

University of Agricultural and Horticultural Sciences, Shivamogga

M. Sc. (Agri.) theses abstracts produced in the
Department of Plant Pathology

1. Studies on Sheath Blight of Rice (*Oryza Sativa* L.) Caused by *Rhizoctonia Solani* Kuhn.

KISHOR UMESH KAMATAGI

ABSTRACT

Rice is the staple diet of over 60 per cent of the world's population. Sheath blight of rice once a minor disease now has been considered as one of the major constraint in all most all rice growing areas. Survey conducted during 2013-14 revealed that maximum sheath blight incidence was recorded at Bhadravati (28.74%) and least incidence was recorded at Soraba (7.11%). *In vitro* studies revealed that amongst different solid and liquid media used, the fungus grew rapidly on PDA and potato dextrose broth (PDB) respectively. The maximum dry mycelial weight was observed on PDB on 13th DAI. Temperature of 25° C was best for the growth of *R. solani*, least growth was observed at temperature 15 C and 30° C was found favourable for production of sclerotia. *In vivo* screening of 49 rice germplasm against *R. solani*, of which three germplasm were found resistant with grade 1. Among 24 paddy cultivars screened against *R. solani*, none of the cultivars were immune or resistant.

In vitro evaluation of bio-agents and botanicals against *R. solani* revealed that *Trichoderma viride* (IIHR, strain) (70.83%) and *Pseudomonas fluorescens* (IIHR strain) (56.00 %) and *Gliricidia maculata* (27.04%) respectively found most effective. *In vitro* evaluation of eight fungicides against *R. solani* revealed that, hundred per cent inhibition was seen in carbendazim, propiconazole, hexaconazole, thiophanate methyl, carbendazim 12% + mancozeb 63%. *In vivo* integrated disease management revealed that among different treatments used, least disease severity (18.52 PDI) was recorded in hexaconazole treated plot with highest yield of 4375.00 kg ha⁻¹ and maximum disease severity (40.74 PDI) was observed in vermicompost treated plot yield of 3765 kg ha⁻¹ compared to untreated control plot yield of 3666.67 kg ha⁻¹.

June, 2014

(Ganesha Naik, R.)
Major Advisor

2. Studies on Alternaria Leaf Blight of Sunflower Caused by *Alternaria Helianthi* (Hansf.)

Tubaki and Nishihara

MAHADEVASWAMY, G.

ABSTRACT

Sunflower is one of the important oilseed crop grown in India. This crop is affected by several diseases among mem Alternaria leaf blight is one of the most important disease caused by *A. helianthi*. During the survey highest disease severity was recorded in Chithradurga (43.75%) followed by Davanagere (39.25%). The different isolates were categorized into four group's viz., *Ah-1* *Ah-2*, *Ah-3* and *Ah-4* based on their morphological characters. Among them Hiriyr isolate produced maximum radial growth followed by Challakere isolate, with grayish black to light brown mycelial colony on Potato Dextrose Agar medium. During cultural studies Carrot medium supported maximum mycelial growth of all the isolates both on solid as well as on liquid medium. During nutritional studies maltose as a carbon source and Asperagine as a nitrogen source supported the maximum dry mycelial weight.

During physiological studies the temperature of 30° C and pH 5 has favoured good growth and development of all the isolates. The epiderniological studies revealed that among the weather parameters, maximum temperature and maximum relative humidity (morning) showed positive correlation with disease development. *In vitro* evaluation of fungicides revealed mat, Hexaconazole and Propiconazole at 600 ppm showed 100 per cent inhibition of mycelial growth whereas among the bio pesticides NSKE at 10 per cent, and *T. hanianum* were induced maximum reduction in colony growth. Fungicides and bio-pesticides tested under field condition revealed that Hexaconazole at 0.1 percent and a combi product Carbendazim+Mancozeb at 0.1 per cent were found to be the most effective chemical in managing the disease as well as in increasing the yield.

June 2014

Department of plant pathology
UAHS, Navile, Shimoga.

(B. Gangadhar Naik)
Major Advisor

3. Studies on Stern Rot of Tuberose (*Polianthes Tuberosa* L.) Caused by *Sclerotium Rolfsii* Sacc.

DIVYA BHARATHI, A.R.

ABSTRACT

Tuberose (*Polianthes tuberosa* L.) is a leading commercial flower crop, because of its multipurpose uses. Stem rot disease caused by *Sclerotium rolfsii* Sacc. has become threat for successful flower production, under severe condition the losses go up to 50-60 per cent. In present investigation attempts were made to study the symptoms of the disease, identification of the pathogen, survey on disease incidence, cultural, physiological and nutritional studies of pathogen, in vitro evaluation of different fungicides and integrated disease management practices against stem rot. The pathogen isolated from stem of diseased tuberose plant and was identified as *Sclerotium rolfsii* based on its cottony white radiating mycelium and formation of brown colour sclerotial bodies in petri dish. The pathogenicity of the fungus was confirmed on healthy plant under in vivo. Maximum per cent disease incidence (35.2) was recorded in Harnalli village of Shimoga.

Among solid media tested maximum growth was observed on Oat meal agar and Potato dextrose agar (90 mm.), among liquid media tested dry mycelial weight was maximum on Corn meal broth (224.33 mg.), the fungus attained maximum growth on 10th day after inoculation in Potato dextrose broth (213.13 mg). Continuous light favoured maximum dry mycelial weight, temperature range of 25°C to 30°C was found to be optimum; maximum growth of the fungus was obtained at pH 5.0. Sucrose recorded maximum dry mycelial "weight among different carbon sources and potassium nitrate among different nitrogen sources tested. Among systemic fungicides Hexaconazole found effective at all the concentrations, Mancozeb was found effective among contact fungicides. Under field condition least disease incidence (10.66%) was recorded on plants treated with treatment combinations of *Trichoderma viride*, Press mud and Carbendazim with maximum plant height (127.18 cm), more number of flowers per plant (50), weight often flowers (17.20 g.) and maximum yield (7858.8 kg/ha.).

June 2014

(H. Narayana Swamy)
Major Advisor

4. Investigations on Root-Knot Nematode (*Meloidogyne Graminicola* Golden and Birchfield, 1965) of Rice (*Oryza Sativa* L.)

NARASIMHAMURTH

ABSTRACT

Of late, *Meloidogyne graminicola* is a serious menace in all types of rice situations and causes yield loss of 16-32 per cent. Investigations were carried out during 2013-14 on survey for the incidence of *M. graminicola* in rice growing areas of Shimoga and Davanagere districts, invasion studies, screening of 20 germplasm against *M. graminicola* and integrated management of *M. graminicola* using bioagents viz., *Trichoderma viride*, *Paecilomyces lilacinus*, *Pseudomonas fluorescens* and *Pochonia chlamydosporia*, organic amendements viz., neem cake and poultry manure, combination of nematicide with bio-agent viz., carbofuran+ *Trichoderma viride*, carbofuran+ *Pseudomonas fluorescens* and nematicide carbofuran alone under field conditions.

The survey revealed maximum nematode population both in soil and root samples in Shimoga, Bhadravathi, Sagara, Davanagere and Honnali taluks with root-knot index ranging between 3 and 4. In invasion studies, 2nd stage juveniles were attracted to roots and moved towards the root tip within 24 hrs after inoculation and within 48 hrs, entered into the root system and started feeding. Among twenty germplasm tested against *M. graminicola*, the entry KMP-179 recorded least root-knot index of 1.6 indicating that the disease intensity was very mild to mild thus, it was resistant to *M. graminicola*. Among various treatments tested, the maximum plant height, better root length, root volume, root weight and maximum yields were observed in *P. fluorescens* + carbofuran treated plots followed by *T. viride* + carbofuran and carbofuran alone. The maximum reduction in nematode population of soil as well as roots, number of galls per root system and least number of egg masses per root system were noticed in *P. fluorescens* + carbofuran compared to other treatments.

June 2014

(H. Ravindra)
Major Advisor

5. Studies on Anthracnose of French Bean (*Phaseolus Vulgaris* L.) Caused by *Colletotrichum lindemuthianum* (Sacc.Andmagn.) Scriber

BHAGAVATHI DEVI, D.

ABSTRACT

French bean (*Phaseolus vulgaris* L.) is also called as dwarf kidney bean where in immature bean pods are eaten as a 'vegetable' or as 'dry seeds' (Rajmah). It is an important food legume crop and provides an essential part of the daily diet. This crop is affected by several diseases among them Anthracnose is one of the most important disease caused by *Colletotrichum lindemuthianum* (Sacc. & Magn.) Scriber. During the survey highest disease severity was recorded in Shivamogga district (26.2%) followed by Davangere district (15.03%). The fungus collected from different locations were categorized into four groups viz., Cl1, Cl-2, Cl-3 and Cl-4 based on their morphological characters.

Among them Hosanagara isolate produced maximum radial growth (81.00 mm) followed by Savalanga (79.00 mm) isolate with brownish white mycelial colony on Potato Dextrose Agar Medium. The results obtained during screening of various genotypes of French bean revealed that, among thirty one genotypes screening eight lines were resistant, ten were moderately resistant, seven were susceptible and six of the genotypes were found to be highly susceptible category. *In vitro* evaluation of fungicides revealed that, mancozeb inhibited cent per cent mycelial growth at 400 and 800 ppm. Among the systemic fungicides, azoxystrobin recorded cent per cent (100%) mycelial inhibition at all the concentrations of 50, 100, 200 and 400 ppm. Among the biocontrol agents, the maximum inhibition of *C. lindemuthianum* was observed in *T. harzianum* (72.44 %). Among fungicides and bio-agents tested under field conditions revealed that captan + azoxystrobin at 0.05 per cent, azoxystrobin alone spray at 0.05 per cent, were found to be the most effective chemicals in managing the disease which helps to increase in the yield of the crop.

June, 2015

(H. Narayana Swamy)
(Major advisor)

6. Studies on Epidemiology and Management of Coffee Leaf Rust Caused by *Hemileia vastatrix* (Berkeley and Broome)

SHRINIDHI BHARATHISHA NAVILEKAR

ABSTRACT

In India, coffee is cultivated as an important commercial crop which is cultivated in an area of 4,15,341 ha. The major disease threatening the coffee cultivation is leaf rust caused by *Hemileia vastatrix* (Berk. and Br.). The roving survey on coffee leaf rust carried out during November-December 2014 revealed that, the disease occurrence varied from moderate to severe infection with the disease severity ranging from 9.40 to 47.83 per cent. The highest mean disease severity was recorded in Kodagu district (22.44 PDI). However, the lowest disease severity of 13.82 PDI was observed in Shivamogga district. The epidemiological studies revealed that, lower disease severity was recorded during the month of April to June. Whereas, peak disease severity was recorded during the month of December 2014.

The mean minimum temperature had significant ($P=0.01$) negative correlation with disease incidence. Screening of varieties against coffee leaf rust revealed that, out of six *Coffea arabica* genotypes, three genotypes (Sln 5b, Sln 9 and Sln 13) were found to have resistance against *Hemileia vastatrix* (Berk. and Br.) whereas, Sln 3, Sln 6 and Sln 12 were found to be susceptible. The studies on variability of the pathogen indicated that, the isolates CHKM-1 and CHKM-2 were yellow in color remaining all the isolates were orange in color. All the isolates observed were reniform in shape and were echinulated. Evaluation of bacterial antagonists against *Hemileia vastatrix* (Berk. and Br.) under *in vitro* condition revealed that, treatment with *Bacillus subtilis* recorded less uredospore germination (20.03%) compared to *Pseudomonas fluorescens* (22.41%) at the higher concentrations (1×10^9 cfu/ml) tested. Among the different fungicides used against coffee leaf rust, Thifluzamide 24 SC at 1 ml/litre concentration was found to be more effective in managing the disease and found on par with Bayleton at 1 gm/litre and Oxycarboxin at 1 gm/litre.

July, 2015

(H. Narayanaswamy)
Major Advisor

7. Studies on Pathogenicity and Management of Stem Rot of Tomato (*Lycopersicon Esculentum* Mill.) Caused by *Sclerotium Rolfsii* Sacc.

NANDASHREE, R.

ABSTRACT

Tomato (*Lycopersicon esculentum* Mill.) is one of the most popular and widely grown vegetable crops of both tropics and subtropics of the world, belonging to the family Solanaceae. Stem rot disease, caused by *Sclerotium rolfsii* has become severe threat for successful tomato production. The pathogen isolated from the stem of the diseased tomato plant was identified as *Sclerotium rolfsii* based on its mycelial and brown coloured sclerotial bodies formation in PDA media. The pathogenicity was confirmed by inoculating the pathogen on healthy plant under *in vivo*. During survey, maximum disease incidence of 27.5 per cent was recorded in Mallapura village of Shivamogga whereas, minimum disease incidence of 9.80 per cent was recorded in Karalahalli village of Davanagere district. Among the cultivars screened against *S. rolfsii* in sick pot, most of the cultivars showed highly susceptible reaction. Whereas few of them showed moderately susceptible and resistant reaction. In case of inoculum density studies all the inoculum levels was found to cause disease in plants.

Maximum percent disease was recorded in the plants inoculated with 5 sclerotial bodies. Among the systemic fungicides, Hexaconazole was found to be effective in inhibiting mycelial growth of *Sclerotium rolfsii* at all the concentrations (100, 150, 200 and 250 ppm) tested. Combi products viz., Avatar and Nativo were found effective at all the concentrations, whereas, the contact fungicide, Mancozeb was found to be effective only at higher concentrations (500 and 1000 ppm). Among the bio-agents, *Trichoderma harzianum* was found to be most effective in inhibiting mycelial growth of *S. rolfsii*. Among the plant extracts, *Azadirachta indica* both at 5 and 10 per cent concentration showed significant inhibition of mycelial growth of *Sclerotium rolfsii* under *in vitro* condition. Under field conditions, least incidence of the disease was observed with soil application of enriched *P. fluorescens* + *T. harzianum* + Neem cake along with higher yield.

June 2015

(B. Gangadhara Naik)
Major Advisor

8. Studies on Frog-eye Leaf Spot of FCV Tobacco (*Nicotiana tabacum*) Caused by *Cercospora nicotianae* ELL. and EVE.

PUNITKUMAR N D

ABSTRACT

Frog eye leaf spot is an important disease in tobacco both in nursery and main field. The severity of the disease was ranged from 8-32 PDI recorded during survey. The disease intensity was more in Belenahalli, Nandi and Palvanahally village of Chikamagaluru and Davanagere districts. The identity of the fungus was confirmed as *Cercospora nicotianae*. The fungus showed maximum growth on PDA on 18th day after incubation room temperature. The fungus which exhibited diversity with respect to cultural character like type of the growth, mycelial color and sporulation. The maximum growth was recorded on Oat meal agar, Host extract PDA, and Czapek's (dox) agar. The highest dry mycelia weight of the fungus was recorded at 20-30°C with optimum pH of 5 to 6. Among carbon sources, fructose, dextrose and lactose, served as best for growth of *C. nicotianae* and ammonium nitrate, ammonium chloride and potassium nitrate were better nitrogen source for *C. nicotianae* growth.

Among Systemic fungicides-Hexaconazole, Carbendazim, Propiconazole; non-systemic fungicides Captan and Chlorothalonil and Combi-products like Nativo G and companion were showed superior in inhibiting the mycelia growth of the fungus under in vitro condition. The bio-efficacy of fungicides which performed well under in vitro condition were tested in vivo condition as well. Among them, lowest disease severity and maximum cured leaf yield were obtained by spraying of 0.1 o/o Carbendazim (26%o and 1616 kg/ha), Hexaconazole (29.15 o/o and 1112 kg/ha) and Propiconazole (31.75 o/o and 1161 kg/ha) respectively over control. The C: B ratio and Top grade equivalent (TGE) was obtained in Carbendazim treated plot. Among 25 genotypes, FCR-26, FCJ-16, FCJ-19 and FCI-24 showed resistant reaction while other 21 genotypes showed susceptible reaction under field condition.

July, 2015

(C. Karegowda)
Major Advisor

9. Investigations on Sheath Rot of Paddy Incited by *Sarocladium oryzae* (Sawada) Gams and Hawksworth

SHIVAPRAKASH V PATILHIREMATH

ABSTRACT

Rice (*Oryza sativa* L.) is the important cereal crop grown throughout the world. It is staple food crop of 60 per cent of world's population. Rice suffers from many of the disease. Sheath rot of rice is prevailing in all rice growing countries worldwide in recent decades. The disease was noticed in all the surveyed locations of Shivamogga and Davanagere districts. This study revealed that highest per cent disease incidence (39.09) and highest per cent disease index (24.71) was recorded in Teerlhahalli taluk of Shivamogga district correspondingly, the lowest percent disease incidence (1.62) and lowest percent disease index (2.09) was recorded in Shikaripura taluk of Shivamogga district. The fungus on PDA produced white to pale orange mycelium, verrucate conidiophores with conidia single celled, hyaline and straight cylindrical. Pathogenicity of the fungus was done with single grain insertion method with rice seeds incubated in fungal culture. The maximum dry mycelial weight of *S. oryzae* was observed after 24 days of incubation on PDB (293.27 mg). In case of solid media maximum radial growth of the fungus (8.70 cm) was recorded on oat meal agar whereas least on Sabouraud's dextrose agar (5.20 cm). However, among the liquid media maximum dry mycelial weight (368.67 mg) was recorded on oat meal broth and least weight on Sabouraud's dextrose broth (154.23 mg). Based on the colony diameter, maximum colony diameter (7.17 cm) was noticed in Balekatte isolate and least growth was observed in Harnkoppa isolate (5.40 cm). Out of twenty nine genotypes used for screening 6 genotypes viz., Intan, Hemavathi, KHP- 9, KHP-10, KHP-11 and Sharavathi Showed resistant reaction. 10 genotypes showed moderately resistant reaction. The management of sheath rot using different fungicides and botanicals in vivo indicated that the spraying of propiconazole @ 0.1 per cent was significantly most effective and recorded higher yield followed by carbendazim @ 0.1 per cent. Marigold leaves applied (1 kg/m² area) plot was found to be least effective.

July, 2015

(H. Ravindra)
Major Advisor

10. Studies on Root-Knot and Wilt Complex in Black Pepper (*Piper Nigrum* L.) Caused by *Meloidogyne Incognita* (Kofoid And White) Chitwood and *Fusarium Solani* (Mart.) Sacc.

SOUMYA, D.M.

ABSTRACT

Black pepper (*Piper nigrum* L.) is the major spice crop in agricultural commodities of commerce and trade in India. The major constraint for the cultivation of black pepper is by root knot nematode and wilt complex diseases are severe one. The disease was noticed in all the surveyed locations of Shivamogga district during 2014-15. The severity of disease complex was more in Hosanagara taluk followed by Soraba and Thirthahalli taluk and minimum disease incidence was recorded in Shivamogga taluk. The present survey results also indicated that high frequency of occurrence of both the pathogens from soil and root samples collected from Hosanagara taluk. Pathogenecity of nematode was proved by using different inoculum levels under glass house condition. Inoculation of 10,000 juveniles per plant recorded least plant growth parameters and maximum number of galls (150.4), egg mass per plant (90.20) eggs per egg mass (352.20) and Root knot index (4.40). It was observed that, there was reduction in the plant growth as the inoculum density increased.

In the interaction studies, *Meloidogyne incognita* was the most aggressive pathogen compared to *Fusarium solani*. However, plants receiving *Meloidogyne incognita* seven days prior to inoculation of *Fusarium solani* recorded least growth and more disease incidence followed by simultaneous inoculation of *M. incognita* and *F. solani* over untreated control. These results indicate that the nematode can predispose black pepper to infection by *F. solani* and can aggravate the disease. Nine black pepper varieties were considered for their resistant reaction against *M. incognita* and *F. solani* under field condition. Among nine varieties Panniyur-1 grafted on *Piper colubrinum* recorded least number of galls (0.00), RKI (1.00), nematode population (115.33) and *Fusarium* population (6.33) and showed higher resistance reaction against the disease complex. 'Pournami' showed resistant reaction against wilt complex whereas, 'Panchami' and 'Karimunda' varieties showed moderately resistant reaction.

July, 2015

(H. Ravindra)
Major Advisor

11. Studies on Stem Rot of Groundnut (*Arachis hypogaea*L.) caused by *Sclerotium rolfsii* Sacc.

SUNILKUMAR

ABSTRACT

Groundnut [*Arachis hypogaea*L.] is an important oilseed crop of India and is cultivated in both tropical and sub tropical regions of the world. Stem rot of groundnut caused by *Sclerotium rolfsii* Sacc has become a major constraint in groundnut production. Survey for stem rot disease incidence revealed that, maximum disease incidence (37.52%) was recorded in Shivamogga, whereas least incidence (35.82%) was observed in Davanagere district. After isolation and characterization of pathogen isolates, the isolates were categorized into five groups viz., SrS, SrH, SrHA, SrHR and SrSH based on their location of occurrence. Among them, SrH isolates produced maximum mycelial growth (80.00mm) and least was recorded by SrHA isolate (60.60mm) with white cottony growth on potato dextrose agar medium. During cultural studies, potato dextrose agar supported maximum mycelial growth of all the isolates both on solid as well as on liquid medium. Development of sclerotial bodies per plate was ranged from 243.70 to 306.00, whereas sclerotial bodies colour was ranged from light to dark brown.

Among the systemic fungicides, hexaconazole, propiconazole, difenconazole and combi products viz., Avatar, Nativo and Companion were found to inhibit the mycelial growth upto 100% at all the concentration tested, whereas among the contact fungicides, mancozeb was found to be effective only at higher concentrations (600 ppm). Among the bio-agents tested, *Trichoderma harzianum* was found to be most effective in inhibiting the mycelial growth of *S.rolfsii* (63.81%). Among botanicals, *Ageva americana* extract was completely inhibited the mycelial growth of *S.rolfsii*. Under field conditions, least disease incidence (13.43%) was observed in soil application of neem cake + *T. harzianum* with higher pod yield (1438.16 kg/ha) followed by neem cake + *P.fluorescens* (13.81%) with a pod yield of 1397.74 kg/ha respectively.

June, 2015

(Ganesha Naik. R)
Major Advisor

12. Investigations on Wilt Complex Incited by *Meloidogyne* and *Fusarium* in Gerbera under Protected Cultivation

SARITHA, A. G.

ABSTRACT

Gerbera (*Gerbera jamesonii* Hook) is very popular and widely used as a decorative garden plant or as cut flowers. The major constraint for the cultivation of Gerbera is due to wilt complex incited by root knot nematode and *Fusarium oxysporum* f. sp. *gerberae*. The disease was noticed in all the surveyed locations of Shivamogga district during 2015-16. The severity of wilt complex was more in Shivamogga taluk followed by Sagara and Hosanagara taluks and minimum disease incidence was recorded in Shikaripura taluk. The present survey results also indicated the high frequency of occurrence of both the pathogens from soil and root samples collected from Shivamogga taluk. Screening of different popular genotypes of gerbera against *M. incognita* and *F. oxysporum* f. sp. *gerberae* wilt complex showed that, the genotype Goliath registered least number of galls, root-knot index and per cent disease incidence as compared to other genotypes indicating its resistance against the wilt complex. Dana Ellen has showed susceptible reaction, while, Stanza and Balance were found to be moderately resistant. The remaining genotypes viz., Primrose and Shimmar were found to be moderately susceptible. In the interaction studies, *M. incognita* was the most aggressive pathogen compared to *F. oxysporum* f. sp. *gerberae*. However, plants receiving *M. incognita* seven days prior to inoculation of *F. oxysporum* recorded least growth followed by simultaneous inoculation of *M. incognita* and *F. oxysporum* over untreated control. These results suggest that the nematode can predispose gerbera to infection by *F. oxysporum* and can aggravate the disease. Studies on integrated management of root-knot and wilt complex of gerbera under protected cultivation revealed that all the treatments registered increased plant growth parameters, reduced nematode parameters and per cent disease incidence as compared to the untreated control. These plant growth parameters, nematode parameters and per cent disease incidence of gerbera in various treatments differed significantly. However, treatment with *Trichoderma harzianum* + *Paecilomyces lilacinus* + vermicompost was found to be superior over other treatments followed by treatment with *T. harzianum* and treatment with *P. lilacinus*.

June, 2016

(H. Ravindra)
Major Advisor

13. Investigations on Early Blight of Tomato Incited by *Alternaria Solani* (Ellis and Martin)

Jones and Grout.

MAHANTESH BALAGAR

ABSTRACT

Tomato (*Lycopersicon esculentum* Mill.) is one of the most popular and widely grown vegetable crop of both tropics and subtropics of the world, belongs to the family Solanaceae. This crop is affected by several diseases among them *Alternaria* leaf blight is one of the most important disease caused by *Alternaria solani*. The disease severity was more in Nyamati village (Honnali taluk) of Davanagere district (47.25 %) and Kommanal village (Shivamogga taluk) of Shivamogga districts (42.50 %). *A. solani* was isolated from the leaf samples collected during survey of 2015-16. Cultural studies revealed that, the growth of the fungus was maximum on Potato dextrose Agar (88.90 mm) and maximum dry mycelial weight (493.00 mg) was observed in Potato dextrose broth. The optimum temperature for the growth of the fungus was ranged 25 °C to 30 °C. The maximum dry mycelial weight was obtained at pH 6.5 (690.17 mg) to 7.0 (649.83 mg).

In vitro evaluation of fungicides revealed that, 1000 ppm concentration of mancozeb (88.42 %), propiconazole (90.58 %) and carbendazim + mancozeb (88.07 %) maximum Per cent inhibition. Among the bio agents, *Trichoderma harzianum* UAHS-1 (80.36 %), UAHS-2 (78.33 %) and *Trichoderma viridae* GKVK (75.56 %) were found effective against *A.solani*. Among nine plant extracts evaluated against *A.solani*, Pongamia leaf extract (54.76 %) at 10 % concentration showed maximum inhibition of the pathogen. Screening of sixteen tomato genotypes against *A.solani*, under glass house conditions revealed that, only one genotype, Arka Rakshaka was found highly resistant and other seven were showed moderate resistance and remaining eight genotypes were found susceptible. The field evaluation of fungicides, bio agents and botanicals indicated that hexaconazole at 1 % and mancozeb at 0.2 % most effective in reducing the disease severity as well as in increasing the yield.

June, 2016

(C. Karegowda)
Major Advisor

14. Studies on Fusarium Wilt of Carnation Caused by *Fusarium oxysporum* f. sp. *dianthi* Snyder and Hans., under Polyhouse Condition

KAVITA TRIYAMBAK HEGDE

ABSTRACT

Carnation (*Dianthus caryophyllus* L.) is one of the most important cut flowers in the world. It belongs to the family Caryophyllaceae. Carnation is severely affected by wilt disease caused by *Fusarium oxysporum* f. sp. *dianthi* leading to death of plants. The pathogen was isolated from infected plant and on the basis of morphological and cultural characters the fungus was identified as *F. oxysporum* f. sp. *dianthi*. The fungus produced microconidia, macroconidia and chlamydospores. Maximum radial growth (90 mm) was recorded in PDA and maximum dry mycelial weight was recorded on Oat meal broth (441 mg). In sporulation studies, excellent sporulation was recorded in Czapek's Dox broth, at 30°C temperature and 6.0 pH. Further maximum conidial germination was observed in 2 % sucrose, 25⁰C temperature and 6.0 pH. Screening of seven genotypes (Trinidad, Pingu, Amos, Loris, Vincidar, Hunza and Soto) were carried out in polyhouse, among seven none of the varieties were found immune or resistant or moderately resistant.

Under *in-vitro* evaluation of bio-agents *Trichoderma harzianum* (UAHS Shivamogga) found effective in reducing the mycelial growth (64.44%). Among the six plant extracts evaluated garlic extracts at 10% (91.11%) found effective in reducing the mycelial growth. Among the non systemic fungicides evaluated Chlorothalonil, Mancozeb found effective in inhibiting the growth of fungus at 1000ppm. Among systemic fungicides Carbendazim, Propiconazole and Difenconazole found effective in inhibiting the growth of fungus in all tested concentrations. 12 treatments were imposed in polyhouse condition against *F. oxysporum* f. sp. *dianthi*. Among 12 treatments Carbendazim at 30 DAP and Propiconazole at 30 DAP were found effective in reducing the wilt incidence and also helped to increase the yield (number of flowers).

June, 2016

(H. Narayanaswamy)
Major Advisor

15. Studies on Purple Blotch of Onion (*Allium cepa* L.) Caused by *Alternaria porri* (Ellis) Ciferri.

KAVITHA S. VEERAGHANTI

ABSTRACT

Onion (*Allium cepa*) is one of the important vegetable crop commercially grown across India. The production of bulbs and seeds is limited by various plant diseases. Among the diseases, one of the most serious disease is the purple blotch caused by *Alternaria porri* (Ellis) Cif. The disease causes extensive damage to bulbs and hinder seed production. Survey carried out during *kharif Rrabi* 2015 revealed that, the highest per cent disease index (68.50) was recorded in Sokke village of Chikkamagaluru district. Whereas, the lowest PDI was recorded in Burujanaroppa (18.33 %) village of Chitradurga district. *In-vitro* evaluation of nine different fungicides against *Alternaria porri* showed that, Mancozeb and Difenconazole was found effective with a per cent mean mycelia inhibition of 99.97 and 97.33 respectively at 1000ppm concentration.

However, *In-vitro* evaluation of five different plant extracts revealed that, highest per cent inhibition (99.73) was observed with Garlic clove extract at 10 % concentration. While Marigold leaf extract proved to be least inhibitor. Among the different bio-control agents tested against *Alternaria porri*, *Trichoderma harzianum* (UAHS, Shivamogga) recorded highest inhibition of mycelia growth (83.10 %). Among the genotypes screened, only one variety Arka Kalyan showed moderate resistant reaction and other varieties *viz.*, Arka Lalima, Arka Pragati, Arka Kirthiman, and Arka Bindhu showed moderately susceptible reaction. Whereas, Arka Niketan, Arka Bhima, Satara Local and Bhima Super showed susceptible reaction. Field evaluation of fungicides, and bio-agents undertaken during *kharif* 2015 by giving five sprays at 15 days interval showed that, Difenconazole 25 EC (0.1 %) was effective in controlling the disease, among bio-agents, *Trichoderma harzianum* effectively controlled the disease along with higher yield.

June, 2016

(B. Gangadhara Naik)
Major Advisor

16. Studies on Powdery Mildew of Chilli Caused by *Leveillula taurica* (Lev.) Arn.

HAREESH, M. V.

ABSTRACT

Chilli (*Capsicum annum* L.), is an important commercial vegetable cum spice crop in India belongs to family Solanaceae. It is also called as red pepper and is grown throughout the world, under dry as well as irrigated conditions. India is a major producer, consumer and exporter of chilli. Chilli suffers from many diseases, among them powdery mildew caused by *Leveillula taurica* (Lev.) Arn. is major menace for chilli cultivation prevalent in chilli growing areas of Karnataka. Survey work revealed that, maximum disease severity was found in Chikmagalur (PDI 43.16) followed by Davanagere (PDI 40.44) districts. Whereas, least severity was recorded in Shivamogga (PDI 36.07) district.

The simple regression model has good fit for *Rabi* 2015-16 prediction of powdery mildew. The correlation studies between disease incidence and weather parameters indicated a negative relationship with all the weather parameters. Disease progress increased gradually from the date of infection (49th MW) and maximum AUDPC value (589.71) was obtained during 4th MW of 2016. Maximum 'r' value (0.1531) was observed between 50th and 51st MW. Among the seventy chilli genotypes screened under field and polyhouse conditions, none of them were found resistant. Whereas, 25 genotypes under field condition and 10 genotypes under polyhouse condition showed moderately resistant reaction respectively and rest of the lines showed either susceptible or highly susceptible reactions against powdery mildew. Among twelve treatments, spraying of Myclobutanil at 0.1 per cent concentration was found to be effective in reducing disease severity (PDI 17.37) with increased yield of 12.72 q/ha.

June, 2016

(R. Ganesha Naik)
Major Advisor

17. Studies on Management of Foot Rot of Black Pepper (*Piper nigrum* L.) Caused by *Phytophthora capsici* Leonian.

LYDIA, M THOMAS

ABSTRACT

Black pepper (*Piper nigrum* L.), the King of Spices is one of the most important spice crops cultivated in India. The cultivation and production of black pepper is limited by many diseases of which foot rot caused by *Phytophthora capsici* is the most important and serious disease. All parts of the plant are susceptible and prone to the infection at any stage of the crop creating huge losses of around 25-30%. The studies were conducted during 2015-16. The survey results revealed a maximum disease incidence of 65% in Mathodu village of Shivamogga taluk in Shivamogga district and 50% each in Kabilaseathve and Boothanakkadu villages of Chickmagaluru and Mudigere taluks respectively in Chickmagaluru district. Least disease incidence (5.00%) was recorded in Thirthahalli and Koppa taluks of Shivamogga and Chickmagaluru districts respectively. The pathogen was isolated from the infected vines and characterized and confirmed as *P. capsici* on the basis of morphological and cultural characters. Out of the eight different culture media tested on *P. capsici*, Oat meal agar, V8 Juice agar, Potato dextrose agar and Rye agar supported maximum colony diameter of 90.00 mm. Among the three antagonists evaluated under *in vitro* condition, *Pseudomonas fluorescens* was found most effective in inhibiting the mycelial growth of *P. capsici* (56.39%). Among the ten systemic and non-systemic fungicides tested, the systemic fungicide Azoxystrobin showed maximum per cent mycelial inhibition of 82.18% at all the tested concentrations (250 ppm, 500 ppm and 1000 ppm). Integrated management of foot rot in field condition revealed that soil application of *T. harzianum* (50g vine⁻¹) and *P. fluorescens* (50g vine⁻¹) along with neem cake (1000g vine⁻¹) was most effective in reducing the incidence of yellowing. Foliar infection was considerably reduced by spraying 0.3% Potassium phosphonate, followed by spray of 1% Bordeaux mixture.

June, 2016

(B. Gangadhara Naik)
Major Advisor

18. Variability and Management of Anthracnose of Mango caused by *Colletotrichum gloeosporioides* (PENZ.) PENZ. and SACC.

SAYIPRATHAP, B. R.

ABSTRACT

Mango (*Mangifera indica* L.) is commonly called as “King of fruits”. Anthracnose caused by *Colletotrichum gloeosporioides* (Penz.) Penz. and Sacc. is one of the most serious disease of mango. During the survey of 2015-16 under nurseries, maximum per cent disease index was recorded in Kolar (32.40 %) district and least was in Bengaluru Rural (21.52%) district. Among the ten isolates collected, higher radial growth was recorded in Cg-8 (88.83 mm) with medium white suppressed colony with good sporulation, whereas, least was in Cg-7 (87.17 mm) with medium white raised colony with excellent sporulation on Potato Dextrose Agar. On Potato Dextrose Broth, maximum dry mycelial weight was recorded in Cg-1 (608.67 mg) and least was in Cg-3 (584.33 mg). Among six temperature levels, Cg-4 recorded maximum radial growth (88.00 mm) with good sporulation and least was in Cg-6 (85.67 mm) with moderate sporulation at 25°C. The maximum radial growth of 88.33 mm was recorded at continues 12 hours light and 12 hours of darkness in Cg-10 isolate with good sporulation, whereas, least was in Cg-3 (83.83 mm) with moderate sporulation. Among the different pH levels, pH-6 was found to be the best for fungus growth and maximum dry mycelial weight was recorded in Cg-10 (609.33 mg) and least was in Cg-3 (582.00 mg) respectively.

Among the nutritional sources, maximum dry mycelial weight of 518.00 mg was recorded in dextrose as carbon source, 501.33 mg in potassium nitrate as nitrogen source and 490.00 mg in magnesium sulphate as sulphur source. Among eight bioagents, maximum inhibition of mycelial growth was recorded in *Trichoderma viride*-1 (69.78 %) whereas, least was in *Bacillus pumilis* (44.91 %) respectively. Among ten plant extracts, pongamia seed extract recorded maximum inhibition (79.92%) of mycelial growth and least was in agarwood leaf extract (40.08%) at 20% concentration. In vitro evaluation of four non-systemic fungicides, maximum mycelial inhibition was recorded in propineb (59.83 %) while, least was in copper oxychloride (13.31 %) at 500 ppm. Among eleven different systemic and combi fungicides, maximum inhibition of mycelial growth was recorded in trifloxystrobin + tebuconazole (82.78 %) while, least was in carbendazim + mancozeb (37.01 %) at 200 ppm. In vivo evaluation of fungicides under nursery revealed that, minimum per cent disease index of 7.50 % was recorded in 0.05% spray of trifloxystrobin + tebuconazole with 76.72 % disease reduction over control, whereas, maximum disease severity was recorded in control (32.23%).

June, 2016

(Suresha D. Ekabote)
Major Advisor

19. Investigation on Bacterial Leaf Blight of Rice (*Oryza sativa* L.) Incited by *Xanthomonas oryzae* pv. *oryzae*

BALANAGOUDA PATIL

ABSTRACT

Bacterial leaf blight (*Xanthomonas oryzae* pv. *oryzae*) is an important and one of the oldest known disease occurs in many parts of the world in epiphytic proportions and causing huge crop losses. With this economic importance survey was carried out in three districts, among them the highest per cent disease severity of 34.64 was observed in Shivamogga followed by Davanagere (30.23 PDI) and lowest disease per cent severity of 21.04 was documented in Chickamagaluru district. Five isolates were subjected to morphological and biochemical tests, all the isolates were found negative for Gram staining and spore staining, positive for capsule staining with monotrichous flagellation. Bacterial cells were small rods, cells measured with an average size of 0.25 -0.40 x 1.25- 3.00 µm. All isolates showed positive reaction for gelatine liquefaction, protein digestion, ammonia production, KOH test, catalase test, starch hydrolysis and H₂S production and negative reaction for indole production, methyl red test, nitrate reduction, Vogues-Proskauere test and production of fluorescent on King's B medium. Nutrient agar medium was significantly supported for the good growth of five isolates of pathogen followed by GYCA. Efficacy of botanicals, bioagents and chemicals were tested under *in vitro* condition against *X. oryzae* pv. *oryzae*, the results revealed that, Marigold, *Trichoderma harzianum* and Kasugamycin were superior in inhibiting growth of the pathogen. Under field condition management of disease by spraying of streptomycin (0.5g) in combination with copper oxychloride(2.5g) was effective over all other treatments with the lowest per cent disease severity of 22.33 with highest yield (56.49 q/ha) over control. Among 41 genotypes screened under field condition, none of them were found immune, where as 10 genotypes showed resistant, seven were moderately resistant, whereas remaining were susceptible to disease.

July, 2017

(C. Karegowda)
Major Advisor

20. Studies on Wilt complex in Cucumber Incited by *Fusarium oxysporum* f. sp. *Cucumerinum* (Owen) and *Meloidogyne incognita* (Kofoid and White) chitwood.

KOLI GANAPATI

ABSTRACT

Cucumber is one of the important vegetable crops, affected by many soil borne pathogens. Among them, Root-knot nematode and *Fusarium oxysporum* f. sp. *cucumerinum* (*FoC*) are major pathogens. The present study was undertaken with various aspects of cultural and morphological studies, *invitro* and *in vivo* evaluation of chemicals, bio-agents and botanicals revealed that, maximum radial growth and dry mycelial weight of *FoC* was recorded in Potato dextrose agar (90 mm) and Potato dextrose broth (326 mg) respectively. Among the nine cucumber varieties screened against wilt complex under polyhouse condition, none of the varieties showed resistant reaction. Sambar Southe and Uttam showed moderately susceptible reaction to wilt complex and Green long showed susceptible and highly susceptible reaction to root knot nematode. *In vitro* evaluation of fungicides against *FoC*, recorded hundred per cent inhibition of mycelial growth in carbendazim at all tested concentrations (0.05, 0.10 and 0.15 %). Among bio-agents, *T. viride*-II showed maximum per cent inhibition of *FoC* (72.00 %), whereas, *P. Lilacinus* showed higher juvenile mortality of *M. Incognita* (61.33%). Among seven plant extracts, turmeric (68.35 %) and garlic clove extract (65.19 %) at 15 per cent showed maximum inhibition of mycelial growth of *FoC*. The field evaluation of fungicides, bio-agents and soil amendments against wilt complex indicated that, combined application of neem cake at 200 g/m² + *P. lilacinus* at 50g/m² during sowing showed higher plant growth parameters and less nematode population with least RKI. Whereas, Carbendazim (0.1%) and Carbofuran (3G @ 0.3g a.i/m²) showed less per cent wilt incidence.

August, 2017

(H. Ravindra)
Major Advisor

21. Studies on Leaf spot and Flower Blight of Marigold Caused by *Alternaria tagetica* (Shome and Mustafee)

MAHADEV SHINDHE

ABSTRACT

Marigold (*Tagetes* spp. L.) is one of the most commonly grown and commercially exploited flower crops in India, belongs to the family Asteraceae. This crop is affected by several diseases, among them leaf spot and flower blight caused by *Alternaria tagetica* (Shome and Mustafee) is one of the most destructive disease causes severe damage to crop and quality and quantity of the flowers. Cultural and morphological studies revealed that, radial growth of *A. tagetica* was maximum on Potato dextrose agar (88.53 mm) and maximum dry mycelial weight (343.32 mg) was observed in Potato dextrose broth. Morphological characters of *A. tagetica* viz., colour of the mycelium varied from whitish to dark grey. The growth varied from flat, raised fluffy to sparse and margins varied from smooth to irregular. Among the ten genotypes screened against *A. tagetica* under polyhouse condition, none of the genotype showed the resistant reaction and three genotypes viz., Arka Agni, Arka Bangara and French Dwarf were found moderately susceptible and remaining seven genotypes showed the highly susceptible reaction to the disease. *In vitro* evaluation of fungicides revealed that, Propiconazole and Hexaconazole showed cent per cent inhibition of mycelial growth at all the tested concentrations. Among the bioagents, *Trichoderma harzianum* UAHS-1 (82.30%) and UAHS-2 (79.22%) were found effective against *A. tagetica*. Among the seven plant extracts evaluated, Garlic clove extract at 15 per cent concentration showed maximum inhibition of pathogen (75.32%). The field evaluation of fungicides, bioagents and botanicals indicated that, at 0.1 per cent of Hexaconazole and 0.2 per cent of Mancozeb found most effective in reducing the disease severity and increased the flower yield.

July, 2017

(H. Narayanaswamy)
Major Advisor

22. Investigation on Wilt complex of Betelvine Incited by *Sclerotium rolfsii* and *Meloidogyne incognita*

NANDEESHA, C. V.

ABSTRACT

Betelvine (*Piper betle* Linn.) is a perennial creeper, commercially cultivated for its economic leaves in the tropical and sub-tropical countries. Wilt disease complex incited by *Sclerotium rolfsii* and *Meloidogyne incognita* is a major constraint for the cultivation of betelvine as they cause up to 100 per cent yield losses. The disease was noticed in all the surveyed locations of Shivamogga and Davanagere districts during 2016-17. The disease incidence was more severe in Harihara taluk of Davanagere district. Individually, *S. rolfsii* was the most aggressive pathogen, while concomitant inoculation of fungi with nematode was causing more damage to the crop because of the action of nematode as predisposition factor. Among the fungicides evaluated *in vitro* against *S. rolfsii*, propiconazole, thiophanate methyl, triadimefon, difenconazole, captan, chlorothalonil, carboxin + thiram, tricyclazole + mancozeb, carbendazim + mancozeb and tebuconazole + trifloxystobin were found to be highly effective at 0.1, 0.2 and 0.3 per cent concentrations with cent per cent inhibition of mycelia growth. Among bio-agents tested *in vitro*, *Trichoderma harzianum* was found to be most effective in inhibiting the mycelia growth. Among the eight plant extracts tulsi recorded a maximum inhibition of mycelia growth at both 10 and 15 per cent concentrations. Four bioagents were evaluated against juveniles of *M. incognita* under *in vitro* condition and *Paecilomyces lilacinus* recorded the maximum juvenile mortality. Integrated management of wilt complex of betelvine with soil application of carboxin + thiram (vitavax power) at 0.2% with neem cake 1 kg/plant was significantly effective.

July, 2017

(H. Ravindra)
Major Advisor

23. Management of Bacterial Wilt of Brinjal (Mattigulla) Incited by *Ralstonia solanacearum* (Smith) Yabuchi

REVATHI, R. M

ABSTRACT

Bacterial wilt caused by *Ralstonia solanacearum* (Yabuchi) is most destructive disease of brinjal in tropical, subtropical and warm temperate regions of the world, causing heavy economic loss. In present investigations, isolation of the pathogen, biochemical characterization and pathogenicity of bacterial wilt along with evaluation of different botanicals, bioagents and antibacterial chemicals against *R. solanacearum* were conducted under laboratory condition. Screening of brinjal varieties for disease resistance and integrated disease management was carried out under field condition during *Kharif* -2016. The pathogen was isolated by serial dilution technique and characterized through cultural, morphological and biochemical characteristics. The isolated bacterium was found as Gram negative, rod shaped and the colonies on TZC medium were white with light-pinkish centre and highly fluidal producing copious slime. *In vitro* evaluation revealed that patchouli leaf extract at 20 per cent (13.00 mm), *Pseudomonas fluorescens* (20.30 mm) and copper hydroxide at 500 ppm (15.00 mm) showed maximum inhibition zone among the tested botanicals, bioagents and antibacterial chemicals. Screening of nine brinjal varieties against wilt disease under field condition showed that the varieties Arka Nidhi, Arka Anand and Arka Ashish were found resistant to reaction. In the integrated management of bacterial wilt of brinjal revealed that the highest disease reduction of 29.24 per cent was recorded in the combination of neem cake+ *P. fluorescens*+*T. harzianum*+streptomycin+copper oxychloride with higher yield of 19.27 kg/plot compared to other treatments and control.

July, 2017

(H. Narayanaswamy)
Major Advisor

24. Studies on Bacterial Leaf Stripe of Arecanut caused by *Xanthomonas campestris* pv. *arecae*

SEEMA, M. N.

ABSTRACT

Arecanut (*Areca catechu* L.) is a palm belongs to the family Arecaceae, which is grown in most parts of the tropical Asia and East African countries. Arecanut is popularly known as betel nut, due to its usage for mastigatory purpose along with betel leaves. It is cultivated as an important commercial crop across many states of India. Arecanut suffers from many biotic and abiotic stresses. Among them bacterial leaf stripe disease is one of the new emerging disease caused by *Xanthomonas campestris* pv. *arecae* that attacks the crop at an age of 3-6 years or in seedling stage itself. Survey conducted for the incidence of bacterial leaf stripe disease incidence in major arecanut growing areas of Shivamogga, Davanagere and Chickamagaluru districts revealed that, Honnali taluk of Davanagere district was found to be a hotspot for bacterial leaf stripe disease of Arecanut with 36.66 per cent incidence. During biochemical tests, ammonia production, starch hydrolysis, fluorescent test and gram staining showed negative reaction whereas, positive reaction were observed in catalase test, gelatin liquefaction, KOH test, methyl red test and hydrogen sulphide production. Neem, *Trichoderma harzianum* and Kasugamycin were found effective in inhibiting the growth of the pathogen under *in vitro* conditions. However, in field conditions Kasugamycin@ 3 mL⁻¹ treated plants showed higher disease reduction over the control.

July, 2017

(B. Gangadhara Naik)
Major Advisor

25. Studies on Root-Knot Nematode [*Meloidogyne incognita* (KOFOID and WHITE, 1919) CHITWOOD, 1949] in FCV Tobacco Growing Soils of Karnataka

ASHWINI, B. N

ABSTRACT

Root-knot nematode, *Meloidogyne incognita* is a serious menace in all tobacco growing regions leading to yield reduction of 59.4 per cent and 52.9 per cent in nursery and filed conditions respectively. Survey conducted in Shivamogga, Hassan, Mysuru and Davanagere districts during 2017-18 revealed that the incidence of root-knot nematode was noticed in all surveyed locations, with maximum incidence in Harave village of Hunsur taluk, Mysuru district and least incidence in Kattige village of Davanagere district. Among twenty two germplasm/genotypes tested against *M. incognita*, the entries FCR-50 and FCJ-35 recorded least root-knot index of 1.0 indicating that they are resistant to root-knot nematode. Two entries recorded moderately resistance reaction, seven entries were moderately susceptible, six entries were susceptible and other four entries were highly susceptible. Three bio-agents were evaluated for their efficacy in inhibition of egg hatching and juvenile mortality of *M. incognita* under *in vitro*, *Bacillus subtilis* was found to be most effective in inhibiting egg hatching and *Trichoderma harzianum* showed maximum juvenile mortality. Among the plant extracts tested under *in vitro*, Marigold leaf extract recorded minimum egg hatching and maximum juvenile mortality at all the concentrations tested and the efficacy of leaf extract increased with increase in exposure period. Management of root-knot nematodes under both nursery and field conditions by different bio-agents, vermicompost and nematicides revealed that soil application of carbofuran + vermicompost and *T. harzianum* + vermicompost were the most effective in increasing number of transplantable seedlings, green leaf yield and cured leaf yield and in decreasing RKI, number of galls, number of females and soil nematode population.

July, 2018

(H. Ravindra)
Major Advisor

26. Studies on Morphology and Eco-Friendly Management of Leaf Spot of Cinnamon Caused by *Colletotrichum gloeosporioides* (Penz.) Penz. and Sacc.

KAVYA DINESHKUMAR MASHALDI

ABSTRACT

Cinnamon (*Cinnamomum verum* Presl., Syn. *Cinnamomum zeylanicum* Blume) is one of the important tree spice in the world, belongs to the family Lauraceae. This crop is affected by several diseases among them leaf spot is one of the important disease caused by *Colletotrichum gloeosporioides* (Penz.) Penz. and Sacc. During the survey highest disease severity was recorded in Chikmagalur district (25.97 %) and least disease severity was recorded in Shivamogga district (10.96 %). Cultural and morphological studies revealed that, radial growth of *C. gloeosporioides* was maximum on Richard's agar and potato dextrose agar with colony diameter of 90.00 mm with good sporulation. Mean dry mycelial weight was maximum on Richard's broth (164.00 mg) and potato dextrose broth (160.00 mg). Morphological characters of *C. gloeosporioides* viz., colour of the mycelium varied from whitish to greyish white. The growth varied from flat to raised fluffy with regular margin. *In vitro* evaluation of bio-agents revealed that, *T. harzianum* recorded highest inhibition of radial growth of 78.42 per cent. Out of nine plant extracts tested marigold leaf extract (73.34 %) and neem leaf extract (72.34 %) at 15 per cent recorded maximum inhibition of mycelial growth of the pathogen. Among the different chemicals tested, maximum inhibition of mycelial growth was recorded in copper oxychloride (68.86 %). In pot experiment, application of 1 per cent Bordeaux mixture has recorded lowest per cent disease index of 6.60 per cent. Whereas, the results of field evaluation of different copper based fungicides, bio-agents and botanicals indicated that spray of 1 per cent Bordeaux mixture (59.21 %) was found significantly superior in reducing the disease severity.

July, 2018

(H. Narayanaswamy)

Major Advisor

27. Bio-efficacy and Molecular Characterization of Native Trichoderma Isolates of Shivamogga

MAHESHWARY, N. P.

ABSTRACT

Trichoderma is one of the most promising biocontrol agent utilized for the management of various plant pathogenic fungi and is found in almost all type of soils. Roving survey conducted to collect rhizosphere soil in Shivamogga taluk from different agricultural and horticultural crops viz., pigeonpea, tomato, arecanut, banana and forest trees such as teak and pongamia resulted in isolation of 29 *Trichoderma* isolates. Among them *T. asperellum* was found in predominant form. Cultural, morphological and molecular characterization of *Trichoderma* isolates revealed that, they can effectively utilize potato dextrose agar medium for their growth. Whereas, *Trichoderma* selective medium induced selective growth of organism with very poor growth. Most of *Trichoderma* isolates exhibited light green to dark green colony colour while reverse colony colour of most isolates varied from white to light green. The conidial shape of isolates varied from oval to round and their colour varied from olive green to green colour. Molecular characterization revealed the presence of three species viz., *T. asperellum*, *T. virens*, *T. aureoviride* in Shivamogga taluk. Bioefficacy of *Trichoderma* spp. tested under *in vitro* conditions against *Fusarium oxysporum* f. sp. *udum* and *Sclerotium rolfsii*, revealed that, *Trichoderma* can effectively suppress the growth of both plant pathogens. Compatibility studies of *Trichoderma* with fungicides showed that, *Trichoderma* was compatible with copper hydroxide, copper oxychloride, mancozeb and metalaxyl and least compatible with captan whereas, tebuconazole, propiconazole and carbendazim were incompatible. Among combi fungicides, metalaxyl-M + mancozeb was found to be highly compatible whereas azoxystrobin + difenoconazole, carbendazim + mancozeb and tebuconazole + trifloxystrobin were incompatible.

July, 2018

(B. Gangadhara Naik)

Major Advisor

28. Investigation on False Smut of Rice Incited by *Ustilaginoidea virens* (Cooke) in Hilly and Coastal Zones of Karnataka

MANJUNATH BANASODE

ABSTRACT

Rice is the most extensively cultivated food crop of Asia and it is affected by several diseases, among them false smut caused by *Ustilaginoidea virens* (Cooke) is one of the most emerging disease causing significant loss in both yield and quality of the grains. The roving survey for disease severity was conducted in hilly and coastal zones of Karnataka, revealed that highest mean disease severity was observed in Kodagu (69.87 %) district followed by Udupi (34.36 %) district and least mean disease severity (9.48 %) was observed in Shivamogga district. Among 102 rice genotypes/varieties screened, 11 were found highly resistant, none of them found resistant, only one variety of IR-64 showed moderately resistant reaction, 53 were found moderately susceptible, 34 were found susceptible and only 3 were found highly susceptible to disease reaction. Cultural and morphological studies revealed that radial growth of *U. virens* was maximum on potato sucrose agar (76.25 mm). *In vitro* evaluation of fungicides indicated that Propiconazole, Tebuconazole, Azoxystrobin + Difenconazole and Tebuconazole + Trifloxystrobin showed cent per cent inhibition at all the tested concentrations viz., 100, 200 and 500 ppm. The field evaluation of fungicides, revealed that Tebuconazole + Trifloxystrobin at 1 ml/l recorded the least false smut severity (2.80 %) followed by Azoxystrobin + Difenconazole at 1ml/ l (6.17 %) with the highest yield of 55.42 q/ha and 53.72 q/ha respectively.

July, 2018

(G. N. Hosagoudar)

Major Advisor

29. Studies on Brown Leaf Spot of FCV Tobacco Incited by *Alternaria alternata* (FRIES) Keissler.

NAILA SHOHRAT

ABSTRACT

Brown spot of tobacco (*Alternaria alternata*) is important and severe disease of tobacco crop in many parts of the world and causing huge crop losses. It is a limiting factor in tobacco production. Among ten different solid media used the radial growth of *A. alternata* was maximum on Potato dextrose agar with colony diameter of 89.00 mm and least growth was seen in Glucose peptone agar (59.00 mm). Physiological studies revealed that maximum dry mycelial weight of the fungus at temperature of 25°C (329.13 mg) and lowest at 5°C (67.16 mg). While the maximum dry mycelial weight was observed at pH 6.5 (586.53 mg) followed by and the minimum dry mycelial weight was recorded at pH 3.0 (110.80 mg). Among the systemic fungicides tested against *A. alternata* under *in vitro* condition, hexaconazole and propiconazole showed cent per cent inhibition of mycelial growth at all the tested concentrations of 125, 250 and 400 ppm. Whereas, least inhibition of mycelial growth was observed in thiophanatemethyl (72.80 %) at all tested concentrations. Among the combi products evaluated, highest inhibition was obtained by tebuconazole+trifloxystrobin (100%). Among the twenty two genotypes none of the genotypes showed immune reaction. Three of the genotypes were resistant. Five genotypes were moderately resistant. Nine genotypes were moderately susceptible. Three genotypes showed susceptible. Whereas, two genotypes showed highly susceptible reaction. Among the three bio-agents tested against *A. alternata* under *in vitro* condition, *T. harzianum* recorded highest inhibition of radial growth (84.30 mm). The field evaluation of different fungicides indicated that at 0.1 per cent of hexaconazole found significantly superior in reducing the disease incidence and increased the leaf yield. Hexaconazole recorded highest leaf yield (9786.69 kg/ha) followed by propiconazole (9279.63 kg/ha) whereas, untreated control recorded 3675.15 kg/ha.

July, 2018

(C. Karegowda)
Major Advisor

30. Studies on Chilli Veinal Mottle Virus in Major Chilli (*Capsicum annuum* L.) Growing Areas of Karnataka

NANDAPPA CHORGASTI

ABSTRACT

Chilli (*Capsicum annuum* L.) is one of the most important vegetable and spice crop belonging to the family Solanaceae and widely grown in India. Chilli has been widely cultivated across the world and prone to many biotic and abiotic stresses. Among the viral diseases, *Chilli Veinal Mottle Virus* (ChiVMV) is one of the most destructive virus limiting the chilli cultivation in many parts of the world. The survey results revealed that, incidence of ChiVMV was ranged from 12.77 to 48.43 per cent. Highest per cent disease incidence (PDI) was recorded in Hosallivillage (48.43%) of Hirekerur taluk and the lowest incidence (12.77 %) was observed at Mathodu village of Shivamogga taluk. Reverse transcription polymerase chain reaction (RT-PCR) technique for detection of *Chilli Veinal Mottle Virus* was used. PCR product of approximately 0.8 kb corresponding to ChiVMV partial CP was amplified using ChiVMV specific coat protein gene primers. Among 42 host plants tested, only ten host plants exhibited the symptoms of ChiVMV. The host plants viz., *Daturametel*, *Capsicum annuum*, *Physalisfloridana*, *Solanumnigrum*, *Lycopersiconesculentum*, *Sesamumindicum*, *Amaranthussp*, *Nicotianatabacumcv*. White Burley *Nicotianatabacumcv*. Samsun and *Capsicum frutescens* found to be the host for ChiVMV. Screening of 50 chilli genotypes for their reaction against ChiVMV has been done and categorized into different groups based on the per cent disease incidence and OD values observed in ELISA reader. Accordingly, five genotypes showed highly resistant (HR), ten genotypes showed resistant (R), six genotypes showed moderately resistant (MR) and remaining showed susceptible.

July, 2018

(R. GaneshaNaik)
Major Advisor

31. Studies on Fungal Fruit Spots and Fruit Rots of Pomegranate

PRUTHVIRAJ

ABSTRACT

Pomegranate is one of the favourite table fruits of tropical and subtropical regions. Among several fungal diseases affecting pomegranate, anthracnose caused by *Colletotrichum gloeosporioides*, spot caused by *Curvularia geniculata* and blight caused by *Alternaria alternata* and *Pestalotiopsis microspora* are important. The studies were conducted on survey for the severity in central dry zone of Karnataka. Morphological, Cultural and *in vitro* evaluation of fungicides were carried against all these pathogens. Among the different district surveyed highest and lowest per cent disease index were recorded in Tumkur and Hassan district respectively. In growth phase studies *C. gloeosporioides*, *C. geniculata* and *P. microspora* reached peak on 10th day, whereas, *A. alternata* reached peak on 8th day after inoculation. The conidia of *C. gloeosporioides* were hyaline, single celled, with two oil globules measuring 12.02 to 12.70 μm \times 3.5 to 4 μm . Whereas, conidia of *A. alternata* were brown to dark brown colour with 2-8 septations, produced in chains measuring 20 to 80 μm \times 6.4 to 8.5 μm . *C. geniculata* conidia were dark brown, typically geniculate shaped curved with 3 to 4 septate spores measuring 19.71 to 22.35 μm \times 5.81 to 6.42 μm and the conidia of *P. microspora* were spindle, five celled with three central coloured cells and two hyaline cells and the length of conidia varies from 25.3 to 29.6 μm \times 3.2 to 4.3 μm . Among the different solid media evaluated potato dextrose agar, oat meal agar and Sabourad's dextrose agar found to be best for growth and sporulation. *In vitro* studies revealed that propiconazole, hexaconazole, pyraclostrobin, difenconazole, tebuconazole + tryfloxystrobin, pyraclostrobin + epoxiconazole and propiconazole + difenconazole were effective in inhibiting the growth of fungus.

August, 2018

(Suresh D. Ekabote)
Major Advisor

32. Investigation on Collar Rot of Cluster Bean (*Cyamopsis tetragonoloba* L.) Incited by *Sclerotium rolfsii* Sacc.

SANNAJAMBANNA, B.

ABSTRACT

Collar rot of cluster bean caused by *Sclerotium rolfsii* has become a serious problem in recent years in cluster bean growing regions of India and the yield loss caused by the pathogen ranges from 50-70 per cent. Hence, investigation were carried out on collar rot of cluster bean caused by *S. rolfsii* with respect to survey for disease incidence, cultural and morphological characters of pathogen, efficacy of fungicides, bio-agents and botanicals under *in vitro* conditions and management of disease under field conditions. Roving survey was carried out in three districts, among them the highest per cent disease incidence of 11.66 was observed in Shivamogga followed by Davanagere (10.05 %) and lowest disease incidence (5.94 %) was documented in Chitradurga district. The cultural and morphological characters of *S. rolfsii* was studied on six different solid and liquid media. The results indicated that, maximum radial growth was observed on corn meal agar (90.00 mm) with white coloured colonies and maximum dry mycelial weight was noticed in potato dextrose broth (461.40 mg) and potato dextrose agar produced 126 dark brown coloured with round shaped sclerotia. Efficacy of fungicides, bioagents and botanicals were tested under *in vitro* condition against *S. rolfsii*, the results revealed that, propiconazole and hexaconazole, *Trichoderma harzianum* and garlic clove extract were superior in inhibiting growth of the pathogen. Field trial results revealed that, propiconazole 25 EC @ 0.1 % treated plots showed the lowest per cent disease incidence of 8.33 with highest per cent reduction over control followed by hexaconazole 5 EC @ 0.1 % (13.33 %) and maximum green pod yield was obtained from propiconazole @ 0.1 % (4599 kg / ha) with 99 no. of pods per plant.

September, 2018

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