

On farm demonstration of zero tillage and herbicides in wheat

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ABSTRACT

25 field demonstrations were laid out during the *rabi* seasons of 2002-03 to 2004-05 in randomly selected two villages (Kushner and Chheri Boroda) adjoining to the National Reserach Centre for Weed Scienc, Jabalpur (Madhya Pradesh) with an objective to demonstrate the performance and profitability of zero tillage and herbicides on weed and productivity of wheat crop under rice-wheat system at farmers' fields. Higher weed density and population of *Phalaris minor* were recorded in conventional tillage than zero tillage. Maximum reduction in weed density was obtained with the application of 2,4-D and isoproturon (500g + 750 g/ha) as tank mix under ZT and CT system. Higher average grain yield and monetary returns due to treatment were also achieved under zero tillage wheat with tank mixed application of 2,4-D and isoproturon as post emergence. Yield achieved in zero tillage was comparable to conventional tillage with clodinafop application.

Key words: Demonstration, Zero tillage, Weeds, Wheat

Rice-wheat is the most predominant cropping system of India with an area of about 13 million hactars. Twenty-five percent of the total rice area of the country is grown in rotation-involving wheat, whereas 40% of the wheat is grown in rotation with rice. The productivity of this system is stagnating or declining, which is causing concern about the sustainability of rice-wheat system. Various diagnostic surveys conducted time to time in the country have identified constraints prevailing at farmers fields responsible for yield stagnation or decline. The major constraints for wheat are poor crop stand, late planting, poor soil conditions due to puddling, problem of weeds specially *Phalaris minor*, high cost of production due to excess tillage. Sowing of wheat crop under conventional tillage delays the sowing by 10 to 15 days, affecting the yield adversely. The reduction in wheat yield due to delay in sowing has been recorded as 37.5 kg/ha/day (Pal *et al.* 1996). Based on these problems zero-tillage machine was developed by G.B. Pant University of Agriculture and Technology, Pantnagar, which can sow the wheat crop after the harvest of rice crop in standing rice stubbles. It has been observed that zero tillage technique not only ameliorates the problem of delayed sowing but also reduces the incidence of *P. minor*, which is most obnoxious weed prevailing in rice-wheat cropping system. Zero tillage has certain advantages. It improves the soil conditions and reduces the cost of production. 2,4-D + isoproturon and clodinafop have been mostly recommended for control of

weeds in conventional tillage system of wheat, whether its performance remains same or not in black soil under zero tillage, needs confirmation. Therefore, the present demonstration was undertaken to asses the efficiency of herbicides and show the performance and profitability of zero tillage under black soil in wheat at farmers' fields.

MATERIALS AND METHODS

25 on-farm demonstrations were conducted for the four years period during winter season, 2002-2003 to 2004-2005 in randomly selected two locations (Village: Kushner and Chheri Boroda of Jabalpur, (Madhya Pradesh). The soils of demonstration sites were red soil to black cotton soil with normal pH. The zero tillage (ZT) consisted of direct drilling of wheat by zero till seed drill machine without any field preparation in presence of anchored rice residues. Whereas conventional tillage (CT) consisted of four to five ploughig and two-three planking. Two tillage systems *viz.*, conventional tillage and zero tillage were evaluated with 2,4-D + isoproturon (500 + 750 g/ha) and clodinafop 60 g/ha applied at 20-25 days after sowing with flat fan nozzle using 500 liter water/ha.

RESULTS AND DISCUSSION

Weeds found at demonstration sites were *Phalaris minor*, *Chenopodium album*, *Melilotus alba*, *Avena ludoviciana*, *Vicia sativa*, *Medicago hispida*, *Cynodon*

dactylon, *Anagallis arvensis* and *lathyrus aphaca*. Number of weeds recorded were substantially low in zero tillage system as compared to conventional system at all the sites. Application of herbicide mixtures effectively controlled both broad leaf and grassy weeds as compared to weedy check. The weed control efficiency (WCE) of 2,4-D + IPU and clodinafop was higher in ZT as compared to CT. Similar finding of maximum reduction in weed density and weed dry matter were obtained with application of isoproturon by (Singh *et al.* 2002).

Results also revealed that grain yield of wheat under zero tillage (3650 kg/ha) and benefit due to treatment (Rs.

12522/ha) were obtained with the application of 2,4-D + IPU. The present findings are in conformity with the finding of Bhardwaj *et al.* 2004, who obtained best yield advantage with the application of mixture of 2,4-D and isoproturon. However, there were no differences in yield and benefits in both tillage systems with application of clodinafop (yield 3450 kg/ha and benefits Rs.10800). Application of herbicide as post-emergence proved to be effective compared to no spray under zero tillage or conventional tillage (Chouhan *et al.* 2001). In addition to this, zero tillage saved around Rs. 2500/ha for land preparation and 7-8 Days sowing time.

Table 1. Performance of zero tillage and herbicides at farmers' fields

Treatments	No. of demo	Mean data of 2002-2003 to 2004-2005									
		No. of weeds/m ²		WCE (%)		Grain yield (kg/ha)		Increased yield over weedy check (%)		Benefit due to herbicidal treatment (Rs./ha)	
		ZT	CT	ZT	CT	ZT	CT	ZT	CT	ZT	CT
2,4-D + IPU (500+750 g/ha)	13	52	153	84	60	3650	3480	55	51	12525	11300
Clodinafop (60 gm/ha)	12	83	158	74	58	3450	3430	48	49	10800	10900
Weedy check	-	316	377	-	-	2350	2300	-	-		

ZT - Zero tillage; CT - conventional tillage.

REFERENCES

- Bhardwaj AK, Singh RK, Singh SP and Singh Y. 2004. Weed management in zero-tillage shown wheat. *Indian Journal of Weed Science* **36** (384) : 175-177.
- Chouhan DS, Sharma RK, Tripathi SC, Kharab AS and Chhokar. 2001. Wheat cultivation after rice – A shift in tillage technology. *Indian farming* **50** : 21-25.
- Pal SK, Kaur J, Thakur R, Verma UN and Singh MK. 1996. Effect of irrigation, seeding rate and fertilizer on growth and yield of wheat (*Triticum aestivum* L.) *Indian Journal of Agronomy* **41**(3) : 386-89.
- Singh RS, Sing VP, Govindra Singh and Yadav SK. 2002. Weed management studies in zero till wheat in rice-wheat cropping system. *Indian Journal of Weed Science* **33** : 95-99.
- Tripathi RS and Singh Ram. 2006 Zero tillage technology for sustainable and conservation agriculture. *Agricultural Economic Research Review* **19** : 217-219.