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Kavita
Department of Plant Pathology, N.D. University of Agriculture and Technology, Kumarganj, Faizabad, Uttar Pradesh, India

SK Pande
Department of Plant Pathology, N.D. University of Agriculture and Technology, Kumarganj, Faizabad, Uttar Pradesh, India

Divya Singh
Department of Plant Pathology, N.D. University of Agriculture and Technology, Kumarganj, Faizabad, Uttar Pradesh, India

Jay Kumar
Department of Plant Pathology, N.D. University of Agriculture and Technology, Kumarganj, Faizabad, Uttar Pradesh, India

Dalbeer
Department of Genetic & Plant Breeding, N.D. University of Agriculture and Technology, Kumarganj, Faizabad, Uttar Pradesh, India

Correspondence
Kavita
Department of Plant Pathology, N.D. University of Agriculture and Technology, Kumarganj, Faizabad, Uttar Pradesh, India

Efficacy of bio-agents against the disease spot blotch of Barley (*Hordeum vulgare* L.)

Kavita, SK Pande, Divya Singh, Jay Kumar and Dalbeer

Abstract
One of the important soil born diseases of Barley is spot blotch, caused by *Bipolaris sorokiniana* (Sacc.) Shoemaker. An experiment was designed to evaluate the efficacy of few bio-agents against the disease. The minimum percent disease severity and percent root infected was observed in T_7 *Trichoderma viride* @ 4g/kg seed with treated seed +soil 8.96% and 9.37%, maximum Plant height, Fresh weight of shoot, Dry weight of shoot, Fresh weight of root and Dry weight of root 46.87 cm, 8.40g, 4.12g, 2.24g and 0.32g.11 treatments tested the application of *Trichoderma viride* treated seed and soil both @ 4g/kg recorded minimum disease severity and percent root infection along with enhancement in plant growth characters studied.

Keywords: spot blotch, *Hordeum vulgare* L. bio-agent management

Introduction
Barley (*Hordeum vulgare* L.) is popularly known as "*Jau*" in Hindi. It ranks 4th among the major food grain crops after wheat, rice and maize in the world with regard to acreage and production. It is originated from Asia and Ethiopia. It can be grown over a wide range of latitude covering diversified agro-climatic conditions. In India, major barley growing states are U.P., Rajasthan, Punjab, Haryana, M.P., H.P., Bihar, Uttaranchal, Jharkhand and Jammu & Kashmir. Barley has become an important crop due to its demand for manufacture of alcoholic beverages, varied utility in food, feed and ayurvedic medicines. Besides, it is most dependable cereal under extreme conditions of drought, salinity and even frost. Hence, it has special significance to Indian agriculture in view of its ability to withstand drought. Its grain is used as animal feed either alone or in combination and also consumed as a food by poor classes as pure flour or mixed with wheat or gram flour for making chapattis. Its chapattis are highly palatable and digestible as compared to the wheat. It is self-pollinated crop and grain contains about 75 per cent carbohydrate, 9 per cent protein, 2 per cent fat and each gram provides about 3.3Kcal energy. Barley grain is rich in zinc (up to 50 ppm), iron (up to 60 ppm) and soluble fibers, and has a higher content of Vitamins A and E than other major cereals, (Wondimu, 2011) [15]. In the recent years an increase in demand of malting barley was noticed from southern region of the country.Work on barley disease in India started quite early but did not reach anywhere near Wheat, both in quantum and depth (Joshi *et al.*, 1986) [5]. Work on foliar blight disease of barley in eastern Uttar Pradesh, has been quite scanty and rudimentary in nature. Therefore the study was conducted with an objective to Studies on Efficacy of bio-agents against the disease Spot Blotch of Barley (*Hordeum vulgare* L.).

Material Method
Seed and soil treatment were investigated in the net house of Department of Plant Pathology, Narendra Deva University of Agriculture and Technology. The details of experiment were given below: Variety RD2503, Treatments: 11Design: CRD Replications: 4 T_1Barley seed treated with *Trichoderma viride* @ 4g/kg of seed was sown in infected soil. T_2 Barley seed treated with *Pseudomonas fluorescens* @ 4g/kg of seed was sown in infected soil. T_3 Barley seed treated with VAM @ 4g/kg of seed was sown in infected soil. T_4 Untreated Barley seed was sown in *Trichoderma viride* @ 4 g/kg of treated soil. T_5Untreated Barley seed was sown in *Pseudomonas fluorescens* @4g/kg of treated soil. T_6 Untreated Barley seed was sown in VAM @4 g /kg of treated soil. T_7Barley seed treated with *Trichoderma viride* @ 4 g /kg seed was sown in *Trichoderma viride* @4 g/kg of treated soil. T_8 Barley seed treated with

Pseudomonas fluorescens @ 4g/kg of seed was sown in *Pseudomonas fluorescens* @4g/kg of treated soil. T_9 Barley seed treated with VAM @ 4g/kg of seed was sown in VAM @ 4g/kg of treated soil. T_{10}Untreated seed was sown in sterilized soil. T_{11} Untreated seed was sown in untreated soil. Observations recorded After 45 days of planting, following observations were recorded- Disease severity, Plant height Fresh and dry weight of shoot and root Per cent root infected.

Result and Discussion

Trichoderma viride, *Pseudomonas fluorescens* and VAM was selected for seed and soil treatment to study their effects on *Bipolaris sorokiniana* causing spot blotch disease in Barley. The data was recorded from 45 days old plants. A perusal of data presented in revealed that table (1) all the treatments were significantly superior to control (T_{11}). The minimum percent disease severity and percent root infected was observed in T_7 *Trichoderma viride* @ 4g/kg seed with treated seed +soil 8.96% and 9.37%, maximum Plant height, Fresh weight of shoot, Dry weight of shoot, Fresh weight of root and Dry weight of root 46.87 cm, 8.40g, 4.12g, 2.24g and 0.32g respectively, followed by T_9 Seed +soil with VAM treated percent disease severity and percent root infected 10.2% and 10.57 %, Plant height, Fresh weight of shoot, Dry weight shoot of, Fresh weight of root and Dry weight root 46.87 cm, 8.29g, 4.1g, 2.22g and 0.31g respectively. The pathogen *Bipolaris sorokiniana* survives in soil as well as on infected seeds and serve as a source of primary infection. Therefore, soil and seed treatment with *Trichoderma viride*, *Pseudomonas fluorescens* and VAM has been done to evaluate its effect on survival of *Bipolaris sorokiniana.* The treatment with *Trichoderma viride*, *Pseudomonas fluorescens* and VAM was selected for seed and soil treatment because it exhibited maximum inhibition percentage against *Bipolaris sorokiniana.* Observations were recorded on disease severity, percent root infection, plant height and fresh and dry weight of shoot and root. The data was recorded from 45 days old plants. All the treatments were significantly superior to control (T_{11}). The minimum percent disease severity (8.96%) and percent infected root (9.37%) was observed in T_7 - *Trichoderma viride* @4g/kg seed with treated seed +soil and maximum Plant height, Fresh weight of shoot, Dry weight of shoot, Fresh weight of root and Dry weight of root, 46.87 cm, 8.40g, 4.12g, 2.24g and 0.32g, respectively are in consonance with Arabi *et al.* (2013) [2]. The treatment with VAM significantly reduced the disease severity in infected Barley plants and increased significantly the root biomass. Salehpour *et al.* (2005) [12, 13] reported that the **s**eed and soil treatment with *Trichoderma viride* was the most effective in the reduction of infection as compare to control ($p<0.01$). All the isolates of *Trichoderma* increased the plant height and fresh and dry weight of root and shoots of wheat seedlings as compare to uninoculated control. Among the *Trichoderma* isolates, *Trichoderma viride* T112 and MO were superior in enhancing the growth of wheat ($p<0.01$). Kumar *et al.* (2009) [8] noted that the soil application of bio-agents was more effective in protecting the crop than foliar spray. Kamal *et al.* (2014) [6, 7] tested that Arbuscular Mycorrhizal fungus (AMF), Plant Growth Promoting Rhizobacteria (PGPR) and Actinomycetes, as a rhizospheric microorganism play an important role in promoting plant growth and protection against plant pathogen. These could participate direct or indirect in enhancement of root colonization by developing their individual effects on plant growth promotion.11 treatments tested the application of *Trichoderma viride* treated seed and soil both @ 4g/kg recorded minimum disease severity and percent root infection along with enhancement in plant growth characters studied.

Table 1: Management of seed and soil treatment of *Bipolaris sorokiniana* in net house condition.

S. No.	Treatments	(%) Disease severity	(%) Root infected	Plant height (cm)	Fresh weight of shoot (g)	Dry wt. of shoot (g)	Fresh wt. of root (g)	Dry wt. of root (g)
T_1	Seed treated with *Trichoderma viride* @4g/kg seed sown infected soil	12.625 (20.76)	12.2 (20.29)	40.18	7.99	3.32	2.16	0.22
T_2	seed treated with *Pseudomonas fluorescens*@4g/kg + infected soil	28.06 (31.95)	25 (29.96)	35.68	6.76	2.32	1.30	0.18
T_3	Seed treated VAM @4g/kg seed+ infected soil	16.98 (24.30)	13.15 (21.20)	40.12	7.34	3.30	2.14	0.21
T_4	Untreated seed +*Trichoderma viride* @4g/kg seed with treated soil	10.67 (19.02)	12.2 (20.37)	40.5	8.03	3.45	2.19	0.25
T_5	Untreated seed +*Pseudomonas fluorescens* @ 4g/kg with treated soil	26.55 (30.95)	20.75 (27.05)	35.98	6.99	2.55	1.31	0.19
T_6	Untreated seed +VAM@4g/kg with treated soil	10.6 (18.94)	10.87 (19.19)	45.28	8.14	4.06	2.20	0.30
T_7	*Trichoderma viride* @4g/kg seed with treated seed +soil	8.96 (17.34)	9.37 (17.76)	46.87	8.40	4.12	2.24	0.32
T_8	*Pseudomonas fluorescens* @4g/kg seed with treated seed +soil	20.95 (27.16)	15.11 (22.70)	38.06	7.12	3.17	1.90	0.21
T_9	VAM@4g/kg seed treated with seed +soil	10.2 (18.56)	10.57 (18.76)	46.87	8.29	4.1	2.22	0.31
T_{10}	Untreated seed + sterilized soil	30.55 (33.51)	29.50 (32.84)	30.75	5.16	1.05	1.05	0.15
T_{11}	Untreated seed + untreated soil	60.26 (50.92)	51.47 (49.38)	31.79	5.93	1.27	1.08	0.17
SEm±		1.28	1.53	0.44	0.2	0.06	0.26	0.02
CD (P=0.05)		3.79	4.49	1.2	0.79	0.18	0.75	0.06
CV (%)		8.34	10.3	1.42	2.04	0.75	3.89	0.56

Figures in parentheses are transformed angular value

References

1. Aada AM, Hack E. The effect of the biological control agent *Trichoderma harzianum* T-22 on spot blotch disease in Libyan barley cultivars in a field experiment. J article. 2013; 86:219-225.
2. Arabi MIE, Kanacri ZS, Ayoubi, Jawhar M. Mycorrhizal application as a biocontrol agent against common root rot of barley. Research in Biotechnology. 2013; 4:07-12.
3. Duczek LJ. Relationship between a greenhouse and field assay for biological control of common root rot of spring wheat and barley. Canadian Plant Disease Survey. 1994; 74:135-140.
4. Jegathambigai V, Wijeratnam RSW, Wijesundera RLC. *Trichoderma* as a seed treatment to control *Helminthosporium* leaf spot disease of *Chrysalidocarpus lutescens.* World J Agric. Sci. 2009; 5(6):720-728.

5. Joshi LM, Singh DV, Srivastava KD. Problems and progress of wheat pathology in South Asia Malhotra Publishing House, New- Delhi, 1986, 401.
6. Kamal R, Singh Y, Gusain, Kumar V. Interaction and symbiosis of AM fungi, Actinomycetes and Plant Growth Promoting Rhizobacteria with plants: Strategies for the improvement of plants health and defense system Int. J Curr. Microbiol. App. Sci. 2014; 3(7):564-585.
7. Kamal R, Singh Y, Gusain, Kumar V. Interaction and symbiosis of AM fungi, Actinomycetes and Plant Growth Promoting Rhizobacteria with plants: Strategies for the improvement of plants health and defense system Int. J Curr. Microbiol. App. Sci. 2014; 3(7):564-585.
8. Kumar S, Rani A, Jha MM. Potential of *Trichoderma* spp. as bio-control agents against pathogens causing maydis leaf blight of maize. J Biol. Control. 2009; 23(1):89-91.
9. Lewis JA, Papavizas GC. Biocontrol of plant diseases the approach for tomorrow. Crop Protection. 1991; 10:95-105.
10. Prasad B, Singh RP. Influence of pre-sowing bio-agent seed treatment on seed yield, its contributing characters and subsequent seed quality in barley (*Hordeum vulgare* L.) cv VLB-1 under rainfed conditions Environment and Ecology. 2009; 27:997-1001.
11. Saari EE. Leaf blight diseases and associated soil borne fungal pathogens of wheat in south and south East Asia. In: Duveiller, E., Dubin, H.J., Reeves, J., McNab, A. (Eds.) *Helminthosporium* blights of wheat: spot blotch and tan spot, Mexico: CIMMYT, DF. 1998, 37-51.
12. Salehpour M, Etebarian HR, Roustaei A, Khodakaramian G, Aminian H. Biological control of Common root rot of Wheat (*Bipolaris sorokiniana*) by *Trichoderma* isolates. Plant Pathology Journal. 2005; 4(1):85-90.
13. Salehpour M, Etebarian HR, Roustaei A, Khodakaramian G, Aminian H. Biological control of Common root rot of Wheat (*Bipolaris sorokiniana*) by *Trichoderma* isolates. Plant Pathology Journal. 2005; 4(1):85-90.
14. Singh CK, Singh C, Singh D, Singh RK, Chaudhary AK, Kumar RR. Effect of Chemicals and Bio-agent on Spot Blotch Disease of Wheat (*Triticum aestivum* L.). International Journal of Bio-resource and Stress Management. 2016; 7(4):712-715.
15. Wondimu A. Nutritional value of barley and acceptability studies on barley based weaning products in Mulatu B and Grando Proceedings of the 2nd National Barley Research and Development Review Workshop, 2830 November 2006, HARC, Holetta, Ethiopia. Aleppo, Syria, ICARDA, 2011, 323-326.