Drudgery reduction among farm women through innovative cotton harvesting bag: a study in Maharashtra, India

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 Received: 09.01.2020/Accepted: 19.02.2020

ABSTRACT

Cotton harvesting is a laborious task performed mostly by women farm workers. Farm Science Centre, Central Institute for Cotton Research, Nagpur, Maharashtra has designed cotton harvesting bags as per standard anthropometric measurements. The ergonomically designed bag is ready to use and promotes ease in tying, picking, load carrying and emptying in comparison to traditional back and front loading cotton harvesting bags. A study to assess efficiency and comfort in use of the bag was carried out in Wardha district of Maharashtra, a predominantly cotton growing area in 2015-16. It was found that more area was covered in an hour and 25 per cent more cotton was harvested in comparison to traditional system; 65 per cent women reported that the bags were most feasible to use for cotton picking. In overall 70 per cent women expressed that their drudgery was reduced by using these bags.

Keywords: Cotton harvesting bags; cotton picking; drudgery; farm women; harvesting efficiency

INTRODUCTION

The women workforce in agriculture and allied sectors in India is estimated to be around 92 million which amounts to 40 per cent of the total rural workers in the country (Singh et al 2007). In cotton growing areas harvesting of the crop or cotton picking is an important source of employment for rural women providing supplementary income to rural farm and non-farm households. A large majority of these women are illiterat earning from cotton picking activity which generally lasts for three to four months of the year and is often their only source of income. On an average they work 8 hours a day and pick 40-50 kg of cotton. Girls aged six years and above and women are involved in this activity and most of them belong to landless poor households (Sayeed et al 2003). Cotton harvesting manually involves moderate drudgery due to posture, load of picked cotton and abrasion of fingers by the sharp points of dried bracts (Kaur and Sharma 2015, Chauhan et al 2012). Hand harvesting operation requires 450-500 women hours per hectare costing Rs 4,192-13,160 ($57-$179) per hectare (Chaudhry 1997). Labour shortage for harvesting is experienced in states with intensive cotton cultivation due to synchronization of boll bursting and early maturity by a month that has narrowed the harvesting window besides increasing the demand for labour to harvest and the load on women cotton pickers (Hebbar et al 2007).

An aid that reduces drudgery and promotes efficient cotton picking would require less labour to pick cotton per unit area thus reducing the cost of cultivation. Chauhan and Raju (2013) reported that innovative cotton harvesting bag (ICHB) was most acceptable for ease in tying, picking, emptying, load carrying and ergonomically efficient compared to other back and front loaded cotton harvesting bags. Significantly 42 per cent higher cotton was harvested and area covered hour per hour over traditional system. ICHB was most efficient in cotton picking with 86 per cent higher output of cotton harvested and cotton harvest.

The cotton harvesting bag costing Rs 180 ($ 2.4) aids in efficient collection and field transportation of manual cotton harvest. There was no increase in harvesting efficiency due to energy variability among harvesters but certainly reduced drudgery as they were ergonomically designed (Chauhan et al 2012). The present study was based on a participatory investigation administered on a small sample of farm women in Wardha district in Vidarbha region of Maharashtra state to evaluate the efficacy and ease of adoption of this bag.

METHODOLOGY

Study area

A set of five villages of Wardha district where a farming system for nutrition study was underway was selected for the study (Fig 1). Farming in their own fields supplemented by wage labour work in other farmers' fields was the primary economic activity. Out of the 556 households inhabiting these villages 54 per cent belonged to the scheduled castes and scheduled tribes communities and the rest were other backward classes and special backward classes households. Farm women aged 18-50 years were found to be engaged in cotton harvesting on daily wage basis in farmers' fields in these villages.

Cotton picking and innovation in cotton harvesting bag

The traditional practice followed by women for cotton picking in central India is using a piece of cloth (Zholi*)* tied around the waist with old full sleeves shirt worn by men on top and petticoat below for body protection. The new cotton harvesting bag designed by Farm Science Centre, Central Institute for Cotton Research (CICR), Nagpur, Maharashtra in 2015 is easy to wear; requires less cloth and provides for equal distribution of load and protection of head and forearms. In addition the carrying capacity of the bag is also higher saving time on frequent emptying and improving harvesting efficiency.

Data collection

The study was undertaken in 2015-16 during cotton harvesting period. The ergonomically designed cotton harvesting bags from CICR were distributed among twenty women farmers in the study villages. A one-day training programme was arranged for the women on the use of the bags for cotton picking to demonstrate the advantages, suitability and use of the bag. Following demonstration on using the harvesting bags, they tried them on and did dummy harvesting. Each woman was then given a bag to use for cotton harvesting in place of the traditional bag. The methodology included both quantitative and qualitative data components based on questionnaire-based survey and focus group discussions for evaluation of acceptability, suitability and comfort of the cotton harvesting bags. Output of cotton picked was measured per hour/day and time using both the harvesting bags and the traditional Zholi.

RESULTS and DISCUSSION

Cotton harvesting

Traditionally cotton flowers in 60 to 140 days after sowing (DAS) and is harvested at 140 and 240 DAS in rainfed conditions with supplemental irrigation. Family labour is engaged in picking cotton (6-8 times) with occasional hiring of labour from the same village. After the adoption of *Bt* cotton, synchronization of boll bursting with more intensity of bolls per unit area reduced the cotton harvesting window from 3 to 2 months in rainfed and supplemental irrigation conditions reducing the number of pickings from 6-8 to 6-3 times. The widespread adoption of *Bt* cotton resulted in increase in demand for hired labour; there was inward migration of labour from outside villages during the cotton harvesting season. Cost of transportation of labour to fields had to be borne by the cultivators; the indirect costs of labour health and fitness problems due to more intensity of workload also had an impact. There was also increase in the burden of drudgery especially among women labourers who were primarily engaged in cotton picking and demanded for higher harvesting price. Contract women farm labourers took up the harvesting work from 9.00 am to 6.00 pm with a lunch break of one hour ie 8 hours of work and were paid wages on daily basis

Cotton picking efficiency with improved cotton harvesting bag

It was observed that while 30-40 kg cotton was harvested per day by women using the conventional method, 40-50 kg of cotton per day was harvested by women using the improved cotton harvesting bags (Table 1). On per hour basis while 4-5 kg of cotton was harvested by conventional method, 5-7 kg/hour was harvested with the improved cotton harvesting bags indicating a 25 per cent increase in efficiency.

Table 1. Comparative analysis of conventional and improved cotton picking method

Component	Conventional method	Improved method
Work hours/day	8	8
Picking (kg/day)	30-40	40-50
Picking (kg/hour)	4-5	5-7

Source: Primary Survey (May 2016)

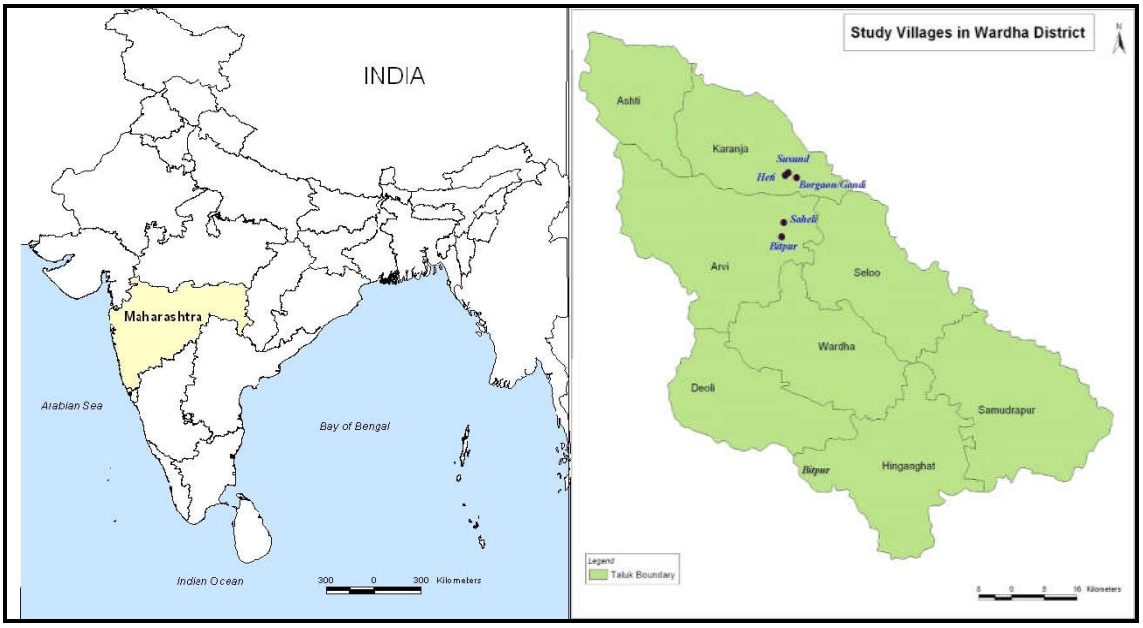

Fig 1. Location of the study area

Perceived feasibility of cotton harvesting bags

The women were asked to rank the utility of the cotton harvesting bag in terms of most feasible technology on a scale of 1-5, 1 being not at all feasible to 5 being most feasible. From the data given in Table 2 it can be observed that a majority (65%) reported that the bag was most feasible for use followed by 30 per cent ranking it as feasible (Table 2).

Impact on health

Respondents were asked to indicate the pain/ discomfort experienced in using the cotton harvesting bag vis-à-vis the traditional Zholi (Table 3). A majority of the respondents (70%) reported reduced hand pain (70%), shoulder pain (80%), waist pain (60%), backache (70%), headache (50%) and protection from sun and cold (90%) as compared to traditional practices.

Reasons for adoption of cotton harvesting bag

Respondents were asked about the efficiency of the bag vis-à-vis the conventional method on the parameters of time saving, durability and sustainability, picking efficiency and comfort, quality of bag and handling and operating. Seventy per cent of the women labourers expressed that the tool was more time saving than conventional practice; 90 per cent of the respondents expressed that the bags were durable and suitable and 70 per cent expressed that the picking efficiency was higher than under conventional method. Ninety per cent of the women labourers expressed that the bag was more economical and comfortable; 95 per cent of the respondents expressed that the quality of bag seemed excellent. Only 50 per cent of the respondents expressed that the bags were slightly difficult to handle and operate (Table 4). This could be because this was the first time they were using it compared with the years of experience in using the traditional Zholi.

CONCLUSION

The study showed that ergonomically designed cotton harvesting bags could reduce drudgery of cotton picking by farm women if adopted besides improving

Table 2: Feasibility of use of cotton harvesting bags as perceived by farm women (n= 20)

Feasibility	Respondents	
	Number	Percentage
Not at all feasible	0	0.0
Least feasible	0	0.0
Somewhat feasible	1	5.0
Feasible	6	30.0
Most feasible	13	65.0

Table 3. Health hazards (drudgery) reduced by using cotton harvesting bags (n= 20)

Health hazard	Respondents*	
	Number	Percentage
Hand pain	14	70
Shoulder pain	16	80
Waist pain	12	60
Backache	14	70
Headache	10	50
Effect of sun and cold	18	90

*Multiple responses

Table 4. Reasons of adoption of cotton harvesting bags by the farm women (n= 20)

Reason	Respondents*	
	Number	Percentage
Time saving	14	70
Durability and sustainability	18	90
Increased picking efficiency (kg/h/day)	14	70
Economical and comfortable	18	90
Quality bags	19	95
Handling and operating	10	50

*Multiple responses

picking efficiency and reducing health hazards. The cost of the bag priced at Rs 180 could be realized in a single season. As observed twenty-five per cent more cotton was harvested with increased area covered in an hour over traditional system; 70 per cent women expressed that there was reduced drudgery from using these improved cotton harvesting bags and it was convenient to pick cotton. Based on this it can be concluded that there was reduction in physiological cost.The technology developed is available at a very low cost. Popularizing the innovation and making the technology reach more women labourers across the cotton growing regions in the country will contribute to reduced drudgery of labour and improved efficiency.

ACKNOWLEDGEMENT

This work was a part of the research generated by the Leveraging Agriculture for Nutrition in South Asia Research (LANSA) research consortium and was funded by UK aid from the UK Government. The views expressed do not necessarily reflect the UK Government's official policies. Authors thank Ms Sunita Chauhan, SMS, Farm Science Centre, Central Institute for Cotton Research (CICR), Nagpur, Maharashtra for extending technical support for the study.

REFERENCES

Chaudhry MR 1997. Harvesting and ginning of cotton in the world. Proceedings of the Beltwide Cotton Conference, New Orleans, USA, 6-10 Jan 1997, **2:** 67-70.

Chauhan S and Raju AR 2013. Innovative Cotton Harvesting Bags. International Journal of Agriculture Innovations and Research **2(1):** 108-111.

Chauhan S, Raju AR, Majumdar G and Meshram MK 2012. Drudgery reduction of farm women with cotton harvesting bags. Indian Research Journal of Extension Education **1(Special Issue):** 118-120.

Hebbar KB, Rao MRK and Khadi BM 2007. Synchronized boll development of *Bt* cotton hybrids and their physiological consequences. Current Science **93(5):** 693-695.

Kaur BS and Sharma S 2015. Ergonomic assessment of conventional and mechanical methods of cotton picking. Agricultural Research Journal **52(1):** 33-36.

Sayeed A, Khan FS and Javed S 2003. Income patterns of women workers in Pakistan- a case study of the urban manufacturing sector. Lahore Journal of Economics **8:** 139-154.

Singh SP, Gite LP and Agarwal N 2007. Improved farm tools and equipment for women workers for increased productivity and reduced drudgery. In: Women-friendly improved farm tools and equipment (LP Gite, SP Singh, N Agarwal and J Mujumder eds), Bhopal Sub-Centre, Central Institute of Agricultural Engineering, Bhopal, Madhya Pradesh, India, pp 230-244.