



Dissemination of Eco-Friendly IPM Technology through OFT on Mustard in Alwar District of Rajasthan

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An eco-friendly IPM technology, particularly use of *Trichoderma* and Garlic extract have been validated on large area of farmers field during Rabi-2008-09 and 2009-10 in the Tilwad village of District Alwar (Rajasthan) collaboratively by the scientists of Agricultural Research Station, Navgaon and Krishi Vigyan Kendra, Navgaon in the form of On Farm Trial. Plant ancillary, yield attributing characters and seed yield of mustard under *Trichoderma* treatment was much superior over the control. Seed treatment with garlic + *Trichoderma* and spraying with *Trichoderma* resulted in lowering the stem rot disease and considerably increased seed yield of mustard over control hence use of *Trichoderma* was very much appreciated by the farmers. The success of IPM in the target village outlines the need for its popularization in larger areas.

Introduction

India ranks 2nd in acreage and 3rd in world's production of oilseeds. India grows mustard in 6.18 million hectares and produces 7.36 million tones annually, (AICRP, 2009). Rajasthan contributes 45.5% area and 48.6% production to the nation. Zone III b of Rajasthan state is known as mustard bowl has higher productivity (15.78 q/ha) as compared to nation (11.9 q/ha). During Rabi 2009-10 mustard was grown in about 7.70 lakh hectare and the average productivity was 15.78q/ha (ZREAC, 2009). India is although a main mustard growing country but it is lagging behind the other countries in productivity of mustard. Several technologies have been generated by our researchers in the recent past. These technologies, however, remain fragmented in various research journals and consequently systematic adoption of the technologies becomes difficult. In the 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 a wide range of soil borne pathogens.

An eco-friendly location specific Integrated Pest Management technology for mustard crop has been developed through front line demonstrations conducted during Rabi 2006-07, 2007-08 & 2008-09 and it was included in POP of Zone-IIIb of Rajasthan. This IPM technology, particularly use of *Trichoderma* and Garlic extract have been validated on large area of farmers field during Rabi-2008-09 & 2009-10 in the Tilwad village of District Alwar (Rajasthan) collaboratively by the scientists of Agricultural Research Station, Navgaon and Krishi Vigyan Kendra, Navgaon in the form of On Farm Trial.

Materials and Methods

The IPM technology have validated in Tilwad village of Alwar district during Rabi-08-09 & 09-10. Ten on farm trials were conducted on the fields of five farmers during each season (one ha. area of each farmer under IPM) (Table-1&2). In case of local check plots existing practices being used by farmers were followed. In demonstration plots, a few critical inputs in the form of quality seeds, fertilizers, bio-agents like *Trichoderma* and garlic etc. were provided and non-monetary inputs like timely sowing in lines and timely weeding, judicious use of irrigation, thinning etc. were also performed whereas, traditional practices were maintained in case of local checks. The demonstration farmers were facilitated by KVK scientists in performing field operations like sowing, spraying, weeding, harvesting etc. during the course of training and visits. The eco-friendly treatments included in the OFT are latest recommendations included in the POP of zone-IIIb viz; seed treatment with 2% garlic extract + seed treatment with *Trichoderma* @ 10g/Kg seed and spraying with 0.2% *Trichoderma* at 50 DAS(Recommendation included in the POP of SriGanganagar). Disease data as Per cent disease severity / per cent disease incidence of AB/ WR/ PM/SS (75-90 d.a.s. on leaves and on pods/ no. of staghead 15 days before harvest) in plots on 10 plants at random using rating scale of Conn et al. (1990).

Results and Discussion

The Mean of the results of five On Farm Trials conducted during Rabi-2008-09 revealed that the disease pressure was very low during that season. Although the incidence of alternaria blight, white rust & powdery mildew were confined to leaves only in the range of 5.0% to 11.5% but all the diseases were reduced by the use of garlic extract & *Trichoderma*. Incidence of stem rot disease was lowest in the treatment where seed treatment with garlic+ *Trichoderma* and spraying of *Trichoderma* was tested (Table-1). Yield levels were also best in this treatment with an increase of 18.55% over farmers practice.

Table-1: Mean results of five OFT's conducted on farmers field during Rabi-2008-09

Name and address of farmer	Treatment	Altenaria Blight (%)	White rust (%)	Powdery Mildew (%)	Stem rot (%)	Yield (q/ha)
		Leaf	Leaf	Leaf		
Gyanchand, Gulabrai, Sohan, Ashok and Ramjilal Village: Tilwad Alwar	T-1= Farmers practice (Control)	11.50	9.00	11.00	8.00	19.4
	T-2 = Seed treatment with garlic extract and <i>Trichoderma</i>	8.00	7.00	9.00	4.00	20.7
	T-3 = Seed treatment with garlic extract and <i>Trichoderma</i> + Spraying with <i>Trichoderma</i>	7.05	5.00	7.00	2.00	23.0

Table-2: Mean results of five OFT's conducted on farmers field during Rabi-2009-10

Name and address of farmer	Treatment	Altenaria Blight (%)	White rust (%)	Powdery Mildew (%)	Stem rot (%)	Yield (q/ha)
		Leaf	Leaf	Leaf		
Sohanlal, Kishan Kumar, Vikram, Gyanchand and Anil, Village: Tilwad, Alwar	T-1= Farmers practice (Control)	12.00	10.00	11.00	10.00	16.00
	T-2 = Seed treatment with garlic extract and <i>Trichoderma</i>	10.00	8.00	10.00	6.00	17.50
	T-3 = Seed treatment with garlic extract and <i>Trichoderma</i> + Spraying with <i>Trichoderma</i>	8.00	7.00	9.00	4.00	19.00

Mean result of the OFT's conducted during rabi 09-10 revealed that the disease intensity of Alternaria blight, Powdery mildew and White rust on leaves was in the range of 7.05% to 11.5% at all the locations. During January the relative humidity remained almost 85 to 95 percent which might be the reason of good congenial conditions for sclerotinia rot disease development on farmer's fields. In few fields where 2nd irrigation were coincided with winter rains there was more than 50% incidence of sclerotinia stem rot disease observed. Ten % incidence of stem rot was recorded in control fields in OFT's whereas in treated plots the incidence was 6 & 4 % in seed treatment with *Trichoderma*+ garlic and seed treatment and spraying with *Trichoderma* respectively in village Tilwad, Alwar. It was clearly observed that the over population, heavy soils and excess water in mustard fields are the prime factors responsible for the increased incidence of stem rot. Plant ancillary, yield attributing characters and seed yield of mustard under *Trichoderma* treatment was much superior over the control. Seed treatment with garlic + *Trichoderma* and spraying with *Trichoderma* resulted in lowering the stem rot disease and considerably increased seed yield (18.75%) of mustard over control hence use of *Trichoderma* was very much appreciated by the farmers. The results are in conformity to the findings of SKRAU-NCIPM collaborative research project (2006-07 to 09-10) carried out by ARS, Navgaon on farmer's field on mustard crop in Alwar district (NCIPM-07-08,08-09). They also conclude that IPM module results in better growth of plants and enhanced yield in mustard crop. Foliar application of bulb extract of *Allium sativum* has been reported to be successful in checking alternaria blight of sunflower (Chattopadhyay,1999) and sclerotinia rot of mustard (Chattopadhyay et. al,2002). Management of alternaria blight of mustard with bulb extract of *A. sativum* and spore suspension of *Trichoderma viride* was also reported by Meena et.al.,2004.

Trichoderma species are among the most frequently isolated soil fungi and present in plant root ecosystems (Harman *et al.*, 2004). The fungi are opportunistic, avirulent plant symbionts and

function as parasites and antagonists of many phytopathogenic fungi, thus protecting plants from diseases. So far *Trichoderma* sp. are among the most studied fungal biocontrol agents and commercially marketed as a potent biopesticides, biofertilizer and also used in soil amendments (Harman, 2000; Harman *et al.*, 2004). Depending upon the strain the use of *Trichoderma* in agriculture can provide numerous advantages: (1) Colonization of the rhizosphere (rhizosphere competence) allowing rapid establishment within the stable microbial communities in the rhizosphere, (2) control of pathogenic and competitive/deleterious microflora by using a variety of mechanism, (3) Improving of the plant health and (4) stimulation of root growth (Harman *et al.*, 2004). Strains of *Trichoderma* added to the rhizosphere protect plants against numerous classes of pathogens, e.g., those that produce aerial infections, including viral, bacterial and fungal pathogens, which point to the induction of resistance mechanisms similar to the Hypersensitive Response (HR), Systemic Acquired Resistance (SAR) and Induced Systemic Resistance (ISR) in plants (Harman *et al.*, 2004). Adoption of IPM empowered the farmers for decision making for the correct application of pesticides (prior the IPM programme, farmers were applying the pesticides indiscriminately). Now they are able to distinguish between harmful and beneficial pathogens. They understand the role of seed treatment and crop management practices in IPM (like judicious use of fertilizers, application of irrigation at right time, thinning operation). The success of IPM in the target village outlines the need for its popularization in larger areas.

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