

Full Paper

PP Singhal Memorial PI Industries Award Competition

Management of Charcoal Stump Rot Disease using AMF and PGPR in Temi Tea Estate, Sikkim



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Abstract

Charcoal stump rot, a primary root disease of tea caused by *Ustulina zonata* prevalent in Temi Tea Estate, Sikkim and its management through the application of beneficial soil microorganisms has been considered as a valuable tool to improve productivity without damaging the soil environment. In the present study, attempts have been made to isolate and study the potential rhizospheric microflora of tea plants and incorporate their use in this plantation crop. One each of the dominant AMF (*Glomus mosseae*) and PGPR (*Bacillus pumilus*) obtained from tea rhizosphere were selected for field application for the suppression of root rot pathogen (*U. zonata*). Plant growth promoting activities as well as disease suppressive mechanisms viz solubilisation of phosphate, siderophore and IAA production were also evaluated *in vitro* condition followed by field trials with single or joint inoculation with the selected AMF and PGPR. Plant growth parameters such as increase in shoot length and number of leaves were noted. Inoculation of tea plants with *G. mosseae* and application of *B. pumilus* followed by inoculation with *U. zonata* revealed that both the treatments reduced the disease incidence in relation to untreated control. Enhanced accumulation of phenol as well as enzyme activities in PGPR and AMF treated plants were observed in relation to untreated control. Dual application revealed better results than single application. New isoform of catechin was observed in treated plants as evident in HPLC analyses. Survival of *B. pumilus* in soil was determined using serological assays.

Key words: *Camellia sinensis*, *Ustulina zonata*, *Glomus mosseae*, *Bacillus pumilus*

Citation: Bhutia LP, Chakraborty BN and Chakraborty U. 2012. Management of charcoal stump rot disease using AMF and PGPR in Temi tea estate, Sikkim. *J Mycol PI Pathol* 42 (1): 1-12.

Full Paper**Evaluation of Soil Solarization, Fungicides and Biocontrol Agents for the Management of *Phytophthora* Foot rot in Black Pepper Nursery****G Sivakumar**

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Abstract

Soil solarization, biocontrol agents and fungicides were evaluated to manage foot rot caused by *Phytophthora capsici* in black pepper (*Piper nigrum* L.) nursery. Results indicated that solarized potting mixture amended with biocontrol agents *Trichoderma harzianum* @1g kg⁻¹ (containing 10⁸cfu g⁻¹ of formulation), vesicular arbuscular mycorrhiza @100cc kg⁻¹ (*Glomus fasciculatum*) and fungicide Potassium phosphonate (0.3%) recorded maximum sprouting (95.4%), root length (23.7cm), shoot length (30.1 cm) and lowest disease incidence (12.3%). The rhizosphere *T.harzianum* population gradually increased after planting and attained the highest level at one month after planting of rooted cuttings. The nursery experiment revealed that Solarization of potting mixture for 35 days, incorporation of antagonistic microorganisms *T. harzianum* @1g kg⁻¹ and Vesicular arbuscular mycorrhiza @100 cc kg⁻¹ of solarized potting mixture and spraying and drenching of Potassium phosphonate @3ml l⁻¹ at monthly intervals on rooted cuttings was effective for the management of *Phytophthora* infections in black pepper nursery.

Key words : Black pepper, nursery, *Phytophthora* foot rot, soil solarization, bio control agents, fungicides**Citation :** Sivakumar G. 2012. Evaluation of soil solarization, fungicides and biocontrol agents for the management of *Phytophthora* foot rot in black pepper nursery. *J Mycol Pl Pathol* 42 (1) : 120-123.

Full Paper**Molecular Characterization of Banana Streak Virus Isolate from Banana Cultivar Kanchi Kela of ABB Genotype****R Verma*, D Mungekar, P Gaikwad and SPS Tomer**

*Indian Agricultural Research Institute, Agriculture College Estate, Shivajinagar, Pune-411005 MS, India. *E-mail: rajverma0762@gmail.com*

Abstract

Banana streak virus (BSV) is an important virus of banana and plantain (*Musa spp.*) throughout the world. A survey was conducted for the occurrence of BSV in banana plantation around Pune, India. The virus has been molecularly characterized, sequenced and designated as BSV - Pune isolate. It was detected by PCR amplification in symptomatic samples. The isolate originated from banana cv. Kanchi kela. The sequence was compared with those of BSV reported previously. The BSV - Pune sequence was homologous to that of BSV-K3, sharing 100% identity, but was distinct from BSV-Uganda A isolate.

Key words: Banana streak virus, Kanchi kela, PCR, sequence analysis

Citation : Verma R, Mungekar D, Gaikwad P and Tomer SPS. 2012. Molecular characterization of Banana Streak Virus isolate from banana cultivar Kanchi Kela of ABB genotype. *J Mycol Pl Pathol* 42 (1): 124-127.

Full Paper**Integrated Management of Dry Root Rot (*Rhizoctonia bataticola*) of Greengram****BS Rathore***Agricultural Research Station, S. K. Rajasthan Agricultural University, Mandor, Jodhpur-342 304, India.**E-mail: rathorebs1957@rediffmail.com***Abstract**

Dry root rot caused by *Rhizoctonia bataticola* (Taub.) Butler is the major disease of green gram crop. Field trials were conducted at Agricultural Research Station, Mandor, Jodhpur for three consecutive kharif seasons (2005-2007) to study the comparative efficacy of fungicide, plant extract, organic amendment, bio-control agent and their combinations. The cumulative analysis of three years field data of experiments revealed that the lowest disease incidence (4.0%) and maximum grain and fodder yields (10.2 q ha⁻¹ and 14.2 q ha⁻¹) were recorded in a combination of carbendazim (2 g kg⁻¹) treated seeds and soil amended with *T. viride* (2.5 kg ha⁻¹) + FYM (2 tonne ha⁻¹). This result was further confirmed by conducting trials at Adaptive Trial Centre at Rampura, Jodhpur.

Key word: Greengram, dry root rot, *Rhizoctonia bataticola*, integrated control

Citation: Rathore BS. 2012. Integrated management of dry root rot (*Rhizoctonia bataticola*) of greengram. *J Mycol Pl Pathol* 42(1) : 128-131.

Full Paper

Post Harvest Association of Moulds and Aflatoxigenic Strains of *Aspergillus flavus* in Different Varieties of Wheat Grains**Amod Kumar, N L Mandal, Sweta Roy and A K Roy**

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Abstract

Grain samples of five commonly grown wheat varieties viz. WH-542, PBW- 343, UP-2003, Kundan and PBW-502 of Bihar were analyzed for association of various moulds including *Aspergillus flavus*. Several moulds like *A. niger*, *A. flavus*, *A. candidus*, *Cladosporium oxysporum*, *Curvularia clavata*, *C. lunata*, *Fusarium moniliforme*, *Mucor mucedo*, *Penicillium citrinum* and *R. stolonifer* were found prevalent in all the varieties, however, their incidence level varied. Of the 37 *A. flavus* isolates recovered from wheat grains 19 were toxigenic. Of these, 8 isolates produced aflatoxin B₁ only, 5 produced both B₁ and B₂, 5 produced B₁, B₂ and G₁, and only one produced B₁ and G₁ but none of them produced aflatoxin G₂. Aflatoxin B₁ production ranged from 30-320 µg l⁻¹.

Key words: Wheat grain variety, Mycoflora, *A. flavus*, aflatoxin production.

Citation: Kumar Amod, Mandal NL, Roy Sweta and Roy AK. 2012. Post harvest association of moulds and aflatoxigenic strains of *Aspergillus flavus* in different varieties of wheat grains. *J Mycol Pl Pathol* 42 (1) : 132-135.

Full Paper**Evaluation of Indigenous *Ganoderma lucidum* Isolates of Uttarakhand for Growth and Yield****KK Mishra* and RP Singh****

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Abstract

Uttarakhand, a hill state of India, is gifted with a rich mushroom flora that includes a most valuable medicinal mushroom *Ganoderma lucidum* in abundance. The fungus occurs in natural habitat of almost all parts of the zones A and B of the State. Isolates of *G. lucidum* obtained from nine locations of different altitudes varying from 350 m (Pantnagar) to 2286 m (Mukteswar) Uttarakhand were designated as GL-1 through GL-9. The pure culture of these isolates were evaluated for their radial growth on malt extract agar medium at 25±1°C. Two isolates, GL-1 and GL-6 gave maximum average growth rate (6.38 mm day⁻¹). These isolates were also evaluated for their yield on wheat straw substrate supplemented with 5 or 10% rice bran. Results showed that isolate GL-1 gave significantly higher yields 40 g 200 g⁻¹ dry substrate (20% biological efficiency), while minimum yield was obtained from isolate GL-7 (11.70 g 200 g⁻¹ dry substrate, 5.85% BE). Supplementing rice bran @ 5 or 10% resulted in significant yield increase of all the isolates.

Key words: *Ganoderma lucidum*, Uttarakhand, domestication, biological efficiency, radial growth

Citation : Mishra KK and Singh RP. 2012. Evaluation of indigenous *Ganoderma lucidum* isolates of Uttarakhand for growth and yield. *J Mycol Pl Pathol* 42(1) : 136-140.

Full Paper

Standardization of Suitable Culture Media and Developing Formulation for Bacterial Antagonists to Chilli Anthracnose Pathogen, *Colletotrichum capsici*

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Abstract

Five bacterial isolates, *Bacillus subtilis* (ENB-24 and EXB-123), *B. megaterium* (ENB-86 and EXB-53) and *Pseudomonas putida* (PBA-5) were identified as potential antagonists to chilli anthracnose pathogen, *Colletotrichum capsici* based on the fruit bioassay studies. Molasses urea broth supported maximum growth of ENB-24, ENB-86 and EXB-53 isolates, while sucrose yeast extract broth was suitable for EXB-123. For *P. putida* PBA-5 isolate, tryptic soya, molasses urea and nutrient broths were suitable culture media. Talc and liquid formulations of the bacterial isolates were prepared and studied for shelf life at ambient temperature of 21-32 C and RH of 43-78% for a period of 6 to 9 months. The cfu counts of ENB-24 isolate were as per the CIB standard for seven months in both the formulations and for ENB-86 isolate, 8 months in liquid and 7 months in talc formulation. For EXB-53, PBA-5 and EXB-123 isolates, the counts were only for a period of 5, 4 and 2 months, respectively.

Key words: Chilli anthracnose, *Colletotrichum capsici*, *Bacillus subtilis*, *Bacillus megaterium*, *Pseudomonas putida*, mass production, formulation.

Citation: Ramanujam B, Basha Honnur, Hemannavar Vinaya, Chowdappa P and Rangeshwaran R. 2012. Standardization of suitable culture media and developing formulation for bacterial antagonists to chilli anthracnose pathogen, *Colletotrichum capsici*. J Mycol Pl Pathol 42 (1) : 141-145.

Full Paper**Production, Partial Purification and Characterization of Extra -cellular β -1, 3-glucanase from *Chaetomium globosum* and its Antifungal Activity against *Bipolaris sorokiniana* causing Spot Blotch of Wheat****S Khayum Ahammed¹, Rashmi Aggarwal, Sapna Sharma, Sangeeta Gupta and BM Bashyal**

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Abstract

An extracellular β -1, 3-glucanase produced by *Chaetomium globosum* (Cg 2) was purified and characterized after standardization of its production at different culture conditions. β -1, 3-glucanase activity was maximum 9 days after incubation at pH 5.5 and 30C in a medium amended with laminarin @ 1mg ml⁻¹ as carbon-source and NH₄NO₃ @ 0.25% as nitrogen source. The Cg 2 was grown under optimum culture conditions and the enzyme was partially purified to homogeneity by gel filtration on Sephacryl S-200 column. The enzyme showed 8.70 purification fold with 19.14 units mg⁻¹ specific activity. Analysis of enzyme by SDS-PAGE revealed a single band of molecular mass 29 kDa. The temperature optima of purified β -1, 3-glucanase was 40 C and it was optically active at pH 5. This partially purified glucanase fraction at 100 μ g ml⁻¹ inhibited 93.5% conidial germination of *Bipolaris sorokiniana*, the wheat spot blotch pathogen whereas, the culture filtrate could inhibit conidial germination only up to 59.9%. Thus, *C. globosum* - Cg 2 could be a potential biocontrol agent for spot blotch of wheat.

Key words: β 1, 3-glucanase, *Chaetomium globosum*, purification, characterization

Citation: Ahammed SK, Aggarwal R, Sharma S and Bashyal BM. 2012. Production, partial purification and characterization of extra - cellular β -1, 3-glucanase from *Chaetomium globosum* and its antifungal activity against *Bipolaris sorokiniana* causing spot blotch of wheat. *J Mycol Plant Pathol* 42(1) : 146-152.

Full Paper

Symptoms and Losses Caused by Onion Yellow Dwarf Virus and Iris Yellow Spot Virus Diseases of Onion Crop in Northern India

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Abstract

Production of bulb and seed crop of onion (*Allium cepa* L.) is hampered by onion yellow dwarf virus (OYDV) and iris yellow spot virus (IYSV) with incidence of 83.2% and 89.9% in bulb crop and 90.6% and 88.2% in seed crop, respectively in the popularly grown cv. Hisar-2. Four symptoms-based variants of OYDV designated as grade A, B, C and D produced varied types of symptoms in onion crop incurring heavy losses in bulb and seed production. IYSV caused tiny yellow coloured spots of different shapes and sizes on leaves and scapes which later coalesced leading to drying and lodging of scapes. The plant height, bulb weight and bulb size were reduced due to both viral diseases in bulb crop. The plant height and yield parameters viz., weight of umbel, number, seed weight in umbel and seed yield of plant were greatly reduced by the infection of OYDV grade A in seed crop. However, the seed quality parameters viz., test weight, germination and seed vigour index were highly affected due to infection of IYSV, because there was drying and lodging of seed crop before seed maturation.

Key word: *Allium cepa*, OYDV, IYSV, symptoms, losses

Citation: Kumar Pawan, Dhawan Poonam and Mehra Rakesh. 2012. Symptoms and losses caused by Onion Yellow Dwarf Virus and Iris Yellow Spot Virus diseases of onion crop in northern India. *J Mycol Pl Pathol* 42 (1): 153-160.

Full Paper

Detection and Management of Seed-borne Toxigenic *Fusarium verticillioides* by Plant Alkaloids

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Abstract

Seed samples of paddy, maize and sorghum were collected from different agro climatic regions of Karnataka. All the seed samples were subjected to standard blotter method for the isolation of *Fusarium* sp. that were morphologically identified, recorded. Most seed samples (34 of 36) were infected with *Fusarium verticillioides* and its incidence varied between 1 to 11%. The morphological identity of *F. verticillioides* was further confirmed using polymerase chain reaction. Two sets of primers, one for *F. verticillioides* species- specific and the other specific to fumonisin - producing *F. verticillioides* were employed. Aqueous extract, different solvent extracts and isolated constituents (alkaloid extract) of *Prosopis juliflora* (a weed plant) was tested for antifungal activity against toxigenic and non- toxigenic *F. verticillioides*. All the extracts recorded significant fungitoxicity against both the strains. The comparative evaluation of antifungal activity of the alkaloid extract from *P. juliflora* with chemical fungicides Blitox (copper oxychloride), Hexastop (thiophanate – methyl), Jatayu (chlorothalonil) and Bavistin (carbendazim) revealed that the alkaloid extract was highly effective at low concentration (300µg ml⁻¹) compared to chemical fungicides (2000µg ml⁻¹).

Key words: *Fusarium verticillioides*, *Prosopis juliflora*, antifungal activity

Citation: Deepa N, Chandra Nayaka S, Udaya Shankar AC, Vijay Krishna Kumar, Niranjana SR, Prakash HS and Raghavendra MP. 2012. Detection and management of seed-borne toxigenic *Fusarium verticillioides* by plant alkaloids. *J Mycol Plant Pathol* 42 (1): 161-166.

Full Paper

Cultural, Morphological and Yield Attributes of Winter Mushroom *Flammulina velutipes* (Curt. Fr.) Sing.

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Abstract

Flammulina velutipes is one of the least exploited mushroom species in India. Out of the total world mushroom production, only 4.6% is contributed by *F. velutipes*. It has been domesticated on locally available agro-wastes. The highest mycelium growth was observed on malt extract agar medium at 25 C and at slightly acidic-alkaline pH 6.0 for isolate Fv 1 and pH 8.0 for isolate Fv 2. Among the different grains used for spawn preparation, wheat grains were found most suitable as it took minimum time period (17 d). Various substrates, wheat straw (WS), maize straw (MS) and saw dust (SD) were evaluated either alone or along with supplementation of 5 or 10% wheat and rice bran for cultivation of *F. velutipes*. Wheat straw supplemented with 10% wheat bran resulted in higher yield (593 g 500 g⁻¹ dry substrate; BE 118%) in case of isolate Fv 1, however, WS supplemented with 10% rice bran gave maximum yield (695 g 500 g⁻¹ dry substrate; BE 139%) in case of isolate Fv 2.

Key words: *Flammulina velutipes*, physiological requirements, substrate, mushroom, cultivation, basidiomycetes

Citation: Mishra KK, Mishra Prachi and Kushwaha KPS. 2012. Cultural, morphological and yield attributes of winter mushroom *Flammulina velutipes* (Curt. Fr.) Sing. *J Mycol Pl Pathol* 42 (1): 167-171.

Short Communication**A New Record of *Boletus fallax* from India****Abhishek Pyasi, K K Soni and R K Verma***Forest Pathology Division, Tropical Forest Research Institute P.O. RFSE Jabalpur-482021, MP, India. e-mail: rkverma28@rediffmail.com*

Key words : *Boletus, mycorrhiza, sal forest***Citation :** Pyasi A, Soni KK and Verma RK. 2012. A new record of *Boletus fallax* from India. *J Mycol Pl Pathol* 42 (1) : 172-173.

Short Communication**First Report of *Metarrhizium anisopliae* (Metchnikoff) Sorokin on Cowpea Aphid (*Aphis crassivora* Koch) (Homoptera: Aphididae) from North East India****JR Pegu, Pranab Dutta, KC Puzari, PD Nath and P Das¹**

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Key words: *Aphis crassivora*, *Metarrhizium anisopliae*

Citation: Pegu JR, Dutta P, Puzari KC, Nath PD and Das P. 2012. First report of *Metarrhizium anisopliae* (Metchinkoff) Sorokin on cow pea aphid (*Aphis crassivora* Koch) (Homoptera: Aphididae) from North East India. *J Mycol Pl Pathol* 42 (1) : 174-175.

Short Communication**A New Species of *Passalora* from India****V S Dadwal, Savitri Bhartiya and R K Verma**

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Key words: *Passalora*, *Emblica officinalis*, new species**Citation:** Dadwal VS, Bhartiya S and Verma RK. 2012. A new species of *Passalora* from India. *J Mycol Pl Pathol* 42 (1) : 176-178.