.

Smt Guman Devi Verma Memorial Best Woman Scientist Award-I



RK Roohie

Assessment of Defense Responses in Resistant and Susceptible Cabbage Cultivars during Infection with *Xanthomonas campestris* pv. *campestris**

RK Roohie and S Umesha

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Abstract

Eleven cabbage cultivars were assessed for their resistance to black rot caused by *Xanthomonas campestris* pv. *campestris* (*Xcc*). Of these, only one (Pusa Mukta) was resistant, six (Gaurav, Indam Saina, Indam Krishna, Unnati, NS 43 and NS 163) were moderately resistant, two (Quisto and Golden Acre) susceptible and two (NBH-Boss and F1 Bhima) highly susceptible. These cabbage cultivars were analysed for peroxidase (POX) activity and superoxide dismutase (SOD) activity. An increase in total POX and SOD activities were observed in all tested cultivars following inoculation with *Xcc*. The activity was greater in resistant cultivar than in susceptible ones. Reverse transcription - polymerase chain reaction (RT-PCR) confirmed the expression of these genes in resistant and susceptible cultivars. Both enzyme activity assays and RT-PCR analyses for the expression of the POX and SOD genes in susceptible and resistant cultivars demonstrated that the POX gene was up-regulated in resistant cultivar compared to susceptible cultivar. The results suggested that resistance in cabbage to *Xcc* infection was similar to a hypersensitive response (HR), although the onset of this response was delayed when compared to the occurrence of the classical HR.

Key words: Black rot disease, cabbage, hypersensitive response, *Xanthomonas campestris* pv. *campestris*

Citation: Roohie RK and Umesha S. 2014. Assessment of defense responses in resistant and susceptible cabbage cultivars during infection with *Xanthomonas campestris* pv. *campestris*. *J Mycol Pl Pathol* 44 (1): 41-45.

PR Verma Ph D Student Award-I**M Hubballi****Morpho-genotyping of *Pyricularia oryzae* Isolates inciting Rice Blast Disease and its Management*****Manjunath Hubballi and R Rabindran***Department of Plant Pathology, Centre for Plant Protection Studies, Tamil Nadu Agricultural University, Coimbatore-641003, Tamil Nadu, India. E mail: manjunathabtnau@gmail.com***Abstract**

A field survey conducted during kharif 2010 to document the rice blast disease (*Pyricularia oryzae*) severity in five southern states (Tamil Nadu, Karnataka, Kerala, Puducherry and Andhra Pradesh) of India indicated that leaf blast was severe at Ambasamudram (Tamil Nadu) and neck blast at Chidambaram (Tamil Nadu). Twenty isolates of *P. oryzae* collected during the survey exhibited variation with respect to morphology and cultural characteristics. Further, the identity of these isolates was confirmed through amplification of internal transcribed spacer (ITS) region. Genetic diversity of the 20 isolates was studied through RAPD. The similarity coefficient based on RAPD ranged from 58 to 92%. The 20 isolates could be grouped into two clusters A and B. In cluster A, nine isolates from Tamil Nadu and in cluster B, 11 isolates from rest of the places from south India were placed. Hence, genetic diversity based on RAPD was not in accordance with geographical locations from where samples were collected. The efficacy of azoxystrobin at different dosages in combination with *Pseudomonas fluorescens* was tested under field conditions using a highly susceptible rice cv Co39 and was observed that azoxystrobin 125g a.i. ha⁻¹ plus *P. fluorescens* (0.2 %) recorded the least incidence of leaf and neck blast disease. There was also increase in rice yield in the above treatment.

Key words: Azoxystrobin, blast, fungicides, *Pseudomonas fluorescens*, *Pyricularia oryzae*

Citation: Hubballi Manjunath and Rabindran R. 2014. Morpho-genotyping of *Pyricularia oryzae* isolates inciting Rice blast disease and its management. *J Mycol Pl Pathol* 44 (1): 46-53.

PR Verma M Sc Student Award-II**P Rajesh K****Antimicrobial Peptide Genes of PGPR for the Management of Fusarium Wilt of Carnation under Protected Cultivation*****P Rajesh Kumar, P Adhipathi and S Nakkeeran***Department of Plant Pathology, Centre of Plant Protection Studies, Tamil Nadu Agricultural University, Coimbatore 641003, Tamil Nadu, India. Email: rajesh_p_kumar@yahoo.co.in***Abstract**

In a field survey conducted to assess the incidence of wilt of carnation (*Fusarium oxysporum* f.sp. *dianthi* (Fod) in Nilgiris district of Tamil Nadu during 2012-2013, the wilt incidence ranged between 10.0% and 50.8% in varieties Gaudina, Liberty, Navona and Bizet. For the management the disease, 12 *Bacillus* strains were screened, of which three BSC5, BSC6 and BScnTNAU2 showed high antagonistic activity against *Fod*. Detection of antibiotic biosynthetic genes reflected the presence of surfactin, iturin, bacillomycin and fengycin genes. The effective bio-control agents were applied through root dipping and soil drenching @ 5ml L⁻¹ either individually or as a consortia. Seedling dip and soil drenching @ 0.5% with BSC5 resulted in enhanced plant height (88.5 cm), number of shoots (6.4) and flower yield (224 stems per m²) of carnation. The efficacy of the strain at 5 and 10ml L⁻¹ were at par, in relation to disease incidence, yield and plant growth parameters, hence the liquid bioformulations of BSC5 can be recommended @ 0.5% for the carnation wilt management and plant growth promotion.

Key words: Antibiotic genes, bioformulations, carnation, *Fusarium* wilt, PGPR

Citation: Rajesh Kumar P, Adhipathi P and Nakkeeran S. 2014. Antimicrobial peptide genes of PGPR for the management of *Fusarium* wilt of carnation under protected cultivation. *J Mycol Pl Pathol* 44 (1): 54-61.

*Presented at the 35th ISMPP Annual Conference at Dr PDKV Akola, MS, 8-10 Jan 2014.

Research Article**RAPD Analysis of Phosphate Solubilizing Fungi and rDNA Gene Sequence based Phylogeny of *Talaromyces flavus*****BN Chakraborty, U Chakraborty, K Sunar and PL Dey***Immuno-Phytopathology Laboratory, Department of Botany, University of North Bengal, Siliguri-734013, Darjeeling, West Bengal, India. Email: bncnbu@gmail.com***Abstract**

A large number of phosphate solubilizing fungal isolates (PSFs) were obtained from different areas of North Bengal. Out of this collection, four isolates of *Talaromyces flavus*, four each of *Aspergillus niger* and *A. melleus* as well as three of *A. clavatus* were found to solubilize phosphate to a greater extent when quantified for rock phosphate and tricalcium phosphate solubilization *in vitro*. Genetic relatedness among these phosphate solubilizing fungal isolates was determined using random decamer primers. UPGMA cluster analysis based on the RAPD banding pattern showed similarity coefficient ranging from 0.17 to 1. The similarity coefficient was also represented by two and three dimensional plots which showed the genetic relatedness among the PSFs. Phylogenetic analysis of *T. flavus* (RHS/P-51)- a more efficient phosphate solubilizers was carried out by sequencing the internal transcribed spacer regions (ITS 1 and ITS 4) of the ribosomal DNA using universal primers. The sequences were aligned against ex-type strain sequences from NCBI GenBank for identification. The open reading frame (ORF) analysis of 565 residue sequence designated as 18S rRNA gene, partial sequence of *T. flavus* revealed that the sequence contains a total of two ORFs encoding 84 amino acids with an estimated molecular mass of 17.12 kDa.

Key words: Phosphate solubilization, RAPD, rDNA sequences, *Talaromyces flavus*

Citation: Chakraborty BN, Chakraborty, Sunar K and Dey PL. 2014. RAPD analysis of phosphate solubilizing fungi and rDNA gene sequence based phylogeny of *Talaromyces flavus*. *J Mycol Pl Pathol* 44(1): 62-73.

Research Article**Assessment of Pathogenic and Molecular Variability in Isolates of *Fusarium oxysporum* f. sp. *ciceri* Infecting Chickpea****Mohan Lal Teterwal, V K Gaur and Jagdish Prasad***Department of Plant Pathology, College of Agriculture, Swami Keshwanand Rajasthan Agricultural University, Bikaner 334006, Rajasthan, India. E-mail: vkg_rau@yahoo.com***Abstract**

Nine isolates of *Fusarium oxysporum* f. sp. *ciceri*, the incitant of wilt of chickpea were assessed for pathogenicity and genetic variability using RAPD markers. Pathogenicity of these isolates varied both in sterilized and unsterilized soils when tested on chickpea variety JG 62. The wilt incidence in sterilized and unsterilized soils varied from 33.3 to 100% and 28.6 to 93.3%, respectively. Isolates differed in their RAPD banding pattern. The similarity value of RAPD profiles ranged from 0.136 (SGN-SKR) to 0.372 (JOB-SGN) with an average of 0.231 ± 0.1 among the isolates. Ten random primers were used to fingerprint the individual isolates. The cluster analysis using Un-Weighted Pair Group Method with Arithmetic Average distinguished *Fusarium oxysporum* f. sp. *ciceri* isolates into three fingerprint groups.

Keywords: Chickpea, *Fusarium oxysporum*, Fusarium wilt, pathogenicity, RAPD markers

Citation: Teterwal ML, Gaur VK and Prasad J. 2014. Assessment of pathogenic and molecular variability in isolates of *Fusarium oxysporum* f. sp. *ciceri* infecting chickpea. *J Mycol Pl Pathol* 44 (1): 74-77.

Research Article**Morphological, Biochemical and Molecular characterization of *Gibberella fujikuroi* isolates causing Bakanae disease of Basmati rice****Jaspal Kaur¹, PPS Pannu¹ and Sucheta Sharma²**¹Department of Plant Pathology, ²Department of Biochemistry, Punjab Agricultural University, Ludhiana, Punjab, India. Email: jassu75@pau.edu**Abstract**

Twenty isolates of *Fusarium* were obtained from foot rot infected plants collected from rice fields of Punjab and were characterized on the basis of morphological characters, type of symptoms produced, ability to produce gibberellic acid (GA) and fusaric acid (FA) and also by PCR using species specific primers. All the isolates were identified as *F. fujikuroi* as they produced abundant micro conidia in chains on polyphialides and none of the isolate produced chlamydospores in culture. Morphological identification was further confirmed by using primers specific to *Fusarium verticillioides* and *F. proliferatum*, *F. subglutinans* and the primer specific for production of fumonisins were also tried. Only two primers specific for *F. verticillioides* (*VER1* and *VER 2*; *Vert1* and *Vert2*) gave amplification of the DNA. DNA of none of the isolates gave amplification with the primer pair VERTF1 & VERTF2, specific for the production of fumonisins. Qualitative and quantitative detection of GA and FA by thin layer chromatography and spectrophotometric methods revealed that all the isolates had ability to produce GA whereas 9 out of 20 isolates were positive for the production of FA. Isolate FR2 and FRD showed maximum production of GA and FA and produced elongation and stunting type of symptoms, respectively.

Key Words: Bakanae of rice, foot rot, *Fusarium verticilloides*, *Gibberella fujikuori***Citation:** Kaur J, Pannu PPS and Sharma S: 2014. Morphological, biochemical and molecular characterization of *Gibberella fujikuroi* isolates causing bakanae disease of basmati rice. *J Mycol Pl Pathol* 44 (1): 78-82.

Research Article

Identification of Bioactive Antifungal Compounds from *Eucalyptus globules* against *Sarocladium oryzae* causing Rice Sheath Rot Disease

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Abstract

Rice sheath rot disease caused by *Sarocladium oryzae* is one of the major constraints in rice production. Since the existing chemical control measures being costly and may favour development of resistance in the pathogen, the present study was carried out to find the efficacy of different solvent extracts of *Eucalyptus globules* against *S. oryzae* and identify the bio active compound present in *E. globules* by gas chromatograph interfaced to a mass spectrometer (GC-MS) analysis. Of the 10 botanicals evaluated ethanol extract of *E. globules* (10%) recorded maximum growth inhibition of *S. oryzae* and was found better than ethyl acetate and methanol extracts. The GC-MS analysis revealed a total of 11 bio active compounds in *E. globules* in which the most prevailing compounds were eucalyptol (55.7%) and 1, 2-benzenedicarboxylic acid di-isooctyl ester (19.0%). Presence of these compounds could be responsible for the antifungal activity of *E. globules* against *S. oryzae*.

Keywords: *Eucalyptus globules*, eucalyptol, 1, 2-benzenedicarboxylic acid di-isooctyl ester, GC-MS analysis, *Sarocladium oryzae*

Citation: Meera T, Balabaskar P and Vengadesh Kumar L. 2014. Identification of bioactive antifungal compounds from *Eucalyptus globules* against *Sarocladium oryzae* causing rice sheath rot disease. *J Mycol Pl Pathol* 44 (1):83-87.

Research Article**Screening Apple Cultivars for Resistance to Pink Canker (*Corticium salmonicolor*)****Durga Prashad and IM Sharma**

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Abstract

Apple (*Malus x domestica* Borkh.) gets infected by pink canker (*Corticium salmonicolor* Berk. and Br.) on the advent of monsoon rains affecting both fruit yield and quality in Himachal Pradesh. In the present study 17 commercial cultivars of apple were screened both in *vitro* and 9 under field conditions. Three cultivars namely; Ace Spur, Zinger Gold and Granny Smith showed moderately resistant reaction with less disease incidence (9.9, 9.4, 9.5 %), minimum apparent infection rate (0.044, 0.037, 0.037/unit/day) and minimum AUDPC (3.357, 3.201, 3.308) respectively, while rest of the cultivars exhibited moderately susceptible reaction. None of the cultivars showed resistant or moderately resistant reaction, while Tydeman Early Worcester showed only moderately susceptible reaction (22.4%), apparent infection rate (0.0894/ unit/ day) and AUDPC (6.363) and four cultivars viz., William's Favourite, Scarlet Spur, Granny Smith and Rich-a-red exhibited susceptible reaction under natural epiphytotic conditions.

Key words: Apple, *Corticium salmonicolor*, pink canker, resistance

Citation: Prashad D and Sharma IM. 2014. Screening apple cultivars for resistance to pink canker (*Corticium salmonicolor*). *J Mycol Pl Pathol* 44 (1): 88-91.

Research Article**Integrated Management of Core Rot in Apple Fruits through Plant Extracts and Fungicides****IM Sharma, HS Negi, Durga Prashad and Shweta Sharma***Department of Plant Pathology, Dr. Y.S. Parmar University of Horticulture & Forestry, Nauni, Solan, Himachal Pradesh-173230 India. Email: imsharma18@gmail.com***Abstract**

Core rot of apple caused mainly by three pathogens viz., *Alternaria mali*, *Trichothecium roseum* and *Fusarium* species has been appearing in moderate to severe form leading to excessive pre-harvest fruit drop and post harvest fruit rot during storage in Himachal Pradesh. In order to develop an integrated control strategy for the disease, different plant extracts alone and in combination with effective fungicides were evaluated *in vitro* and in field experiments. *In vitro* evaluation of 18 different plant extracts indicated that aqueous extracts of *Murraya koenigii* leaf, aonla fruits and *Allium sativum* bulb were most effective against *A. mali*, *T. roseum* and *Fusarium tricinctum* in inhibiting their mycelial growth (81.2-100.0%). Field evaluation of six plant extracts (leaf/ fruit/ seed) that were effective under *in vitro* test revealed that three consecutive sprays of garlic extract (7.5%) at the pink-bud stage followed by another two sprays at the petal fall – pea stage and marble – walnut stage was highly effective (68.6% disease control), followed by leaf extract of *M. koenigii* and walnut. Similarly, evaluation of nine different combinations of plant extracts showed that three sprays starting with garlic bulb extract (7.5%) followed by *M. koenigii* leaf extract (12.5%) and *M. azedarach* seed (10%) + aonla fruit (10%) at the above three critical stages of plant growth in that order was highly effective (82.5% disease control) and was at par with another schedule wherein first two sprays were exchanged and the third one was replaced with walnut leaf extract (12.5%). Of the nine different integrated disease management schedules consisting both fungicides and plant extracts tested, the one consisting three sprays starting with garlic bulb extract (5%) + difenoconazole (0.012%), followed by another two sprays with *M. koenigii* leaf extract (10%) + propiconazole (0.04%) - mancozeb (0.25%) + aonla fruit extract (10%) at the above three stages of plant growth, respectively was the most effective (96.4% disease control) and highly economical (CBR 10.89).

Key words: *Alternaria mali*, apple fruits, core rot, integrated disease management, fungicides, *Fusarium tricinctum*, plant extracts, *Trichothecium roseum*

Citation: Sharma IM, Negi HS, Prashad D and Sharma S. 2014. Integrated management of core rot in apple fruits through plant extracts and fungicides. *J Mycol Pl Pathol* 44 (1): 92-98.

Research Article

Effect of Paddy Straw Quality and its Supplementation on Growth, Yield and Biochemical Composition of Redhead mushroom (*Hypsizygus ulmarius*)

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Abstract

Redhead or blue oyster (*Hypsizygus ulmarius* (Bull. Ex. Fr.) is one of the important mushrooms in India. Among the scented/non-scented varieties of paddy straw used, non-scented rice varieties Shyamala, Swarna and MTU 1010 took minimum days for spawn run (18-20d) and produced higher biological efficiency (68.6-77.4%), while scented rice varieties, Gopalbhog, Basmati and Indira-9 showed no spawn run and only Kasturi gave minimum biological efficiency of 52.6%. *H. ulmarius* showed low fat in Kasturi (1.7%), but protein, carbohydrate and ash contents were higher 18, 52.6 and 8.1% respectively, in Shyamala. Among the amended (organic/inorganic) rice straw, least spawn run time (27d) was taken by *H. ulmarius* in 50:40:40 kg NPK/ha + nitrogen blending with FYM rice straw. Number of sporophores was highest (34.2) in 50:40:40 kg NPK/ha + nitrogen blending with FYM and in 10 ton FYM + 30:30:30 kg NPK/ha amended rice straw. The protein and ash contents of *H. ulmarius* were highest in 50:40:40 kg NPK/ha + nitrogen blending with FYM. In paddy straw supplemented with lemon grass (75% lemon grass +25% paddy straw) showed the highest number of sporophores (52.4), yield (361.3g) and protein content (20.5%). First harvesting was earlier (30-31d) in sole lemon grass, 75% lemon grass + 25% paddy straw and 50:50 lemon grass: paddy straw while it was delayed in sole paddy straw (35.8 d). The carbohydrate and moisture contents were highest in sole paddy straw (53.3%, 92.6%). Ash content was highest in 75% lemon grass+25% paddy straw and lemon grass sole (8.1%), and fat content was highest in lemon grass sole (1.7%).

Key words: biochemical composition, *Hypsizygus ulmarius*, lemon grass, supplementation, paddy straw

Citation: Kaushal Ashulata and Thakur MP. 2014. Effect of paddy straw quality and its supplementation on growth, yield and biochemical composition of *Hypsizygus ulmarius*. *J Mycol Pl Pathol* 44 (1): 99-104.

Research Article

Taxonomic Studies of Meliolaceae Associated with Some Plants of Aligarh, India

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Abstract

The Meliolaceae is a family of fungi in the order Meliolales. Mostly tropical in distribution, species in this family are biotrophic on the leaves and stems of plants. These fungi are known to cause black or dark mildew disease on the plants. Extensive work on the foliicolous fungi belonging to family Meliolaceae at Aligarh and other adjacent areas has not been carried out. Therefore, a study was carried out to isolate and identify the foliicolous fungi attacking different plants of Aligarh. This paper gives the detailed description and illustration of four Meliolaceae fungi viz., *Meliola alstoniae*, *M. mangiferae*, *M. memecyli* and *Amazonia peregrina* associated with different plants of Aligarh, Uttar Pradesh, India. These fungi were reported for the first time from Aligarh.

Key words: black/dark mildew, foliicolous fungi, Meliolaceae

Citation: Ganie AA, Wani AH, Azam MF and Parveen S. 2014. Taxonomic studies of Meliolaceae associated with some plants of Aligarh, India. *J Mycol Pl Pathol* 44 (1): 105-107.

Research Article

Dynamics of *Corynespora* Leaf Fall and *Colletotrichum* Leaf Spot Diseases of Rubber Plants (*Hevea brasiliensis*)**M J Manju, V I Benagi, T H Shankarappa, C Kuruvilla Jacob and K K Vinod***Hevea* Breeding Sub-Station, Rubber Research Institute, Kadaba 574221, Karnataka, India. E-mail: manjumjm@yahoo.co.uk**Abstract**

A field study was carried out to understand the dynamic nature of two major leaf diseases, *Corynespora* leaf fall (CLF) and *Colletotrichum* leaf spot (CLS) of rubber plants (*Hevea brasiliensis*). These diseases appeared regularly in the rubber plantations and caused more damages to younger leaves. Fresh infection of CLF disease was observed in the plantation from the second fortnight of January during the period of refoliation and the disease intensity was maximum from the second fortnight of March to the first fortnight of April. The disease decreased considerably after the onset of rains and remained mild until the next reflushing season. The disease intensity was limited to refoliation period after the annual wintering and warm humid periods only. The CLS disease was present throughout the year in the plantation at all the stages of leaves. However, the disease intensity was mainly confined to younger plantations. The disease was found to establish with the refoliation and became more severe during the rainy season and warm humid months. Unlike CLF, this disease did not cause considerable economic damage to mature rubber, but it is a serious problem in nurseries and for very young rubber plants in the main field.

Key words: *Colletotrichum* leaf spot, *Corynespora* leaf fall, *Hevea brasiliensis*, rubber plants

Citation: Manju M J, Benagi V I, Shankarappa T H, Kuruvilla Jacob C and Vinod K K. 2014. Dynamics of *Corynespora* leaf fall and *Colletotrichum* leaf spot diseases of rubber plants (*Hevea brasiliensis*). *J Mycol Pl Pathol* 44 (1): 108-112.

New Report

***Termitomyces microcarpus* (Berk. & Broome) R. Heim: A New Record from Nepal**

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Abstract

During a survey of wild edible mushrooms in the tropical to temperate belts of Nepal during the rainy seasons 2010 and 2011, a number of macro fungal species were collected and identified. This paper highlights a new record of *Termitomyces microcarpus* (Berk. & Broome) R. Heim, reported for the first time from Nepal and re-described. Phytogeographically, the 70 ha sample collection area lies within a narrow altitudinal range between 1000 and 1250 masl in a subtropical forest. The specimens have been housed in Natural History Museum (NHM), Tribhuvan University, Swayambhu, Kathmandu, Nepal.

Kew words: Basidiomycetes, Macrofungi, Termite's mushroom

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Short Communication

Influence of Weather Variables on the Incidence and Severity of Aflatoxin in Field Maize Crops

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Key words: Aflatoxin, maize, kharif crops, weather variables, regression equations

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Short Communication**Induction of Defense Enzymes in Tomato in Response to Treatment with *Bacillus subtilis* EPCO 16 Liquid Formulation****SA Ramyabharathi and T Raguchander**

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Key words: *Bacillus subtilis*, *Fusarium wilt*, *Peroxidase*, *Polyphenol oxidase*

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