

# **Fourth International Agronomy Congress**

**Agronomy for Sustainable Management of Natural Resources,  
Environment, Energy and Livelihood Security to Achieve Zero  
Hunger Challenge**

22–26 November 2016, New Delhi, India

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**Organized by**

**Indian Society of Agronomy  
Indian Council of Agricultural Research  
New Delhi, India**



**Published in November 2016**

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Fourth International Agronomy Congress

Indian Society of Agronomy

Division of Agronomy

ICAR-Indian Agricultural Research Institute

New Delhi 110 012, India

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Printed at the Cambridge Printing Works, B-85, Naraina Industrial Area, Phase-II, New Delhi 110 028, India



## Resource use efficiency in yam production in Ekiti State, Nigeria

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The study examined the resource use efficiency in yam production in Ekiti State, Nigeria. A multistage simple random sampling technique was used to select 120 respondents using a well structured questionnaire. The study examined the socio-economic characteristics of the farmers, the system of land ownership, the constraints the yam farmers faced as well as the technical efficiency of the farmers. Descriptive statistics such as frequency counts and percentage was used while the inferential statistics used was stochastic frontier function to estimate the technical efficiency. The

findings revealed that the study area is dominated by age, male, married, experienced and small holder farmers who mostly attained secondary school level of education. The mean and maximum technical efficiency was 0.87 and 0.99, respectively. The study recommended that government should provide adequate extension and supportive services with a view of improving farming techniques with technological innovation and farm inputs should be made available at highly subsidized rates through adequate and efficient distribution to the farmers.



## Weed wiper—A tool for drudgery reduction of hill farmer and resource conservation

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In the North-Western Himalayas, finger millet, horsegram (during *kharif*), wheat and lentil (during *rabi*) are the most important rainfed crops. Weed infestation is a major problem in these crops which lead to reduction in productivity. In addition, broadcasting method of sowing, non-availability of specific herbicides and negligible use of post-emergence herbicides in these crops makes the situation more challenging. In general, weeding is done manually by women in hills, which is time consuming and labour intensive. Effectiveness, efficiency and economics broadly make chemical weed control methods more advantageous than cultural and physical methods. The prevalent herbicide application equipments are very expensive and needs to be carefully calibrated. Thus to reduce the labour and drudgery of farm women, save time and control a variety of weeds,

non-selective herbicide application in between the crop rows and in a protected way through small tools without any injury to crop plants can be a good option. Keeping these points in view, a simple, low-cost, light weight hand-held weed wiper was developed, which applies herbicide solution in between crop rows by direct contact with an impregnated absorbent surface without damaging the crops. The objective of the study was to calibrate the weed wiper for herbicide dose with volume of water and see the weed control efficiency, yield and economics in finger millet, horsegram, wheat and lentil crops.

### METHODOLOGY

The field experiment was conducted during 2013–14 and 2014–15 at the Experimental Farm of ICAR-Vivekananda

**Table 1.** Weed control efficiency and labour required in different weed control treatments

Crop	Weed control efficiency (%)		Labour requirement (man hours/ha)		Labour reduction in
	WW	MW	WW	MW	WW over MW
Finger millet	39	93	55	1602	96.6
Wheat	64	95	41	558	92.7
Horsegram	60	90	34	866	96.1
Lentil	62	91	45	885	94.9
Average	56	92	44	978	95.5

requirement. Although the weed control efficiency was higher in manual weeding (92%) than weed wiper (56%) but the former required huge labour (978 man hours/ha) (Table 1). In contrast, use of weed wiper reduced the labour requirement by 95.5% as compared to manual weeding. Stroud and Kempen (1989) had tried wick/wiper applicators to control weedy rice in rice crop by applying glyphosate. Manual weeding recorded highest grain yield in all the crops and use of weed wiper resulted into 297, 53, 76 and 33% higher yield than control in finger millet, wheat, horsegram and lentil, respectively (Table 2). On an average there was 90% increase in grain yield due to weed wiper over control. Although manual weeding recorded 24% higher yield than weed wiper

**Table 2.** Yield, cost and benefit ratio under different weed control treatments in different crops

Crop	Grain yield (kg/ha)			Cost of weed control (% of total cost of cultivation)		B : C ratio		
	WC	WW	MW	WW	MW	WC	WW	MW
Finger millet	517	2,051	2,965	9.9	60.3	0.53	1.61	0.91
Wheat	1,684	2,583	2,955	8.4	36.5	1.5	1.99	1.52
Horsegram	761	1,337	1,586	6.6	43.2	2.12	3.12	2.1
Lentil	607	807	923	9.0	48.9	1.05	1.22	0.75
Average	892	1,695	2,107	8.5	47.2	1.30	1.99	1.32

Parvatiya Krishi Anusandhan Sansthan, Almora, India. The site is located at 29° 36' N latitude and 79° 40' E longitude at an elevation of 1,250 m amsl. The experiment comprised three weed control treatments, i.e. weedy check (WC), weed control through weed wiper (WW) and manual weeding (MW). In weed wiper treatment, non-selective herbicide, glyphosate 41% SL, was applied for post-emergence weed control through the newly developed prototype while in manual weeding, one manual hoeing was done to control the weeds. The weed wiper and manual weeding treatments were applied at 25, 55, 30 and 60 days after sowing in finger millet, wheat, horsegram and lentil, respectively. All the four crops were sown as per recommended package of practices.

## RESULTS

In weed wiper treatment, the herbicide dose used was 1.975, 1.792, 1.692 and 2.013 l/ha in finger millet, wheat, horsegram and lentil, respectively with corresponding values for volume of water used being 395, 358, 338 and 403 l/ha, respectively. The capacity of weed wiper was 0.018, 0.024, 0.031 and 0.024 ha/h in finger millet, wheat, horsegram and lentil, respectively with 55, 41, 34 and 45 man hours/ha labour

but it incurred very high cost of cultivation. For weed control, manual weeding contributed 47.2% of the total cost of cultivation as compared to only 8.5% in case of weed wiper. The cost of weeding in these crops with wiper was found 89.9% less as compared to manual weeding. Thus, weed wiper proved very economical in terms of weed control and gave highest B : C ratio (1.61, 1.99, 3.12 and 1.22 in finger millet, wheat, horsegram and lentil, respectively). Proportionately more increase in cost of cultivation than increase in grain yield resulted into low B : C ratio (1.32) in manual weeding.

## CONCLUSION

Relatively simple, low-cost, light weight hand-held weed wiper appears to be new tool for drudgery reduction saving labour and time. It was also found to be effective in terms of yield with favourable economics for weed control. The prospect warrants accelerated investigation and follows up.

## REFERENCES

- Stroud, D. and Kempen, H.M. 1989. Wick/Wiper. In: *Principles of Weed Control in California*. California Weed Conference. Thomson Publication, Fresno, pp. 148–50.