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RESEARCH PAPER

Impact of technical trainings on socio-economic status and knowledge to farmers for the management YMV and charcoal rot diseases of soybean by antagonistic microorganism and chemical pesticides

S. R. Sharma*, V. K. Singh[1], O.M. Gupta[2] **and** D. P. Singh[3]
Krishi Vigyan Kendra (JNKVV), Stationganj, Narsinghpur (M.P.) India
(Email: srsharma_srsgkp@rediffmail.com)

Abstract : On the basis of Socio Economic Status of farmers records, technical trainings to Farmers and knowing the constraints of farmers faced during last years, an experiment was conducted in the year 2017 and 2018 *Kharif* season with four soybean verieties namely JS 20-29, JS 97-52, RVS 2001-4 and JS20-69 in four replications with control plot. Personal contact with farmers indicated that majority of farmers (60%)came under small land holders categories having only 3.0 ha cultivated area whereas 13.33% farmer occupied > 10ha cultivated areas considered large land holding farmers. More than 57% young farmers having age below 35 years seriously engaged in agricultural work than old age (>50years) whose interest was 26.66% followed by middle age groups (35-50years). As for as educational level was concerned, 56% respondents were of medium category having education between 10 th to higher secondary. Nearly 29% respondents had high qualification (Graduate and above) level while14% were of low educational level. Majority of respondents (78%) was engaged in Agricultural enterprise followed by horticulture^{+} (14.64%) and dairy (6.66%). Incidence of both diseases was also varied from variety to variety of soybean. Highest incidence of yellow mosaic disease was found in RVS2001-4(8.79%) followed by JS20-29 (5.57%) and JS97-52 (2.32%) whereas no incidence was observed in JS 20-69. It was observed that YMV affected plant either unable to bear the flowers and fruits (pods) or very few pods appear but dried prematurely. Results revealed that RVS2001-4 affected maximum (14.15%) with charcoal rot infection than JS20-29 in comparison to JS97-52 whereas minimum incidence was recorded in JS20-69. Control plot affected more severely than demonstration and it was due to none application of trichoderma in seed and soil treatment. Among the soybean entries JS 2069 gave more yield (17.39q/ha) followed by RVS2001-4 (14.57q/ha) in compassion to JS20-29 and JS97-52).Timely application of bio-agent and chemical pesticides for seed/soil treatment plus spray and change of knowledge through technical training to the farmers during crop period play an important role in managed the diseases and enhanced the soybean productivity. The ratio of yield increased was 15.73% to32.04% over control. A training was organized after harvested of the crop to know the major constraints and observed that 94.66 per cent respondents were face difficulties recording lack of knowledge for identification of beneficial and damager pests followed by unavailability of quality bio-pesticides (93.33%) such as trichoderma, NPV, *Bavaria basiyana* and bio-fertilizers (81.33%) at local level for pests and diseases management. Besides above problems, unavailability of trained labours (78.66%), quality seed (68%), rate of wages and problems of storage were also the important and time needed constraints.

Key Words : Soybean variety, Trichoderma, Thiomethaxam, Farmers profile, Trainings, Constraints

*** Author for correspondence :**
[1]Deportment of Plant Pathology, Bada Agriculture University, Bada (U.P.) India
[2]Jawaharlal Nehru Krishi Vshwa Vidyalaya, Jabalpur (M.P.) India
[3]Jawaharlal Nehru Krishi Vishwa Vidyalaya (KVK), Panna (M.P.) India

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INTRODUCTION

Soybean (*Glycine max* L.) is one of the most valuable dominant oil seed crop. It is a good source of vegetable protein and oil (Herridge *et al.,*2008). It is mainly cultivated in USA, Australia, Africa, Europe, Japan and India. United State of America leading first position in area and production. In India, major producing area found in Maharashtra, Gujarat, Chhattisgarh and Madhya Pradesh but productivity is much less than USA. Soybean crop in Madhya Pradesh know as yellow Gold. But from last few years both area and productivity dramatically going to decline. Soybean though suffer from various insect pest and diseases which caused heavy losses in favourable environmental condition to the crop. Important damagers pests of soybean are whitefly, stem fly, girdle beetle, tobacco and chickpea caterpillars, pod borers but its can be controlled under economic injury level after identification by the application of IPM practices at time. Soybean plants are susceptible to yellow mosaic caused by yellow mosaic virus besides wet/dry root rot (charcoal rot) and stem rot caused by soil and seed born pathogens and Among the mentioned diseases, charcoal rot of soybean caused by the polyphagus fungus *Macrophomina phaseolina is a very dangerus and important disease* infect plants from seedling stage to maturity with peculiar symptoms such as development of radish brown lesion on the hypocotyls, which become ash grey and lastly turn black.The presence of small, black sclerotia in the cortical tissue confers the charcoal appearance that give the disease its name (Mengistu *et al.,* 2015). This pathogen infects a wide host range of nearly 500 species in more than hundred families including other important crops such as cotton, chickpea, corn, moong bean and common bean (Srivastava *et al.,*2001). *Macrophomina phaseolina* (Mp) fungus enable to adopt in different environmental conditions and became widely distributed geographically with new strain/biotypes (Su *et al*., 2001). The fungus Mp also infected mature plants with clear chlorotic lesion on the leaves, which then die but remain attached to the stem and finally the plants die prematurely in the presence of water stress and high temperature (Reznikov *et al.,* 2016). In India, numbers of agricultural improvement programme have been introduce to increase the agricultural production and income of the farming community time to time, but the results of these programme is not satisfactory for achieving higher agricultural production. The most important factor came in light after filtration for this poor outcome was lack of understanding by the farmers about various technological recommendations given by the scientific communities. As a result more emphasis on farmers training, Kisan Mobile Advisory, field demonstration visit at farmer field, kisan mela like activities are being organized by the ICAR, SAUs and state Deportment of Agriculture. All these activities increases the technical efficiency of the farmer. Soybean area in Narsinghpur district gradually going to decreased and covered by paddy cultivation by the regular occurrence of charcoal rot and yellow mosaic like destructive diseases in soybean. Besides, other reasons are not availability of good soybean seeds, low rainy period and unavailability of good bio pesticides/ cultures (Bt, Bb, trichoderma, pseudomonas, rhizobium). In order to evaluate the impact of training and during crop period, performance of soybean varieties and other activities of KVK, the present study was taken under cluster front line demonstration programme with 75 farmers in four villages with the objective to asses the awareness of the farmers, adoption of the soybean varieties against destructive diseases and economical net profit of the farmers.

MATERIAL AND METHODS

Before going to conduct an experiment on the management of both destructive diseases of soybean *viz.,* charcoal rot and yellow mosaic, socio-economic personal profile of the total 75 farmers were collected through interview. For collecting information a semi structure interview schedule was designed and communicated through Kisan Mobile Advisory to all the farmers of respective villages. At decided date and place, we have collected necessary information about the farmers and also answered their problematic questions about reduction of soybean productivity in the meeting. Technical trainings on agronomical and plant protection aspect were schedule to organize to find out the basic

knowledge about soybean cultivation. Before training we have designed a questionnaire for examined their basic knowledge about soybean cultivation process including application of IDM practices and same trained was adopted after training for justification in the change of knowledge level. Soybean area and production gradually declined and came from one lack hectare to 22 thousand hectare areas in the Narsingpur district in last five years. In this saturation, we have convinced and satisfied all the respondents and selected them for soybean cultivation. After extensive survey, discussion with farmers for their faced problems in last years during soybean cultivation results came in hand that soybean diseases and early rain set are the main constraints for decreased the yield. So, after considering the problems in mind, an experiment was conducted during the *Kharif* season in the year 2017 and 2018 with four soybean verities namely JS 20-29, JS 97-52, RVS 2001-4 and JS20-69 in four replications of each variety and control plot (FP) was also maintained. Soil of each experimental plot was treated with trichoderma@5kg/ ha mixed in 50kg vermicompost before sowing. Seeds of each variety were treated with trichoderma@5g/kg +thaiomethaxam 3g/kg + carbendazim@2.5g/kg before three hours of sowing. Standing crop sprayed after 25 DAS of sowing with trizophos@1lit/ha for the initial management of white flies which play important role in disseminating the yellow mosaic virus. Second preventive spray was done with tebuconozole fungicide@500ml and thiomethaxam@ 150g/ha just before flowering for the management of charcoal rot and YMV carriers. The field experiment was established in Randomized Block Design. All the needed agronomical practices were applied during the crop period. Farmer practices applied in each control plot by farmer it self. Data on diseases incidence were recorded during crop period and analyzed and mean value of both years data mentioned in respective table. Yield data of each variety recorded after harvest of the crop and average values taken for consideration. Sold rate of produce was Rs. 3000/q. Extension gap and technological gap were calculated as per formulae given by Samui *et al*. (2000).

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Socio- economic profile of respondents:

Results of the personal contact of the farmers summarized in Table 1 indicated that majority of farmers (60%) came under small land holders categories having only 3.0 ha cultivated area whereas 13.33% farmer occupied more than 10ha cultivated areas considered large land holding farmers. More than 57% young respondents having age below 35 years found more aggressive in agricultural work than old age (>50years) whose interest was 26.66% followed by middle age groups (35-50 years). As for as educational level was

Table 1: Socio- economic profile of the respondents **(n=75)**

Socio-economic profile	Categories of respondent	Number of respondents	Percentage
Land holding	Small farmer(< 3 ha)	45	60.00
	Medium farmer(3-10 ha)	20	26.66
	Large farmer(>10 ha)	10	13.33
Age	Young(<35 years)	43	57.33
	Middle(35-50 years)	12	16.00
	Old (>50 years)	20	26.66
Education	Low (up to 10^{th})	11	14.66
	Medium(10-12^{th})	42	56.00
	High (Graduation and above)	22	29.33
Enterprise	Agriculture	59	78.66
	Plus dairy	05	06.66
	Plus horticulture	11	14.66
Knowledge level in IDM	Low	60	80.00
	Medium	10	13.33
	High	05	06.66

concerned, 56% respondents were of medium category having education between 10th to higher secondary. Nearly 29% respondents had high qualification (Graduate and above) level while14% were of low educational level. Majority of respondents (78%) was engaged in Agricultural enterprise followed by horticulture+ (14.64%) including vegetables, orchards and flower cultivation than dairy (6.66%). Kisan mobile Advisory service started with the aim to quick passing of new agricultural technologies to the mass of farmers on needed aspects. But it was seen that low level of farmers (80%) always read the sent information but not applied under field condition. Only 6.66% farmers known about integrated pest and diseases management practices. Dubey *et al.* (2008) reported that below 30 years respondents with medium qualification had their more engagement with interest in agriculture than those having higher qualification.

Impact of trainings for change in knowledge of respondents:

In order to asses the impact of training programmes on the knowledge level of farmers regarding application of IDM practices in soybean, the data were categorized in to before and after training and summarized in Table 2. It was observed that initially eighty per cent farmers had low knowledge of IDM followed by medium (13.33) and only 6.66% farmers was aware about disease management practices whereas after acquiring trainings the value were changed having 10% for low,11% medium and more than 79% high level of knowledge. So, it might be indicated that trainings organized by KVK either on campus or off campus in hence, the level of farmer's knowledge. The present findings were totally agreed with the results reported by Dubey *et al.* (2008) and Murthy and Veerabhadriah (1999). Kumar *et al.* (1994) reported that on campus agricultural related training have more knowledge than off campus trainings.

Disease management and yield gap analysis of soybean cultivars:

Results of the experiment given in Table 3 indicated that incidence of yellow mosaic and charcoal rot diseases were less in demonstration plots in comparison to control farmer practices plot. Incidence of both diseases was also varied from variety to variety of soybean. Among the demonstration trial, highest incidence of yellow mosaic disease was found in RVS2001-4(8.79%) followed by JS20-29(5.57%) and JS97-52 (2.32%) whereas no incidence was observed in JS 20-69. Under farmer practice. YMV infection was minimum in JS20-69 followed by JS 97-52 while higher noted RVS2001-4. YMV directly not only affected the plant growth but also had greater effect on flowering and fruiting stages. It was observed that YMV affected plot either unable to bear the fruits (pods) or very few pods appear and dried prematurely. Second destructive charcoal rot disease incidence noted minimum in JS 20-69 than other cultivated varieties of soybean. Results revealed that RVS2001-4 affected maximum (14.15%) with charcoal rot infection than JS20-29in comparison to JS97-52 whereas minimum incidence was recorded in JS20-69. higher infection of charcoal rot. Overall control plot (FP) affected more severely than demonstration plot and it was due to none

Table 2: Impact of training in change the knowledge level of respondents

Categories of respondent	Knowledge level(%) before training	Knowledge level (%) after training
Low	80.00	10.00
Medium	13.33	12.00
High	06.66	78.00

Table 3: Performance of soybean varieties against charcoal rot and yellow mosaic, yield and net profit

Variety	Disease incidence (%) in demonstration		Disease incidence (%) in farmer field		Demons-tration yield (q/ha)	Farmer practice yield (q/ha)	Yield increased (%)	Extension gap	Technolo gical gap	Net rrofit (Rs./ha)	B:C ratio
	YM	CR	YM	CR							
JS 20 -29	5.57	13.83	11.67	18.73	12.72	10.60	20.43	2.12	7.28	20660	1:2.12
RVS 2001-4	8.79	9.67	14.15	15.87	14.57	12.59	15.73	1.98	7.43	24710	1:2.30
JS 97 - 52	2.32	4.19	6.12	6.39	10.33	8.49	21.67	1.84	11.67	12990	1:1.79
JS 20- 69	0.00	3.47	1.12	8.75	17.39	13.17	32.04	4.22	4.61	34170	1:2.89

application of trichoderma in seed and soil treatment. In the present investigation, it might be seen that seed treatment with trichoderma plus thiamethoxam and soil treatment with trichoderma have greater effects in minimized the incidence of both diseases in comparison to control plot. Variety also differs in their reaction charcoal rot. Present results agree with those reported by Ramayana (2008). Both seed treatment and sprayed crop with thiamethoxam provided protection to moongbean crop from infestation of white fly and reduced MYMV disease (Ganapathy and Karuppiah, 2004 and Dubey and Singh, 2013). Khaledi and Taheri (2016) reported that seed and soil treatment with trichoderma was capable of induce phenolic compound in soybean plants against *M. phasealina*. Phenolics oxidized byperoxidases to form more toxic compound,knowledge as quinines which are directly toxic to fungal pathogens (Gogoi, 2001).

Yield gap analysis and net profit of soybean crop:

The entire demonstration plot gave more yield than control FP plot. Yield gap analysis results indicated that, JS 20-69 produced highest (17.39q/ha) yield followed by RVS2001-4(14.57q/ha in compassion to JS20-29 and JS97-52.). Whereas in farmer practice 13.17q/ha yield obtained in JS20-69 and it was significantly more than JS 20-29 and JS97-52(8.49q/ha). Timely application of bio-agent and chemical pesticides for seed/soil treatment plus spray and change of knowledge through technical training to the farmers during crop period play an important role in enhancing the soybean productivity. The ratio of yield increased was 15.73% to32.04% over control FP. The above finding was in agreed with Dubey *et al.,* 2010. As well as extension gap is concern, it was 1.84q/ha to 4.22q/ha depend on the varieties and extension activities. However, highest technological gap(11.67/ha) noted in JS97-52 and lowest (4.61/ha) was in JS20-69. It was seriously observed that, technological gap can be minimized by timely supply of good variety, provide innovative cultivation approaches through training/pumplets, make sure timely availability of quality bio-agent for seed and soil treatment along with convince farmers for summer ploughing. Highest net profit (Rs. 34170/ha) and B:C ratio found in JS20-69 and it was lowest in JS 97-52. Results of the present experiment showed that soybean variety JS97-52 can not be recommended for Narsinghpur climatic condition for cultivation. Besides charcoal rot and YMV this variety also severely affected with girdle beetle insect pest, rhizoctonia aerial blight disease and long dry rainy spell.

Constraints in adoption of IDM practices:

A training was organized after harvested of the crop to know the major constraint came in the production of soybean crop are summarized in Table 4. It is observed that 94.66 per cent respondents were face difficulties recording lack of knowledge for identification of beneficial and damager pests followed by unavailability of quality bio-pesticides (93.33%) such as trichoderma, NPV, *Bavaria basiyana* and bio-fertilizers (81.33%) at local level for pests and diseases management. Besides above problems, unavailability of trained labours (78.66%), quality seed (68%), rate of wages and problems of storage were also the important and time needed constraints. Keeping in view the findings of present study, it is recommended that to overcome these constrains the efforts of this regard need to be intensified through demonstrations, trainings, field days etc., which

Table 4: Main identified constraints of farmers responsible for decreasing the soybean productivity

Sr. No.	Constraints	No. of respondent faced	Percentage
1.	Unavailability of trained labour at time	59	78.66
2.	Unavailability of quality seed	51	68.00
3.	Unavailability of bio-pesticides	70	93.33
4.	Unavailability of quality bio-fertilizers	61	81.33
5.	Higher cost of chemical pesticides	30	40.00
6.	Lack of technical guidance during crop period	28	37.33
7.	Lack of knowledge for identification of pests and diseases	71	94.66
8.	Unavailability of Gov. Perches agency at local level	35	46.66
9.	Rate of wages	47	62.66
10.	Problems of storage	45	60.00

will be help to increase the interest, knowledge of farmers in the adoption of improved IDM practices and also certainly increase the area of soybean for cultivation. In feature, chemical fungicides should be replaced with bio –agents because of the emergence of fungicide-resistant fungal isolates and public concern regarding the health and environmental inputs of these chemicals. Host resistance may be a practical method to manage the disease. However, soybean genotypes with high level of resistance have not been identified.

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