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#### Crop Protection

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### Farmers' knowledge about common pests and pesticide safety in conventional cotton production in Pakistan



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#### Abstract

Innovations in cotton (Gossypium hirsutum L.) pest management should be initially based on the perspective of cotton farmers, recognizing farmers' constraints and their existing technical knowledge as the basis for an effective collaboration. A survey of 318 randomly selected farmers from two districts of the cotton belt of Punjab in Pakistan was conducted to study common crop protection problems and related behaviors in cotton production in the area. Data were collected through group discussions with farmers and individual interviews. Relative frequencies of distribution for the tested variables, weighted average scores based on the weight assigned to each answer for the rating scales, and the Borich Needs Assessment Model for the training needs were used for relevant comparisons. Most farmers considered pest damage to be important in cotton production causing significant yield losses. Farmers had awareness of some major insect pests, but the majority of them used descriptive than specific names when defining a pest. Among wellknown insects whiteflies, aphids, leafhoppers, thrips, and bollworms were mentioned, but farmers had great difficulty in distinguishing the different species. Identification of cotton diseases was practically non-existent, except from cotton leaf curl. Farmers were aware of a limited number of major weeds. Most of them stated  $\underline{purple\ nutsedge}$  and  $\underline{bermudagrass}$  as frequent weed problems in cotton production in the area. In general, weeds were perceived as a constant and unresolved problem in cotton production, but with less impact on yield than insects. The majority of the farmers relied on the chemical method for pest control, but knowledge on pesticide safety issues was below average. High needs for training were found on a) the proper period for pesticide application, b) the identification of natural enemies for cotton pests, and c) the discrimination of symptoms of various diseases. Understanding farmers' views of pests and their impact can be a first major step for more efficient pest management in cotton production.

#### Introduction

Cotton (*Gossypium hirsutum* L.) cultivation is often highlighted for excessive consumption of plant protection products for pest control (Deguine etal., 2008, Damalas and Hashemi, 2010). Insects are a major constraint to efficient cotton production worldwide and a serious problem, particularly for resource-poor smallholder farmers in many developing countries; insect control in cotton imposes high costs which can lead to environmental problems (Fitt, 2000). Plant pathogens may be also harmful in some areas and years, but are regarded of minor importance (Oerke, 2006). Cotton plants are also affected by weed competition mostly in the vegetative stages. Despite continuous improvement in the performance of chemical control strategies, harvest losses remain quite high, reaching 30%. The estimates of the potential losses (i.e. losses that would occur without the use of control methods) by animal pests and weeds averaged worldwide to 37 and 36%, respectively, whereas pathogens and viruses added about

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9% to a total potential loss of almost 82% (Oerke, 2006). Despite the use of pest control measures, about 29% of the attainable production is lost to pests.

Pest management in cotton rely mainly on the use of pesticides, although many farmers, especially in developing countries, are not capable of applying pesticides effectively primarily due to limited knowledge of basic concepts of pest control (Ochou et al., 1998, Sinzogan et al., 2004, Midega et al., 2012, Khan and Damalas, 2015). Even in transgenic Bt cotton in developing countries, the majority of the farmers were found to rely heavily on chemicals to control key cotton pests (Yang etal., 2005, Arshad etal., 2009). Farmers' knowledge of pest management issues is one of the factors affecting pesticide use in practice. Previous studies showed that lack of knowledge on pest management and pesticide use among farmers was strongly correlated with excessive pesticide use (Chen et al., 2013, Khan et al., 2015). In the cotton belt of Punjab, Pakistan, there was a clear tendency towards pesticide overuse among farmers, but with a decreasing trend after training on integrated pest management (IPM), a high level of education, and use of highly toxic pesticides (Khan et al., 2015). Different from that in the developed countries, many farmers in developing countries do not receive extension services on the appropriate use of new pest control technologies (Midega et al., 2012).

Cotton production in Pakistan has been on the 'pesticide treadmill' in which heavy reliance on synthetic pesticides worked well for several years and in the end proved to be disastrous (Jabbar and Mallick, 1994, Iqbal et al., 1997, Khan et al., 2002, Tarig et al., 2007). Farmers all over the world utilize pesticides to protect commodities from pests and pathogens and maximize agricultural output both in terms of quantity as well as quality of the produce (Damalas, 2009, Damalas and Eleftherohorinos, 2011). However, ample use of pesticides in most sectors of the agricultural production in Pakistan has resulted in substantial health and environmental threats over the last decades (Igbal et al., 1997, Khan et al., 2002, Tariq etal., 2007). Therefore, there is an urgent need to address pest management issues in the area, so that rural communities are well informed about pest control practices and be secured from health and environmental impact that put extra cost to the national economy. Farmers are looking for new management systems better adapted to their constraints. The selection of such systems that are expected to reduce pesticide costs, improve cotton yields, and ensure high profitability of cotton production, particularly for resource-poor farmers, is a challenge.

One of the major constraints upon establishing effective pest management approaches for smallholder farmers is the lack of adequate information about knowledge, perceptions and practices of farmers regarding pest management (Damalas etal., 2006a, Damalas etal., 2006b, Isin and Yildirim, 2007, Hashemi and Damalas, 2011, Hashemi etal., 2012). Notable failure of programs was observed in areas where farmers' knowledge was found to be inadequate. However, the need to understand farmer knowledge systems has been recognized as a basis for the development of pest management technologies that are adapted to local farmers' situations (Van Huis and Meerman, 1997, Norton etal., 1999, Damalas and Hashemi, 2010, Hashemi and Damalas, 2011) and meet their aspirations as a key condition to adoption of new practices (Settle etal., 2014). Therefore, the first step for the development of relevant pest management approaches is an evaluation of farmers' basic socio-economic characteristics, knowledge and perceptions of pests, current pest management practices as well as constraints to effective implementation of these pest management practices.

Identifying farmers' needs for knowledge and finding theappropriate way to provide it is a constant challenge. Farmers' surveys arealways helpful because of their usefulness in setting the research agenda, testing research hypotheses, designing extension strategies, evaluating the effectiveness of projects and development interventions and so on. In this context, the aim of the present study was to identify potential points for intervention in the development of pest management strategies for cotton pests based on the needs of small-scale farmers in the area of Punjab, Pakistan. In particular, the objectives of the study could be divided to the following parts: a) to evaluate farmers' knowledge and perceptions of cotton pests, b) to examine farmers' current practices in managing cotton pests, and c) to point out challenges and intervention opportunities in pest control that could lead to improved cotton productivity and increased personal safety of farmers in the area.

#### Section snippets

The study was conducted in two districts of Punjab province in Pakistan, covering the key cotton-growing agro-ecologies in the region. Punjab is located at the north western edge of the geologic Indian plate in South Asia. This province contributes about 76% to annual food production in the country, with cotton and rice (*Oryza sativa* L.) being the cash crops that largely contribute to the national treasury. Almost 80% of cotton is produced in Punjab province under intensive use of pesticides....

#### Basic demographic profile of farmers

Farmers of this survey were from 18 to 66 years old, with an average age of 33.3 years (data not shown). Most farmers were in age groups 21–30 (35.5%) and 31–40 (31.8%) (Table2). The majority of the farmers (over 73%) had received education of different levels. About 6% had a university graduation degree, whereas 26.4% were illiterate, i.e. were practically incapable of reading or writing. The majority of the farmers (84.0%) owned land (Table2), following the typical land tenure system in...

#### Discussion

Most farmers in this survey mentioned pests as serious constraints to efficient production of cotton on their farms (moderate or high impact on yield), with responses varying among pest groups. A similar finding was previously reported with cotton farmers in Kenya (Midega et al., 2012). Most farmers felt that the impact of insects on cotton yield was high, whereas a significant proportion of farmers thought that the impact of weeds was moderate or low. An intermediate proportion of farmers...

#### References (38)

R.I. Adam et al.

Farmers' knowledge, perceptions and management of diseases affecting sweet potatoes in the Lake Victoria Zone region, Tanzania

Crop Prot. (2015)

R. Chen et al.

Farmers' knowledge on pest management and pesticide use in Bt cotton production in China

China Econ. Rev. (2013)

G.P. Fitt

An Australian approach to IPM in cotton: integrating new technologies to minimise insecticide dependence

Crop Prot. (2000)

S.M. Hashemi et al.

Farmers' competence and training needs on pest management practices: participation in extension workshops

Crop Prot. (2009)

S. Isin et al

Fruit-growers' perceptions on the harmful effects of pesticides and their reflection on practices: the case of Kemalpasa, Turkey

Crop Prot. (2007)

M. Khan et al.

Pesticide use and risk perceptions among farmers in the cotton belt of Punjab, Pakistan

Crop Prot. (2015)

C.A.O. Midega et al.

Farmers' perceptions of cotton pests and their management in western Kenya

Crop Prot. (2012)

A.A.C. Sinzogan et al.

Farmers' knowledge and perception of cotton pests and pest control practices in Benin: results of a diagnostic study

NJAS – Wagen. J. Life Sci. (2004)

M.I. Tariq et al.

#### Pesticides exposure in Pakistan: a review

Environ. Int. (2007)

P. Yang et al.

Farmers' knowledge, perceptions and practices in transgenic Bt cotton in small producer systems in Northern China

Crop Prot. (2005)



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