



## **Knowledge Level of Sugarcane Growers Regarding Integrated Pest Management Practices in South Punjab, Pakistan**

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### **Abstract**

Integrated Pest Management (IPM) is a sustainable approach to pest control, contributing to reduce use of pesticides. The present study explored the levels of technical knowledge about integrated pest management among sugarcane growers in Punjab Pakistan. The study was conducted in District Rahim Yar Khan. Two tehsils i-e Tehsil Rahim Yar Khan and Tehsil Sadiq Abad were selected purposively as they have comparatively more area under the cultivation of sugarcane. The results revealed that the majority of the respondents were unable to practice IPM due to a lack of technical knowledge, practical skills, and awareness related to the identification of sugarcane pest and their management. Findings indicated that the extent of knowledge regarding removal of weeds, crop rotation, use of any kind of seed treatment and selection of disease-free varieties were high among respondents in the study area. Whereas, the extent of knowledge regarding other IPM practices among farmers was low. Farmers needed training regarding integrated pest management practices to ensure sustainable sugarcane production to improve their knowledge.

**Keywords:** Sustainable Sugarcane Production, Sugarcane Pests, Integrated Pest Management, Sugarcane Growers

### **Introduction**

Sugarcane crop is damaged by several insect pests which reducing sugarcane production. Among different sugarcane pests that are responsible for crop damage root borer, shoot borer, top shoot borer, pathogen and nematodes have been discussed more in available literature (Samsonat al, 1999; Srivastava and

Rai, 2012; Cockburn et al, 2014, Wilson, 2019, Wangila et al, 2012; Haar, 2018). There are few sucking insects like sugarcane pyrilla and whitefly. These are serious pests of sugarcane crops throughout Pakistan. Therefore, sugarcane farmers are frequently using toxic chemicals to control the insect pest population instead of using IPM techniques. Due to the frequent usage of insecticides, the insect is

becoming tolerant against chemicals. Usage of excessive insecticides is threatening to the health of farmers and also kills natural enemies of the pest as well as disturb the natural ecosystem. The unwise and indiscriminate use of pesticides had resulted in resistance development in insects and the resurgence of new pests besides environmental pollution and public health hazards (Gibbons et al., 2015). The irrational use of agrochemicals (fertilizers and pesticides), improper disposal of city waste, sewerage and industrial water is polluting food chain as well as the environment. One of the safest ways to overcome the insect pest population and reduced the impact on the natural ecosystem is the use of integrated pest management (Gibbons et al., 2015). It is an ecological approach to pest management based on a combination of conventional practices. It is an inclusive use practice and up-to-date information related to the life cycle of the pest and their ecology. It is a general approach to reduce the losses from pests in ways that are effective, economically sound and ecologically compatible (Wijnands, 2012). Similarly, Goebel and Salam (2011) indicated that IPM emphasizes the vital importance of biosecurity in pest management to reduce such risks. It is an approach to sustain biodiversity, maintain soil fertility and water purity, consume and improve the chemical-physical and biological control qualities of soil, recycle natural resources and consume energy. Generally, chemical control is used to combat insect pests but nowadays the use of Biocontrol is also in progress in which parasitoids and entopathogens are used to control harmful insects (Hajek and Eilenberg, 2018). Awareness regarding the identification and control of pest attacks is a gap for the related management. Pest scouting allows rapid detection of all pests and diseases for timely implementation of management practices. The success of farmers in the management of pests of sugarcane is hidden behind timely and proper detection of pests before reaching to Economic Injury Levels (EIL). It is quite possible that if sugarcane growers can identify the prevalence of pests on their sugarcane crop, they will manage it in a good way by themselves or with the consultation of experts. For another case, even if the farmers become successful in detecting the related pests at Economic Threshold Levels (ETL) they don't use appropriate methods to control pests of their crops. Instead, chemicals are sprayed on their field to manage the prevailing pests. Harmful chemicals are indiscriminately applied to the crop which has proven to be harmful to the health of living beings and also to the climate of the earth. Judicious use of pesticides

against pests is the recommended strategy in this regard. Integrated Pest Management (IPM) is one of the strategies which promotes the sagacious use of different methods in combination for the management of pests rather than relying only upon chemical solutions. Pest levels in crops can be reduced through IPM which has proven to be effective and is a knowledge-based integration method used to control pests and diseases in the sugarcane crops. It is used to manage pest damage by the most economical means and with the least possible hazards to people, property and the environment. In short, long-term prevention of pests through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, the introduction of resistant varieties and pesticides is achieved through it. In addition, the consequent damages on the eco-system are reduced through the use of the techniques. Different methods are used to control pests through integrated pest management like agronomic, biological and chemical as well as many other practices that sugarcane growers adopt to eliminate pest attacks for ensuring good quality and high production of the crop. But at the same time, such methods involve high care and considerations to be effective against pests and in absence of such delicacies, the methods remain unsuccessful for pre-determined purposes. Therefore, such methods lose the preferences and trust of farmers. Farmers don't generally adopt integrated control methods to stop pest attacks on their crops due to their perception that such methods are less effective, more complex and take more time than the direct supply of chemical sprays on their fields. In wake of the related easiness, they prefer to adopt conventional chemical solutions for coping with pest-related threats of sugarcane. The purpose of this study was to investigate the knowledge of the sugarcane farmers regarding the effectiveness of integrated pest management. Understanding farmers' perceptions of pests and pest management can improve rates of adoption of pest management strategies, in particular for knowledge-intensive practices (Cockburn et al, 2014).

## **Methodology**

The present study to access the perception of sugarcane growers regarding the effectiveness of integrated pest management was conducted in the purposively selected province Punjab, Pakistan. A multistage sampling technique was used for the selection of respondents for the present study. Province Punjab comprises 32 districts. Among them,

District Rahim Yar khan was selected purposively as it has most of the fertile area under cultivation of sugarcane due to the recent paradigm shift from cotton to sugarcane. District Rahim Yar khan comprises of 4 Tehsils Khanpur, Liaqatpur, Rahim Yar Khan and Sadiq Abad. Among four Tehsils two tehsils i-e Tehsil Rahim Yar Khan and Tehsil Sadiq Abad were selected purposively as they have comparatively more area

under the cultivation of sugarcane. All the sugarcane growers in Tehsil Rahim Yar khan and Tehsil Sadiq Abad were considered as the population of the study. From each tehsil, two rural union councils were selected randomly. Out of each selected rural union council, 25 respondents were selected randomly to make a sample size of 100 respondents.

## Results and Discussion

**Table 1: Percentage extent of knowledge regarding integrated pest management practices**

Techniques	Not known (%)	Slightly aware (%)	Have knowledge to medium extent (%)	Have complete knowledge (%)	Have knowledge and currently practicing (%)
Suction trap	40	18	25	17	0
Light traps	36	30	31	3	0
Pheromone traps	12	25	11	18	0
Use of knock down agents	88	8	4	0	0
Use of resistant varieties	8	11	35	20	26
Judicious use of pesticide	28	32	16	2	22
Use of selective pesticide that have minimum harm to friendly insects	52	31	12	3	2
Record keeping	6	42	36	16	0
Evaluation of past control techniques	72	23	3	2	0
Trichogama cards	15	13	18	21	33
Crop rotation	0	4	38	28	30
Use of Dab Method	5	18	31	17	29
Hand removal of weeds	0	0	0	56	44
Use of any kind of seed treatment method	3	17	18	35	27
Selection of disease free variety	2	8	39	35	16

The data in the above Table 1 indicating the percentage of responses regarding knowledge level about different IPM measures. The data explored that among different IPM practices most of the respondents were removing weeds by hand (without application of herbicide) (44% respondents were using this technique to remove weeds) secondly they were using

Trichogama cards to control sucking insects (33% respondents were using trichogama cards to control insects), 30% of respondents were using crop rotation to manage pests from their field and 29% respondents were using Dab method to control weeds and other soil born pests.

**Table 2: Mean, weighted score and ranked order of different IPM measuring techniques**

Techniques	Mean	Weighted score	Ranked order
Hand removal of weeds	4.12	344	1
Crop rotation	3.73	284	2
Use of any kind of seed treatment method	3.65	266	3
Selection of disease free variety	3.57	255	4
Use of Dab Method	3.38	247	5
Use of resistant varieties	3.24	245	6
Trichogama cards	3.31	244	7
Judicious use of pesticide	2.82	158	8
Record keeping	2.76	137	9
Pheromone traps	2.56	128	10
Suction trap	1.81	119	11
Light traps	1.57	101	12
Use of selective pesticide that have minimum harm to friendly insects	1.98	72	13
Evaluation of past control techniques	0.92	35	14
Use of knock down agents	1.12	16	15

The data in the Table 2 depicting the descriptive statistics of responses regarding the extent of knowledge about different IPM techniques. The data exhibited that among all the techniques hand removal of weeds, Crop rotation, and application of seed treatment were the most ranked techniques having a weighted score of 344, 284, and 266 respectively. any kind of seed treatment method. Moreover, the use of a selective pesticide that has minimum harm to friendly insects, Evaluation of pest control techniques (evaluation of best pest management practice), and use of knockdown agents such as pyrethrin spray (Kamal, 2000) were least using for managing the pest in sugarcane crop.

## Conclusion

This study brings to light useful information for better understanding common problems in sugarcane production and farmers' knowledge regarding IPM. The study revealed that the majority of farmers were not aware of integrated pest management practices, they are using conventional techniques and are using pesticides injuriously which is very much unsuitable according to sustainability point of view. In addition, excess use of pesticides also negatively affects human health and our environment. Farmers needed training

regarding integrated pest management strategies to ensure sustainable sugarcane production. Training and extension services related to IPM are also essential. Knowledge can make farmers become more aware of pesticide risks and subsequently lead to changes in misleading attitudes in sugarcane production.

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