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Short communication

Management of Sclerotinia rot of Indian mustard (*Brassica juncea*) under eastern Rajasthan conditions

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Abstract

Bharatpur region of Rajasthan state in India is known as Indian mustard bowl and has higher productivity (13.4 q/ha) as compared to state (12.9 q/ha) and nation (11.8 q/ha). During *Rabi* 2015-16, Indian mustard (*Brassica juncea* L.) was grown in about 7.49 lakh hectare and the average productivity was 17.2 q/ha. In present scenario of non- availability of host resistance, there is need for developing cost effective and eco-friendly Integrated management strategies. Use of bio-control agent is advantageous, as they are often effective against wide range of soil borne pathogens. An eco-friendly integrated disease management technology, particularly use of *Trichoderma* and garlic extract have been validated on large area of farmer's field during *Rabi* 2011-12, 2012-13 and 2013-14 in five villages of district Dholpur (Rajasthan) in the form of On Farm Trials (OFT). Results showed that seed treatment with *Trichoderma* @ 10 gm/kg seed + garlic extract @ 25 gm/kg seed. gave highest yield (21.1 qt./ha in 2011-12, 21.1 qt./ha in 2012-13 and 21.5 qt./ha in 2013-14), B:C Ratio (1: 5.76 in 2011-12, 1: 5.76 in 2012-13 and 1: 3.42 in 2013-14) is higher than farmers local practice. Farmer's could be benefited by enhancing productivity of Indian mustard through adopting new management practices.

Key words*: Indian mustard, management, Sclerotinia rot, Trichoderma*

Introduction

The total production of oil crops and products in oil equivalents for 2050 at the global level is projected at 282 million tonnes suggesting a 100 plus additional production from the current production of 178 million tonnes. The projection of per capita consumption of oil crops in 2050 for food and all uses is estimated to be 16 and 30 kg, respectively (Anonymous 2014). In South Asia which includes India, the same is projected at 16.7 kg/ capita /annum in 2050 (Alexandratos and Bruinsma, 2012). India's self-sufficiency in terms of domestic production has come down, from 94 % in 1994- 95 to 43 % in 2014-15. With the increasing share of imports, domestic prices of various oils are impacted due to volatility in international prices, particularly that of palm oil. This has increased the vulnerability of domestic producers and consumers (Anonymous 2016). The average contribution of rapeseed-mustard to the total oilseed production in India was 22.0%, during 2015-16. Its average productivity was 1176 (kg/ha) as compared to 1135 kg/ha of total oilseeds. Though, rapeseed-mustard ranks 2nd in terms of production, after soyabean, however due to more oil content (ranging from 35- 45%) rapeseed-mustard ranks 1st in terms of oil yield among all oilseeds crops. The rapeseed-mustard production trends represent fluctuating scenario with an all time high production of 8.3 million tonnes from 6.9 million hectare during 2010-11. The yield levels also have been variable ranging from 1001 (2007-08) to 1250 (kg/ha) (2013-14) during the last 5 years. Highest productivity 1262 (kg/ha) level was achieved during 2012-13. Rajasthan has the 47.9 % share in all India rapeseed-mustard production and Bharatpur region also has higher oilseed productivity (13.4 q/ha) as compared to state (12.8 q/ha) as well as nation (9.7 q/ha) (Anonymous 2016). India is although main mustard growing country but it is lagging behind the other countries in productivity of Indian mustard.

Rajasthan, Uttar Pradesh, Madhya Pradesh, Haryana, Gujarat and West Bengal states accounted for nearly 86.5% area and 91.4% production of rapeseed-Mustard in the country during 2012-13. The productivity of Haryana, Gujarat, Rajasthan, UP and MP was above 1000 kg/ha in the descending order. There was reduction in area and production of rapeseed-mustard in Gujarat, Uttar

Pradesh and Rajasthan. States like Bihar, West Bengal, Madhya Pradesh showed increase in area and production. Maximum increase in production (43.7%) was witnessed in Bihar followed by West Bengal, Madhya Pradesh and Haryana. However, the productivity levels were increased in all the states. This fluctuating trend in area, production and productivity requires multi-pronged strategies and technological interventions in upcoming years. These areas need to be focused separately (Anonymous 2014). During 2015-16 area under rapeseed-mustard was 25.5 lakh ha in Rajasthan and 57.6 lakh ha in India but productivity of Rajasthan (1282 kg/ha) is higher than the nation (1184 kg/ha) by having the production of 32.7 lakh tonnes in Rajasthan and 68.2 lakh tonnes in India (Anonymous 2017).

Zone IIIb of Rajasthan State is known as mustard bowl and has higher Productivity (13.4 q/ha) as compared to state (12.9 q/ha) and nation (11.8 q/ha). During *Rabi* 2015-16 mustard was grown in about 7.5 lakh hectare and the average productivity was 13.4 q/ha (Anonymous 2016). India is although the third largest growing country but it is lagging behind the other countries in productivity of Indian mustard. Several technologies have been generated by our researchers in the recent past. These technologies, however, remain fragmented in various journals and consequently systematic adoption of the technologies becomes difficult. In present scenario of non- availability of host resistance, there is need for developing cost effective and eco-friendly integrated management strategies. Garlic aqueous bulb extract has been reported to be effective against Alternaria blight of Indian mustard even earlier (Meena *et al*., 2004)

Use of bio-control agent is advantageous, as they are often effective against wide range of soil borne pathogens. *Trichoderma* has its own significance in the agricultural industry due to its varied activities ranging from being a valuable antagonist against the soil-borne pathogens to acting as a provider of nutrition to the soil as well (Patel and Patel 2014). *Trichoderma* produces different kinds of enzymes which play a major role in biocontrol activity like degradation of cell wall, tolerance to biotic or abiotic stresses, hyphal growth etc. The understanding of filamentous fungi belonging to the genus *Trichoderma* has continuously evolved since last two decades, from the simple concepts of biocontrol agents to their recently established role as symbionts with different beneficial effects to the plants (Waghunde and Shelake 2016). Keeping all in view, an eco-friendly integrated disease management approach, particularly use of *Trichoderma* and garlic extract have been validated on large area of farmer's field during Rabi 2011-12, 2012-13

Table 1. On Farm Trials for technology rrefinement

Treatments	On Farm Trials						Technology refined							
	Yield (q/ha)		%	Increase			Production (kg/ha)			Net Return (Rs)			B:C Ratio	
	2011-12	2012-13	2013-14	2011-12	2012-13	2013-14	2011-12	2012-13	2013-14	2011-12	2012-13	2013-14	2011-12	2012-13 2013-14
T_1 FP (No ST)	17.12	16.43	17.50	-	-	-	1712	1643	1750	30800	39290	27250	3.56	4.92 2.86
T_2 ST with Apron 35 SD @ 6 g/kg seed	20.50	19.75	20.50	19.74	20.20	17.14	2050	1975	2050	37250	48250	32850	3.66	5.38 3.22
T_3 - ST with *Trichoderma* @ 10 g/kg seed + garlic extract @ 25 g/kg seed	21.00	21.12	21.50	22.66	28.54	22.85	2100	2112	2150	3850	52360	34950	3.75	5.76 3.42

and 2013-14 in five villages of District Dholpur (Rajasthan) in the form of On Farm Trials by the Scientists of Krishi Vigyan Kendra, Dholpur, Rajasthan,, India.

Materials and Methods

Five On Farm Trials (OFT) were conducted on the fields of five farmers during each season (one ha area of each farmer under IDM). On Farm Trials were framed on the basis of 20 mustard growing villages surveyed with low yield of mustard due to stem rot with high mortality of plants 20 village surveyed. The eco-friendly treatments included in the OFT are i. T_1 Farmers practice (FP) (No seed treatment), ii. T_2-Seed treatment (ST) with Apron 35 SD @ 6 gm/kg seed, iii. T_3- Seed treatment (ST) with *Trichoderma* @ 10 g/kg seed + garlic extract @ 25 g/kg seed. The latest recommendations included in the POP of zone IIIb of Rajasthan viz; seed treatment with 2% garlic extract+seed treatment with *Trichoderma* @ 10g/kg seed and need based spraying of 0.2% *Trichoderma* at 50 DAS (recommendation included in the POP of Sriganganagar).

Results and Discussion

Plant ancillary, yield attributing characters and seed yield of Indian mustard under garlic +*Trichoderma* treatment was much superior over control. Though, the incidence of Alternaria blight, white rust, powdery mildew on lower leaves and all the diseases were reduced by the use of garlic extract and *Trichoderma* (Meena *et al*., 2004, 2008). Our results showed (Table 1) that the seed treatment with *Trichoderma* @ 10 g/kg seed + garlic extract @ 25 g/kg seed. gave highest yield (21.0 q/ha in 2011-12, 21.1 q/ha in 2012-13 and 21.5 q/ha in 2013-14), B:C Ratio (1: 5.76 in 2011-12, 1: 5.76 in 2012-13 and 1 : 3.42 in 2013-14) is higher than farmers local practice. Our results also illustrated per cent yield increase over control was 22.7% in 2011-12, 28.5% in 2012-13 and 22.9% in 2013-14. Seed treatment with garlic + *Trichoderma* resulted in lowering of stem rot disease and considerably increased seed yield of mustard over control hence use of *Trichoderma* was very much appreciated by farmers. Similar results were reported by Yadav *et al.* (2012) in their studies where Sclerotinia rot was 11.1% in treated as compared to control (26.9%) and seed yield was maximum (27.2/ha) in treated as compared control (17.7 q/ha).

Conclusion

Final recommendation for micro level situation: Seed treatment with Trichoderma @ 10 gm/kg seed + garlic extract @ 25 g/kg seed is good to check stem rot and white rust in mustard and gave higher yield. Process of farmers participation and their reaction:Farmers participating in very large number on mustard is the main crop of Dholpur district and adoptability is 50% and farmers like it as cheap resource input. ST with *Trichoderma* and garlic extract gave highest yield cheaper and organic in nature and safe to easy use against diseases. Adoption of IPDM empowered the farmers for decision making for the correct application of pesticides (prior the IPDM programme, farmers were applying the pesticides indiscriminately). Now they are able to distinguish between harmful and beneficial pathogens the understand the role of seed treatment and crop management practices in IPDM (like judicious use of fertilizers, application of irrigation at right time, thinning operation). The success of IPDM in the target village outlines the need for its popularization in larger areas.

References

Anonymous. 2014. Vision-2050-Document of ICAR-Directorate of Rapeseed-Mustard Research, Bharatpur, India.

Anonymous. 2016. State Indian Agriculture 2015-16. Govt of India Ministry of Agriculture & Farmers Welfare Dept of Agri, Cooperation & Farmers Welfare Directorate of Economics & Statistics, New Delhi.

Anonymous. 2017. Agricultural Statistics. Department of Agriculture, Jaipur, Rajasthan, India.

Alexandratos N and Bruinsma J. 2012. World Agriculture Towards 2030/2050. ESA working Paper No. 12-03 June 2012, Agricultural Development Economics Division, FAO, Rome .

Anonymus. 2017. Agricultural Statistical Year Book 2017. Government of India. Ministry of Statistics and programme Implementation. New Delhi, India.

Meena PD, Meena RL, Chattopadhyay C and Arvind Kumar. 2004. Identification of critical stage for disease development and bio-control of Alternaria blight of Indian mustard *(B. junce*a). *J Phytopathol* **152**: 204-209.

Meena PD, Meena RL and Chattopadhyay C. 2008. Eco-friendly options for management of Alternaria blight in Indian mustard. *Ind Phytopath* **62**: 65-69.

Patel R and Patel D. 2014. Screening of Trichoderma and antagonistic analysis of a potential strain of *Trichoderma* for production of a bioformulation. *Int J Sci Res Pub* **4**: 744–749.

Waghunde R and Shelake RM. 2016. *Trichoderma*: A significant fungus for agriculture and environment. *African J Agril Res* **12**:1952-196.

Yadav MS, Ahmed N, Singh S, Yadav DK, Godika S and Gaur RB. 2012. Multilocational validation of integrated management practices for Sclerotinia rot of mustard (*B. juncea*). *Ind J Agril Sci* **82**: 922-77.