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Role of Farmers' Training on Cotton Production through Farmer Field School (FFS) approach in Sanghar, Sindh Pakistan

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ABSTRACT: The impacts on various indicators of improved cotton production through FFS approach were assessed in Sanghar district of Sindh province of Pakistan. CABI CWA runs Better Cotton Fast Track Project at district Sanghar. The total sample for the baseline survey and training was consisted of 154 farmers participated in the training throughout the years. Paper evaluates the impact of Better cotton Fast Track Project Sanghar on farmers' knowledge, decision making skills, social and economic indicators, integrated pest management (IPM) practices related to cotton crop cultivation. The comparison of the economic performance of the medium farmers of cotton cultivated in 2014, 2015 and 2016 after the training is depicted. Uses of pesticide per acre were recorded as 6.87, 4.45, and 3.43 liters in the year of 2014, 2015 and 2016. Reduction of chemical fertilizer showed 417 Kg, 283 Kg and 216 kg per acre in 2014, 2015 and 2016 respectively. Enhancement of decision making skills showed score 27%, 68% and 89%, field experiments14%, 38%, and 76%, Observed bio diversity score 10%, 18%, and 54% and attitudes towards alternatives 14%, 41%, and 69% in the year of 2014, 2015, and 2016 respectively managed on board. However, the pesticides and fertilizers, significant differences existed among all medium farmers, with highest cost of these inputs at the year of 2014. The similar comparisons were seen in the differences among 2014, 2015 and 2016 for all variables. Difference in the number of pesticide doses and fertilizer application in the farms of the Producer unit were observed as a result of improved understanding and knowledge of Better Cotton Standard System, beneficial and harmful insect interactions through Natural Enemies Field Reservoir (NEFR) technology and application of the compost technology. Crop observations and experimentation contributed significantly towards using environment friendly bio pesticide as alternatives at FFS farms.

***Keywords*:** Cotton, Pesticides, Fertilizers, Productions, Skills

INTRODUCTION

The design of agricultural extension programs in developing countries has been the subject of heated debate. Guided by these debates, extension services have undergone several transformations in the past few decades (Byerlee, 1994). The main transformation, until recently, was a shift from the transfer-of-technology approach to the Training-and-Visit, or T&V, system. Under T&V, the extension system was reoriented from a desk-bound bureaucracy with multiple economic and social objectives to a field-based cadre of agents who focused mainly on technology diffusion (Picciotto and Anderson, 1997). In the world Pakistan is the fourth largest producer and one of the major cotton exporting countries. Cotton is grown largely in Punjab and Sindh provinces and accounts for about 10.5 percent of the value-added in the agriculture sector. The majority of cotton growers are smallholders and a large number of them are tenant farm households. Frequent pest outbreaks since the early 1990 have induced pesticide-based farming in Pakistan. Also, the liberalization of generic pesticide import has resulted in a many-fold increase in pesticide use in the country. However, this has neither increased cotton productivity nor the prosperity of the poor cotton growers (Poswal and Williamson 1998,; Ahmad and Poswal, 2000). The Farmers Field School (FFS) approach aims at generating a deeper understanding of the important interactions of agro-ecosystems as well as on sustainable farming, with the particular emphasis on reduction of chemical pesticide (Berg, *et al.* 2004). Other studies have also shown that over- and misuse of pesticides has led to tremendous economic losses and hazards to human health (Azeem2000; Feenstra *et al.* 2000; Orphal2001; Ahad, *et al.* 2001). The results of the pesticide policy analysis and the onset of the FAO-EU IPM Programmed for Cotton in Asia led to the establishment of a National IPM Programmed of Pakistan in December 2000. During 2001, the Training of Facilitators (TOF) and Farmers Field School (FFS) activities were initiated in the cotton growing areas of Sakrand and Khairpur Districts of Sindh Province of Pakistan, which were later expanded to other areas and provinces, i.e. Punjab and Baluchistan. CABI International (CABI) is a not for profit, intergovernmental organization of 48 member countries established in the early part of the 19th century and currently have over 400 staff based in 18 countries including in Asia - China, Pakistan, India and Malaysia. Our aim to improve people's lives worldwide by providing information and applying scientific expertise to solve problems in agriculture and the environment. We focus our scientific and development activities into global themes, one of which is involving commodity crops such as cotton, coffee and cocoa. CABI aims to improve the livelihoods of smallholder producers of these crops, by improving productivity and increasing their market access. In Asia, we have been working on cotton for over 30 years notably working in Pakistan, India and China. Much of our work has involved IPM, technology transfer and building capacity in a wide range of stakeholders. Cotton is often intensively sprayed with pesticides and yet with understanding of the ecology of the crop and its pests and diseases, significant reductions can be made on expensive inputs, saving the farmer money whilst also lowering the risk of pesticide contamination to the environment and to the farmer. District Sanghar is the main district of the Sindh region in which 125506 hectare of cotton is sown. CABI Central and West Asia is a pioneer in Pakistan in using one such approach “Training of Facilitators (TOF)” together with Farmer Field Schools (FFS) in projects where the key objectives are crop improvements and farmer empowerment. CABI CWA also has experience to run BCFTP at district Sanghar (154 medium farmers in one Producer Unit) having cotton acreage of 9247 hectare .This paper use data from RIR of better cotton farmers in Sanghar, Sindh Pakistan, to examine the impact of a Better Cotton Fast Track Project on farmers’ knowledge, awareness, alternative of hazardous chemical and Chemical Fertilizers and decision making skills.

Study Area and Sample Size

The impacts on various indicators of improved cotton production through FFS processes were assessed in Sanghar District of Sindh province of Pakistan.District Sanghar is the main district of the Sindh region in which 125506 hectare of cotton is sown. CABI Central and West Asia is a pioneer in Pakistan in using one such approach “Training of Facilitators (TOF)” together with Farmer Field Schools (FFS) in projects where the key objectives are crop improvements and farmer empowerment. CABI CWA also has experience to run BCFTP at district Sanghar (154 medium farmers in one Producer Unit) having cotton acreage of 9194 hactare .The total sample for the baseline survey and training was consisted of 154 Farmers participating throught the years in Tehsil Tando Adam, Sinjhoro, and Shahdadpur district of Sanghar.Fifteen Control farmers were selected from each tehsil the villages having at least a minimum distance of 23 Kilometers from none Project area where sufficient cotton growing farmers were available. The observed decision making skill, field experiment, Observed biodiversity, Attitude towards Alternative source was projected through collecting responses on questions asked at the time of Internal assessment in mid cropping season and revised at harvesting

Data Indicator

Data of pesticide ,fertilizer, labor cost reduction was observed from Farmer Field Book (FFB) managed by farmer trained by field Facilitator, and from Result Indicator Report (RIR) at the end of harvesting.

Role of Facilitators

Facilitator comes from a wide variety of domains. Their role is to encourage active exploration and understanding of how farming systems work. Conduct training fortnightly at their home villages with demonstration, lectures, and awareness raising materials. They introduce new ideas through guided exercises and stimulate discussion “by farmers, for farmers”, without dominating the scene. Facilitators go through rigorous, season-long training conducted by “Expert Field Facilitator” and follow the same “learning-by-doing” approach as the farmers they will eventually train in FFS. The facilitators and Producer Unit Manager ensure linkages with broad level resources, helping to improve flows of information and knowledge sharing.

Result and Discussion

The comparison of the economic performance of the Medium farmers of cotton cultivation in 2014, 2015 and 2016 after the training is depicted. the pesticide 6.87 in 2014, 4.45 in 2015 and 3.43 liter were used per acre in 2016 (Fig 1), While the reduction of chemical fertilizer 417 Kg, 283 Kg and 216 kg per acre in 2014, 2015 and 2016 respectively mentioned in (Fig 2) Enhancement of decision making skills score 27%, 68% and 89%, field experiments 14%, 38%, 76%, Observed bio diversity score 10%, 18%, 54% and attitudes towards alternatives 14%, 41% and 69% in the year of 2014, 2015, and 2016 respectively managed on board (Fig 4). However, the control farmers showing no significant difference among pesticide, fertilizer, use in same years which also effect on cost and income. Significant differences existed among all medium farmers, with high costs of these inputs at the year of 2014.The similar comparison showed that the differences among 2014, 2015 and 2016 were significant for all variables. The lower cotton yield were seen in 2014 and 2015 on all farms due to the highest pest infestation and excessive vegetative growth (Fig 3) It also were observed that the yields differed significantly among various farm groups in this year and the FFS farms obtained relatively higher cotton yields with low cost than 2015.

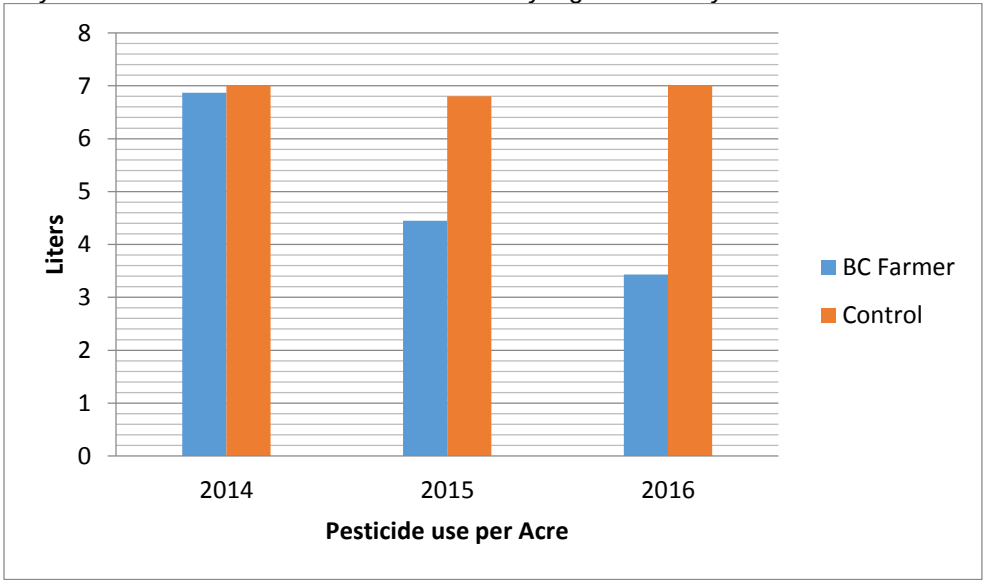

Fig 1. Application of Pesticide used per acre

The results revealed that application of chemicals has non-insignificant effect on yield hinting that high use of chemicals not necessarily result in high yields. Similarly, the fertilizer nutrient (nitrogen as well as phosphorus) has non-significant effect on cotton yield. The small and non-insignificant elasticity coefficients for these variables suggest that use of fertilizer and chemicals can be reduced without any significant reduction in cotton yield. Some potential gains can be realized through environmental improvement (NEFR technology, Bio pesticide, Compost,) on account of reduced fertilizer and chemical. Further with labor cost of application for replication fertilizer and pesticide reduced. Ahmad, *et al*. (2002) found formal education as well as extension contact (for technical

guidance) as significant factors in determining farm level technical efficiency in case of wheat production. The insignificant role of general education found in our study may be due to the fact that cotton production is relatively a more technical enterprise than wheat production

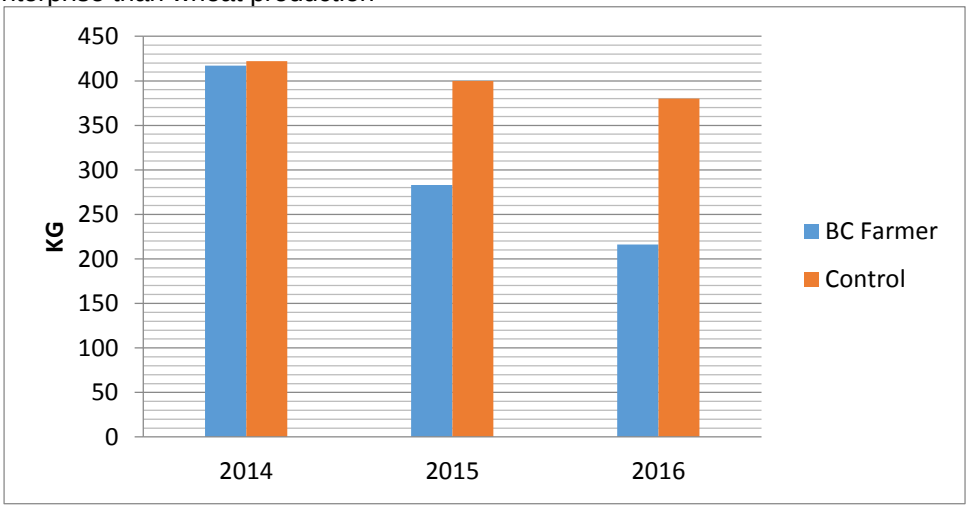

Fig 2. Showed reduction of chemical fertilizer

Difference in Pesticide and Fertilizer Use

Pesticide and fertilizer use is a variable of major concern in the assessment farmers training. Consequently, detailed account of pesticide and fertilizer use practices was taken in each year 2014, 2015 and after 2016. The total replication of pesticide and fertilizer applications differed in year 2014, 2015 and 2016. In 2014 farmers had the highest pesticide application frequency throughout cotton season. Difference in the number of pesticide doses and fertilizer application on Producer unit farms was observed as a result of improved understanding of Better cotton farmers on beneficial and harmful insect interactions due to establishment of Natural Enemies Field Reservoir technology (NEFR), attraction towards alternative (Bio pesticide), and use of compost technology in producer unit. Crop observation and experimentation contributed significantly towards using environment friendly bio pesticide as alternatives at FFS farms.

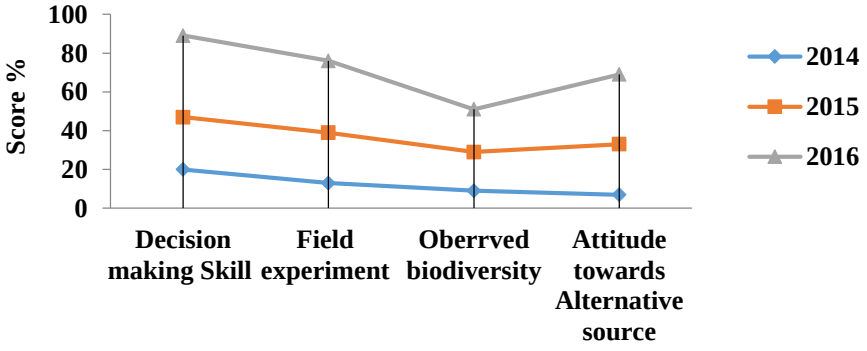

Fig 3. Shows change in behavior of better cotton farmer

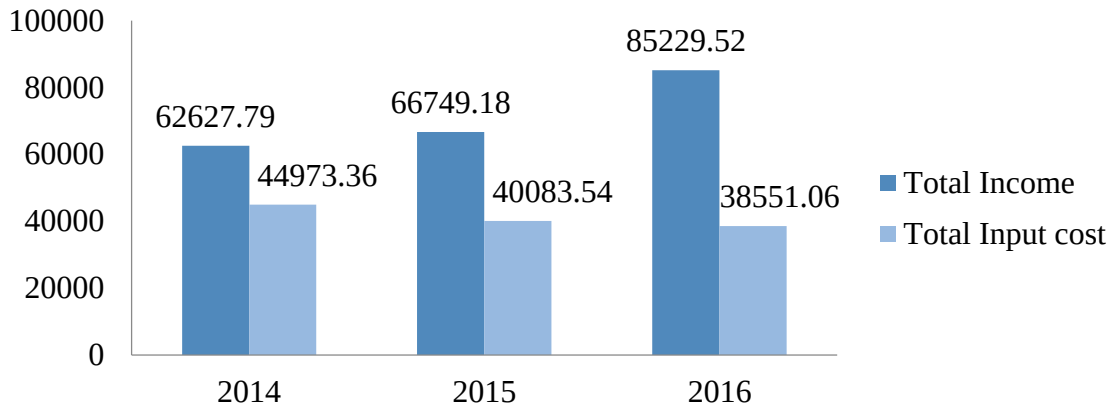

Fig4. Input cost and income of cotton production

Conclusion

Non formal education implemented in project implement area has provided farmers with opportunities to be trained and enhanced skills of cotton management in a participatory and modern way. As a result of training, farmers' skills for making decisions about cotton crop management were significantly enhanced. The field observation, situation analysis, and decision-making capacities have improved to a greater extent among Producer Unit farmers. Training has contributed to more cost effective and environmental friendly crop management with effect of immediately decisions making skills. The high input costs in year 2015 are showing that the management of key components like land preparation, seeds, fertilizer, irrigation and pesticide scheduling were noticeably neglected at these farms whereas these issues have received due to attention by the FFS farmers. Therefore reasonable that the variation in gross margins has increased in the year of 2015 and 2016.

Recommendation

Results also revealed that the majority of farmer's dependence on highly toxicity chemical which can be reduced through adoption of various biological cultural and mechanical methods. FFS approach has the potential of achieving high production effectiveness along with other environmental and health gains. Further analysis and data collection is warranted to confirm these indicative results in the long run. Planning, record keeping, situation analysis, and interpretation aspects of these experiments by farmers need further backup support to strengthen this crucial component for sustaining IPM practices.

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