Journal of Global Biosciences
ISSN 2320-1355
Volume 7, Number 8, 2018, pp. 1-1
Website: www.mutagens.co.in

Research Paper

HERBICIDAL WEED MANAGEMENT IN WHEAT *(Triticum aestivum)* THROUGH FRONT LINE DEMONSTRATION IN FARMER'S FIELD

Dwivedi, R.K.[1], A. K. Shrivastav[1] and N. K. Pandre[2]

[1]JNKVV Krishi Vigyan Kendra, Damoh (M.P.),
[2]JNKVV Krishi Vigyan Kendra, Panna (M.P.),
India.

Abstract

The front line demonstrations of wheat were conducted on farmers field of Damoh district during *rabi* season of 2015-16 and 2016-17 at two different location under irrigated condition. Prevailing farmers practices were treated as control for comparison with recommended practice i.e. application of Clodinofop propargyl 15 % + Metsulfuron methyle 1 % @64g a.i. /ha at 25-30 days after sowing (DAS). The result of front line demonstration conducted by Krishi Vigyan Kendra Damoh shows a greater impact on farming community due to significant increase in crop yield greater than farmers practice. The economics and benefit cost ratio of both farmers practice (FP) and recommended practice (RP) were worked out. The weed intensity and weed biomass were found lower under RP (17.5/m^2 and 12.7 g/ m^2) than FP (135 /m^2 and 107 g/ m^2). An average of Rs. 37400/ha was recorded net profit under RP while it was Rs. 20500/ha under FP. Benefit Cost Ratio was 2.49 under RP, while it was 1.73 under FP. By introducing the proven technology i.e. chemical weed management, yield potential and net income from wheat in irrigated condition can be enhanced to a great extent with increase in the income level of the farming community of the district.

Key words: Wheat, Front line Demonstration, farmers practice recommended practice, B.C. ratio.

INTRODUCTION

Wheat is the most important and widely cultivated cereal crop in the world. Wheat occupies 22% of total area under food grains in India constituting 36% (90.7mt) of total food produced from 30.4mha during 2016-17. There are several constraints to achieve desired yield potential of wheat, but major detriments to attain higher productivity of wheat are stiff competition from weeds, multiple nutrient deficiencies, insect-pests and incidence of diseases. Infestation by different species of weeds in wheat is one of the major problems faced by the farmers and severe weed competition has resulted from the change in morphological characteristics of wheat varieties and shift in sowing paradigm over a period of four decades. Moreover, high initial soil moisture and

low temperature at sowing leads to severe infestation by grassy and non grassy weeds. Anjuman and Bajwa (2010) reported that selected wheat varieties incurred 60-65% biomass loss due to weed infestation. The effect was evident on tillering capacity which decresed by 41.6%. Among the different weed species, the infestation by little seed canary grass (Phalaris minor) in wheat is rampant and it alone divests the crop of 42.2 kg N, 6.5 kg P and 71.6 kg K/ha (Walia and Gill,1985a). Weeds also interfere with harvest and lower the quality of grains. Yield loss and harvest problems caused by weed species in wheat will vary depending on the weed species, weed population, time of weed emergence, growing conditions and status of wheat crop. A healthy stand of wheat that has a head start on weeds is competitive and will suppress weed growth. However, increased uptake of mineral nutrients in weeds often results in a significant competitive advantage over crop species. Use of clodinofop-propargyl is one of the herbicide which has been found promising against grassy weeds, particularly for Phalaris minor biotype (Brar et al.,2003). Phalaris minor has been observed to emerge in several flushes in the growing season of wheat and its early sowing is recommended for effective weed management (Malik and Singh, 1993). New herbicides recommended for the control of Phalaris minor (fenoxaprop-p-ethyl, clodinofop-propargyl and sulfosulfuron) vary in their efficacy on different weed species of wheat and several factors viz.; moisture at spraying, stage of weeds, water volume, nozzle types and application methods contribute for their weed control efficacy (Walia & Brar,2006 and Yadav et al.,2006). In Damoh District wheat accupaies 30% of total cropped area of Rabi season (95000 ha wheat of total 37000 ha Rabi area).

Farmers utilized the resources mainly seeds, fertilizers and irrigation on wheat but they ignore the proper weed management and many times crop is facing severe weeds problem. Although dominant weeds in wheat are brads-leaved weeds in the district but some potential villages had been facing severe problem of grassy weeds viz.; *Phalaris minor* and *Avena fatua*. Hand weeding is although traditional method of weed management but farmers are doing slight hand weeding at flowering stage. (uprooting of weeds) but crop faced the severe competition up to that period, resulting the poor yield of wheat. Chemical weed management is although effective, cheaper, less time taking and easy adverse soil and climatic conditions but due to lack of awareness, farmers of the district are not adopting this technology. Hence an effort was made by the KVK scientists to demonstrate the clodinofop-propragyl 15% +metsulfuron methyl 1%@64g. a.i./ha.at 25-30DAS on wheat during Rabi season of 2015-16 and 2016-17.

MATERIAL AND METHODS

The present study is a part of the mandatory programme of Krishi Vigyan Kendra, Damoh (M.P). Participatory Rural Appraisal (PRA), group discussion and transect walk were followed to explore the detail information of study are.between the technology vintervention HRD components (Trianings/Kisan sangoshti/Kisan mela/Field day etc.) were also include to excel the farmers understanding and skill about the demonstrated technology on chemical weed management in wheat under irrigated conditions. The front line demonstration conduct in Twenty four farmers field at Bamori and Jortala villages on wheat cv Lok-1 under irrigated conditions during winter season of 2015-16 and 2016-17. The soil was clay loam in texture with High water holding capacity, medium in organic carbon (0.51-0.71%), low to medium in available nitrogen (132.5-281.3 kg/ha), medium to high in available phosphorus (12.8-23.6 kg/ha) and low to medium in available potassium (213.5-316.8 kg/ha). The soil pH was neutral in reaction (7.1-7.4). What cultivar “Lok-1” was sown (most popular variety of wheat grower in the

district) between last week of November to first week of December in rows, 20cm apart at the rate of 100kg seed/ha during winter seasons of 2015-16 and 2016-17, respectively. Wheat received recommended does of nutrients (80kg N, 60kg P2O5 and 40kg K2O/ha) of which nitrogen was applied in three equal splits i.e. basal (at the time of sowing), active tillering and at panicle initiation stages while P and K applied as basal.

All the above practices adopted on both RP and FP plots. Under RP plots clodinafop-propargyl 15% + metsulfurn methyl 1% @ 64g ai/ha used knap sack sprayer in 0.4ha area at 25-30 DAS for chemical weed management while farmers practice plots treated as one slight hand weeding (uprooting) when weeds came to flowering stage (existing practice). Data on weed intensity and weed dry matter was recorded at 60 DAS with the help of quadrate(0.5m x 0.5m) placed at two places her plot and then converted to per square meter. All other steps like site and farmers selection, layout of demonstration, farmer participation etc. were followed as suggested by Choudhary (1999), visit of the farmers and the extension functionaries were organized at demonstration plots to disseminate the message at large. Yield data was collected from FP and demonstration plots; other parameters i.e. number of tillers/m2, biological yield (q/ha), harvest index (%), gross expenditure (Rs/ha), net returns (Rs/ha) and befefit cost ratio were computed and finally the extension gap, technology gap and technology indepx were worked out. To estimate the technology gap, extension gap and technology intex, following formula have been used.

$$\text{Technology Index} = \frac{(Pi\text{-}Di) \times 100}{pi}$$

Where,
Pi-Potential yield of ith crop
Di- Demonstration yield of ith crop

RESULTS AND DISCUSSION

Study on weed parameters: Demonstration field was infested with grassy (Phalaris minor and Avena ludoviciana) and broad-leaved weeds *(Chenopodium album, Vicia sativa* and *melilotus alba)*. Amongst them *Phalaris minor* was the most dominent weed in demonstration area while *Chenopodium album, Vicia sativa and Melilotus alba* were found in lower intensity (Table.1). The herbicidal treatment i.e. clodinofop-propargyl 15% + met sulfurn methyl 1% @ 64g ai/ha (RP) Weed intensity and weed biomass were calculated at 60 DAS . Under herbicidal treatment (RP) weed intensity and weed biomass were found in lower range (17.5/m2 and 12.7 g/m2) while higher under FP treatment (135/m2 and and 107.5.g/m2). Data showed the greater impact of herbicidal treatment (RP) on wheat farmers practice (slight hand weeding) was not effective to sufficient impact of herbicidal treatment (RP) on wheat crop while farmers practice (slight hand weeding) was not effective to sufficient weed control in wheat.

Yield attributes and biomass yield analysis: The yield attributing characters have direct influence on the crop productivity and for increasing the yield. In the present findings number of tillers was influenced positively due to herbicidal treatment. Thus, the maximum number of tillers 407/m2 was noted in case of herbicidal treatment (application of clodinotop propergyl 15% + metsulfuron methyl 1% @ 64g ai/ha Comapred to farmers practice i.e. 289 tillers/m (Table.1). Application of clodinofop-proprgyl 15% + met sulfuron methyl @ 64g a.i./ha (RP) as post emergence (25-30 DAS) increased the quantitative parameters of wheat. High grain and biological yield of wheat (32) and 91.3q/ha) were observed in RP over FP (25 and 80 q/ha), respectively

Moreover ear length (cm) , No. of grains/car, and 1000 grain weight (g) were found higher under RP(9.5, 63.2 and 42.1, respectively) than farmers practice plots (7.8,40.3,42.1,respectively) brar et al. (2003) also reported the similar findings on wheat. The maximum increase in wheat yield was noted due to herbicidal treatment in RP, while increase the yield attributing characters responsible for higher yield. Among both the treatment harvest index was observed (Table.1) 31.2% and 35% in farmers practice (FP) and herbicidal treatment (RP) , respectively. This variation may be due to minimize the crop-weed competition in RP. Harvest index (HI) was found higher in herbicidal treatment where maximum weed control was occurred and minimum HI was associated with farmers practice. This means that sufficient weed control offered the sufficient availability of sun light, space, plant nutrients, space and water availability which was finally resulted in to superior crop harvest. Walia & Gill (1985a) and Malik & Singh (1993) also reported the similar findings in wheat.

Economics: Economic indicators i.e. gross expenditure (Rs/ha), net returns (Rs/ha) and benefit cost ratio (BC ratio) of front line demonstration are presented in Table-3 The data clearly revealed that, the net returns from the recommended practice were substantially higher than FP plots during both the years of demonstration (Table.3). Average net returns from RP were observed to be Rs/ 37400/ha in comparison to FP 20500/ha. On an average Rs. 16900/ha as additional income is attributed to the technological intervention provided in demonstration plot i.e. application of clodinofop-proparyl 15% + met sulfurn methyl 1% @64 g.ai./ha (RP) as post emergence (25-30 DAS). Economic analysis of the yield performance and FP plost were 2.41, 2.57 and 1.65, 1.81 during 2015-16 and 2016-17, respectively. Hence, favorable BC ratio proved the economic viability of herbicidal weed control under demonstration and convinced the farmers on the untility of intervention . Brar et al. (2003) also reported the similar finding on wheat.

Extension and technology gap:

The extension gap i.e. 7q /ha during the period of study emphasized the need to educate the farmers through various means for the adoption of improved agricultural production to reverse the trend of wide extension gap (Table.2) The trend of technology gap ranging between 7-9q/ha reflected farmer's cooperation in carrying out such demonstation with encouraging results in both the years. The technology gap observed may be attributed to the dissimilarity in weather condition. The technology index showed the feasibility of the evoived technology at the farmer's field. The lower the value of technology index, the more is the feasibility of the technology. As such, the reduction in technology index from 17.5% during 2016-17 to 22.5% during 2015-16 exhibited the feasibility of the demonstrated technology in this region (Table.2).

Table.1 Performance front line demonstration of wheat as affected by recommended practices as well as farmer's practices (mean of two years).

S	Parameters	Treatment	
		Recommended Practice(RP)	Farmers Practice(FP)
1.	Number of tillers/m2	407	289
2.	Grain yield (q/ha)	32	25
3.	Biological yield (q/ha)	91.3	80
4.	Harvest index (HI%)	35	31.2
5.	Ear length (cm)	9.5	7.8
6.	No of grains/ear	63.2	40.3

7	1000-grain weight (g)	42.1	40.1
8.	Weed intensity (m-2)	17.5	135
9.	Weed biomass (g/m2)	12.7	107.5

Table.2 Productivity, Technology gap, Extension gap and Technology index of wheat as affected by recommended practices as well as farmer's practices.

Year	Area(ha)	No of Farmers	Grain yield (q/ha)			% increase over RP	Technology gap (q/ha)	Extension gap (q/ha)	Technology Index (%)
			Potential	RP	FP				
2015-16	4.8	12	40	31	24	29.1	9	7	22.5
2016-17	4.8	12	40	33	26	26.9	7	7	17.5
Total	9.6	24	40	32	25	28	8	7	20.0

HRD components: To increase the understanding and skill of the district and villages about recommended technology of chemical weed management in wheat; various training programmes, radio talk, field day, Kisan Sangosthi, CD shows, folders (technology manual) and kisan Mela were organized both at district level and village level. These human resource development components not only helped in proper understanding of the technology required to adopt farmers themselves compared in actual recommended practice plots with farmers practice plots (Table.4).

Table.3 Economices of Front line demonstration of wheat as affected by recommended practices as well as farmer's practices.

Year	Field (q/ha)		% increase over FP	Gross expenditure Rs/ha		Gross Return (Rs/ha)		Net Return Rs/ha		B:C ratio	
	RP	FP		RP	FP	RP	FP	RP	FP	RP	FP
2015-16	31	24	29.1	25000	28000	60450	46300	35450	18300	2.41	1.65
2016-17	33	26	26.9	25000	28000	64350	50700	39350	22700	2.51	1.81
Mean	32	25	28	25000	28000	62400	48500	37400	20500	2.49	1.73

Table.4 HRD component : Cumulative data of 2015-16 and 2016-17.

S.	HRD component	Frequency	Beneficiaries
1	Training	10	642
2	Radio talk	2	Mass
3	CD shows	4	245
4	Kisan mela	2	3415
5	Kisan sangosthi	4	75
6	News paper converge	11	Mass
7	Folder	1	mass

Thus, the application of clodinofop propargyl 15 % + Metsulfuron methyl 1 % @ 64 g a. i. ha at 25-30 days after sowing has been found effective against phalaris minor by which be which wheat productivity and productivity and profitability increased to farmers practice in wheat under irrigated conditions.

REFERENCES

Anjuman, T. and Bajwa, R. (2010) the philipine Agricultural scientist,93 (3)

Brar,L.s.; Mahajan, G. Boperai, B.s. and sardana, V. (2003). In: Biennial Conference of Indian society of weed Science, pantnagar,p. 14

Choudhary, B.N.(1999) Krishi Vigyan Kendra- a guide for KVK mangers. Pub. Division of Agricultural Extension, ICAR; pp. 73-78.

Malik, R.K. and singh,s. (1993) In : proceeding of the ISWS International symposium on Integrated Weed Management for sustainable Agriculture, Hisar, pp. 225-228

Walia, U.S. and Brar, L.S. (2006) *Indian j. Weed sci*., 38:207-212.

Walia, U.S. and Gill, H.S. (1985a). *Indian j. Weed sci*., 17:12-17.

Yadav, A. K,; Malik, R.K,; Gill, Gurjeet, singh, chauhan, B.S. and Belinder, R.K.(2006) *Indian j. Weed Sci.* ,38:194-206