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Herbicidal weed management in chickpea (*Cicer arietinum*) through front line demonstration in Farmers field

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Abstract
The domestic requirement of pulse had been manifold of a modern living standard which has been fulfilled through the imports that leads to imbalance the Indian economy. To fulfil the domestic demand and to boost the production and productivity of chickpea, the major constraints are still competition from Weeds. Keeping this view in mind, one front line demonstration on herbicidal weed management in chickpea was conducted at farmer's field by Krishi Vigyan Kendra Damoh. Demonstrations were conducted in twenty four Farmers field at Jortala and Bandakpur village on chickpea c.v. JG12 during winter season of 2019-20 and 2020-21. Prevailing farmers practices were treated as control for comparison with recommended practice i.e. application of pendimethalin 38.7 cs @700ml ai/ha at 0-3 day after sowing (DAS) The result of front line demonstration shows a greater impact on farming community due to significant increase in crop yield greater than farmers practices. 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 (7/m2 and 10.5g/m2) then FP (65/m2 and 95.7 g/m2) an average of Rs 36328/ha was recorded under RP while it was Rs 26065 under FP. Benefit cost ratio was 2.54 under RP, while it was 2.34 under FP. By introducing the proven technology i.e. Pre-emergence use of pendimethalin 38.7 cs @ 700 ml ai/ha in chickpea yield potential and net income from chickpea can be enhanced to great extent with increase in the income level of the farming community of the district.

Keywords: Chickpea, frontline demonstration, farmers practice, recommended practice

Introduction
Chickpea (*Cicer arietinum* Linn) is a major rabi pulse crop grown in India. Among the pulses, chickpea, occupies 30% of area with 38% of annual production in India. In Madhya Pradesh, Chickpea occupying about an area of 73.3 lakh ha with the production of 79.7 lakh tonnes and productivity of 1087kg/ha. There are several constraints to achieve desired yield potential of chickpea, but major determents to attain higher productivity of chickpea are stiff competition from weeds, multiply nutrient deficiencies, insect pest and incidence of disease. Weeds also interfere with harvest and lower the quality of grains. A healthy stand of chickpea that has a head start on weeds in competitive and will suppress Weed growth. Use of pendiethalin 38.7 cs @ 700 ml ai/ha at 0-3 DAS has been found promising against major weeds. (*Vyas et at* 2003) [2]

Herbicidal Weed Management is although effective, cheaper, less time taking and easy in 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 Scientist to demonstrate the pendimethaline 38.7 cs @ 700 ml a.i/ha at 0-3 DAS on chickpea during Rabi season of 2019-20 and 2020-21.

Material and Method
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 the technological intervention. HRD components (Training, Kisan Sangosthi/ Kisan Mela/ Field day etc.) were also include to excel the farmers understanding and skill about the demonstrated technology on herbicidal Weed management in chickpea under rainfed conditions. The front line demonstration conduct in twenty four farmers field at Jortala and bandakpur village on chickpea c.v JG12 under rainfed condition during winter season of 2019-20 and 2020-21. Chickpea cultivar JG12 was sown between last

week of October to first week of November with the rate of 75 kg seed/ha. Chickpea received recommended dose of nutrient (20 kgN, 40 kg P 2O5 and K2O 20 kg per ha) as basal (at the time of sowing) all the above practices adopted on both RP and FP plots. Under RP plots Pendimethalin 38.7 cs @ 700 ml ai /ha at 0-3 DAS used knap sack sprayer in 0.4 ha area, while farmer practice (FP) 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 50 DAS with the half of quadrate (0.5m x0.5m) placed at two places per plot and than converted to per square meter. All other steps like site selection, layout of demonstration, farmer participation etc. were followed as suggested by Choudhary (1999), visit of the farmers and extension functionaries were organized at demonstration plots to disseminate at large. Yield data was collected from FP and RP other parameters i.e biological yield (q/ha), harvest index (%), gross expenditure (Rs/ha), net returns (Rs/ha) and benefit cost ratio were computed and finally the extension gap, technology gap and technology index were worked out. To estimate the above, following formula (*Samui et al.* 2000) [1] have been used.

Technological gap = Potential yield – demo. Yield.
Extension gap = Demo. Yield – farmers yield.

$$\text{Technology Index} = \frac{\text{Potential yield} - \text{demo yield}}{\text{Potential yield}}$$

Results and Discussion

The herbicidal treatment i.e. spray of pendimenthalin 38.7 cs @ 700ml ai/ha at 0-3 days after sowing (DAS) was used in RP and weed intensity and weed biomass were calculated at 50 DAS. Under herbicidal treatment (RP) weed intensity and weed biomass were found lower range (7/m2 and 10.5 g/m2). While higher under FP treatment (65/m2 and 95.7g/m2). Data showed the greater impact of herbicidal treatment (RP) on chickpea while farmers practice (Slight hand weeding) was not sufficient for weed control.

An average yield was recorded 15.4 q/ha under RP as compared FP (11.7 q/ha). Among both the treatment harvest index was observed (Table 1) 32.0% and 34.2% in FP and herbicidal treatment (RP). This variation may be due to minimize the crop weed competition in RP. Harvest index (HI) was found higher in herbicidal treatment (RP) where maximum weed control was occurred and minimum HI was associated with FP. This means that sufficient weed control offered the sufficient availability of sunlight, space, plant nutrients, space and water availability which was finally resulted into superior crop harvest.

Economics indicators i.e. gross expenditure (Rs/ha), net return (Rs/ha) and benefit cost ratio (B:C ratio) of FLD are presented in Table 3. Average net return from RP were observed to be Rs 36328/ha in comparison to FP 26065 /ha. On an average Rs 10263/ha as additional income is attributed in demonstration plot i.e. application of pendimenthalin 38.7 cs @ 700ml a.i./ha at 0-3 DAS., BC of RP and FP was 2.54 and 2.34, found respectively.

The average technology gap is 4.4 q/ha reflects farmer's cooperation in carring out such demonstration with encouraging results in both year (Table 2).

On an average extension gap is 3.6 q/ha (Table 2) which emphasized the need to educate the farmers through various extension means i.e. FLD for adoption to improve production and protection technology to revert the trend of wide extension gap more and more use of latest production technology.

Technology index indicates the feasibility of the evolved technology in the farmers fields. The technology index varied from 17.5% to 27% (table 2) which showed the efficacy of good performance of technological interventions. This will accelerate the adoption of demonstrated technical intervention to increase the yield of chickpea.

Table 1: Performance of front line demonstration on chickpea as affected by RP as well as FP (mean of two years)

S. No	Parameters	Treatment	
		RP	FP
1	Grain yield (q/ha)	15.4	11.7
2	Biological yield (q/ha)	42	36.5
3	Harvest Index (%)	34.2	32.0
4	Weed intensity (m^2)	7	65
5	Weed biomass (g/m^2)	10.5	95.7

Table 2: Productivity, Technology gap, Extension gap and Technology index of chickpea as affected by RP as well as FP.

Year	Area (ha)	No of Farmers	Grain yield (q/ha)			% increase over FP	Technology gap (q/ha)	Extension gap (q/ha)	Technology Index (%)
			Potential	RP	FP				
2019-20	4.8	12	20	14.6	10.8	35.1	5.4	3.8	27
2020-21	4.8	12	20	16.2	12.7	27.5	3.5	3.5	17.5
Mean	4.8	12	20	15.4	11.7	31.3	4.4	3.5	22.2

Table 3: Economics of front line demonstration of chickpea as affected by recommended practices (RP) as well as farmer's practices (FP).

Year	Yield 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
2019-20	14.6	10.8	35.1	22413	18715	55280	41040	33067	22325	2.47	2.19
2020-21	16.2	12.7	27.5	24319	19812	63782	49617	39463	29805	2.62	2.50
Mean	15.4	11.7	31.3	23366	19263	59631	45328	36328	26065	2.54	2.34

Conclusion

By introducing the proven technology i.e. pre-emergence use of pendimethaline 38.7 cs @ 700ml ai/ha in chickpea was improved yield potential and net return with increase in the income level of the farming community of the district. Horizontal spread of improved technology i.e. chemical weed management may be achieved by successful implementation of front line demonstration and various extension activity in farmers field for wide dissemination of technology.

Reference

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