Third Annual Cotton IPM Survey Report 2023

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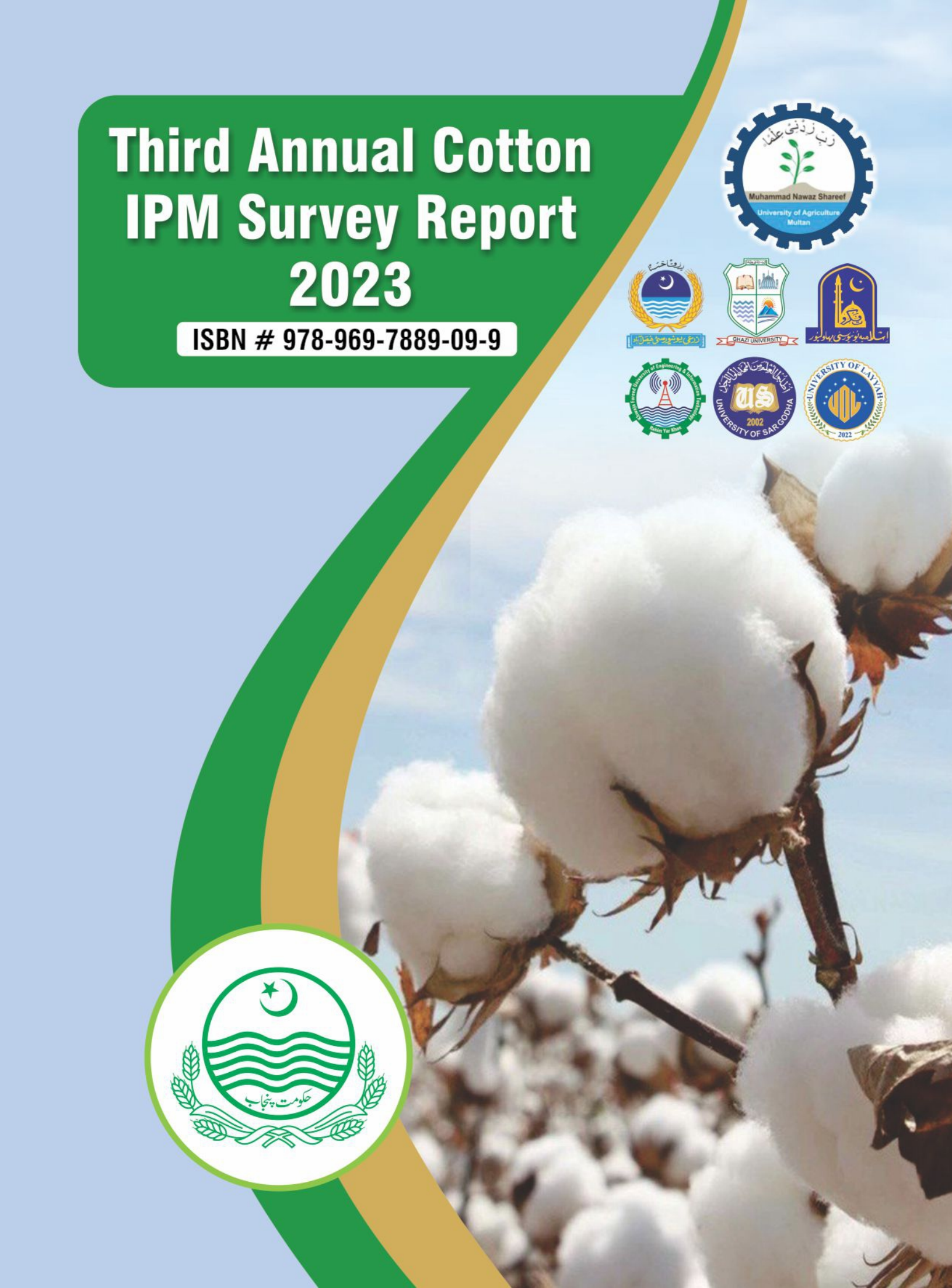

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بسم الله الرحمن الرحيم

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1. Additional Chief Secretary Message

Cotton is a linchpin in Pakistan's economy, playing a pivotal role in the nation's financial stability and the livelihoods of a substantial portion of its population. As a major cash crop, cotton cultivation serves as a cornerstone of the agricultural sector, contributing significantly to expert earnings and gross domestic product (GDP) with 0.3% and 1.4% value addition share. The textile industry, heavily reliant on cotton, forms the backbone of Pakistan's industrial landscape, generating employment opportunities and fostering economic growth. Pakistan's share in the world cotton production in 2022-23 was 3.4 percent.

Cotton cultivation in Pakistan has faced numerous challenges, including pest infestations that have led to declining yields and economic losses for farmers. The conventional methods of pest control, often relying heavily on chemical pesticides, have proven to be unsustainable, causing environmental pollution, resistance issues, and adverse health effects for farmers. Adopting Integrated Pest Management practices emerges as a sustainable and effective solution to address these challenges. IPM is an ecosystem-based strategy that combines various pest control methods to minimize impact on the environment, human health, and non-target organisms while promoting economic viability for farmers. The adoption of IPM reduces reliance on chemical inputs and enhances the resilience of cotton crops against pests. Moreover, it promotes sustainable farming practices, aligning with global trends in environmentally conscious agriculture.

Collaborative efforts involving government bodies, agricultural extension services, research institutions, Universities and farmers can play a pivotal role in disseminating knowledge, providing training, and ensuring the availability of resources for the successful implementation of IPM. The integration of IPM practices in cotton cultivation is a crucial step towards the revival of the cotton industry in Pakistan. By endorsing sustainable and environmentally friendly methods, we can ensure the long-term prosperity of cotton farmers and contribute to the overall development of our agricultural sector.

I extend my sincere appreciation to Mr Saqib Ali Ateel, Secretary of Agriculture South Punjab, and his team for their innovation and dedication to reviving cotton on environment-friendly sustainable practices. I also appreciate experts from the top seven universities of Punjab, MNS- University of Agriculture Multan, University of Agriculture, Faisalabad, Islamia University Bahawalpur, Ghazi University, D.G. Khan, KFUEIT, Universities of Layyah and Sargodha, to conduct third-party validation in their respective areas.

I hope this report will become an indispensable resource for farmers, researchers, policymakers, and anyone with an interest in the future of cotton cultivation. May the knowledge contained herein inspire a new era of responsible farming practices and contribute to a world where agricultural abundance coexists harmoniously with environmental stewardship.

Additional Chief Secretary

2. Secretary Agriculture Message

With great pleasure and enthusiasm, I introduce our 3rd Annual Survey Report on Integrated Pest Management (IPM) practices in cotton crop cultivation. In the realm of agriculture, where the balance between productivity and sustainability is ever more crucial, this report serves as a beacon, illuminating the path towards responsible and effective pest management.

This report highlights the successes and advancements of our cotton farmers and researchers made in enhancing the conservation and utilization of natural enemies and reducing reliance on synthetic pesticides through implementing integrated pest management (IPM) practices. Key features of IPM were monitoring and early detection, biological control, cultural practices, mechanical control and chemical control as a last resort.

Improved crop health, reduced pest resistance, lower environmental impact, and increased profitability are just a few of the benefits highlighted in this report regarding the use of bio-pesticides s and their effects on natural enemies in cotton pest control. It also details the possibilities and threats to the widespread use and improvement of these IPM tools, including education for farmers, knowledge gaps, market incentives, and regulatory hurdles.

I would like to express my gratitude to everyone who played a role in this survey. My sincere appreciation goes out to the cotton farmers who not only practiced IPM for their cotton crops without any financial support from the government but also took the time to fill out the form and provide their valuable insights, as well as the professionals from the MNS- University of Agriculture Multan, University of Agriculture, Faisalabad, Islamia University, Bahawalpur, Ghazi University, D.G. Khan, Khawaja Fareed University of Engineering & Information Technology, Rahim Yar Khan. University of Layyah & University of Sargodha, Agriculture Extension Department, Pest Warning & Quality Control of Pesticides Department and Director IPM Punjab. I encourage you to read the report and learn from the best practices and lessons learned from our cotton IPM community.

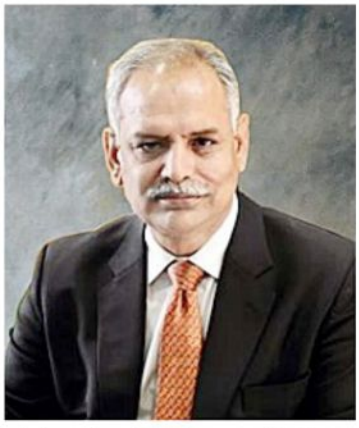
Sustainable agriculture that safeguards our natural resources, improves food security, and fortifies our rural economy is something I am deeply committed to as Secretary of Agriculture. I think we can accomplish these goals with the help of a resilient and diverse pest management system that includes bio-pesticides and natural enemies. This report will encourage cotton growers and others to adopt environmentally and economically beneficial sustainable farming methods. Collaborating with relevant parties, I hope to speed up studying, creating, and using these integrated pest management (IPM) tools for cotton and other crops.

Secretary of Agriculture in Punjab

3. Vice Chancellors' Notes

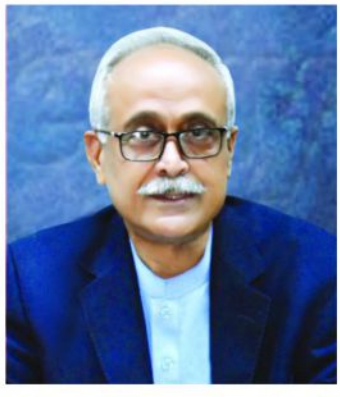
1. Vice Chancellor, MNS-University of Agriculture, Multan

Cotton is one of the major crops that directly effects farming community as well as country's economy. From last few years, cotton growers are facing multiple challenges due to climate change which include high pest pressure, heat shocks followed by high rainfall and flooding in south Punjab. Moreover, a positive change in the farmers behavior regarding pesticide use against pink bollworm, whitefly, and other cotton pests is being witnessing and they are gradually inclining towards the integrated approaches for managing the pests. Integrated pest management strategies have enormous potential to improve cotton crop performance. The Agriculture Department and university along with the industry and Department of Plant Protection are working towards the development of legislation for bio-pesticides. After this legislation, it is expected that multiple bio-pesticides products will be available to farmers. This report presents the results of implementing IPM strategy and other key interventions which have been tested across the cotton-growing areas in Punjab. The data were collected through a comprehensive survey conducted by the Institute of Plant Protection, MNS University of Agriculture, Multan. The survey tools included face-to-face interviews with the farmers and field visits to both IPM and non-IPM blocks. I am confident that outcome of this collaborative survey would certainly encourage the wider adoption of IPM strategy among the stakeholders.



2. Vice Chancellor, University of Agriculture, Faisalabad

Cotton is fibrous and cash crop with a significant impact on the national economy of Pakistan. It contributes around 1.4 percent of the value added in the agriculture sector and about 0.3 percent share in GDP. Cotton provides raw material to the textile industry but also key share in oil production of the country. Moreover, cotton made commodities has the largest share in the country's exports. Being cash crop it provides reasonable profit to the farmers along with the employment to the labour. Pakistan is the 5th largest country in the world for cotton production. During the last few years there is a drastic fluctuation in cotton production due to unavailability of quality and certified seeds, insect pests infestation, changing environmental conditions, low net return and high cost of production are the key factors. Keeping all in view, effective strategies to mitigate the decline of cotton production and to revise the agriculture policies, a timely pest scouting by the agriculture department, to educate farmers about relevant pesticide applications their judicial use and seed related problems. To get view of all field information a comprehensive survey was conducted by the Department of Entomology, University of Agriculture Faisalabad in collaboration with agriculture department through a surveying tool conducting face-to-face interviews of the farmers and conducting field visits of the IPM blocks. This survey would certainly enhance the knowledge gap for the policymakers and stakeholders to revive the cotton by employing various strategies. A report of this kind is always important because a broader audience benefits, ranging from policy makers to planners, academia, researchers, student community, growers, growers' associations, chambers of agriculture and traders. We as Department of Entomology, University of Agriculture Faisalabad greatly appreciates the feedback and suggestions from all corners and looking forward for a continued partnership in the formulation of long-term policy analysis and producing of important reports concerning agriculture and food security.



3. Vice Chancellor, Ghazi University, DG Khan

Cotton is linchpin of Pakistan economy. Punjab province plays a vital role in the cotton production of the country. In the recent past, Punjab contributed the 70% in overall cotton production of the country while Sindh province has 30% share. This situation has been reversed now and Sindh is the largest contributor whereas Punjab is the second one after decline of cotton in Punjab. There are several factors behind this decline including high insect pest pressure, whitefly mediated sooty mold, Para wilting, Fusarium wilt, CLCV and climate change. Realizing the gravity of the situation and importance of cotton crop in Punjab, the Secretary Agriculture department Mr. Saqib Ali Ateel directed the Agriculture Department to launch an IPM program for effective management of cotton insect pests and 46 IPM plots were selected in D.G. Khan Division. A total of 26 plots were supervised by Agriculture Extension Department and 20 plots were monitored by the Pest Warning & Quality Control department. The Vice Chancellor was asked for third party validation of these plots. A five-member committee was constituted which surveyed the IPM plots throughout the division and interviewed the farmers. The findings of the committee are presented in this report. I hope the finding of this report will help the Agriculture Department in development of a comprehensive IPM program and its dissemination to the farmers.

4. Vice Chancellor, Khawaja Fareed University of Engineering and Information Technology, Rahim Yar Khan

Cotton is one of the major crops that directly affect the farming community as well as the country's economy. Over the past few years, cotton growers have faced multiple challenges due to climate change, including high pest pressure, heat shocks, followed by heavy rainfall and flooding in South Punjab. Moreover, a positive change in farmers' behavior regarding pesticide use against pink bollworm, whitefly, and other cotton pests is being witnessed, and they are gradually leaning towards integrated approaches for managing the pests. Integrated pest management strategies have enormous potential to improve cotton crop performance. Mr. Saqib Ali Ateel, Secretary Agriculture Department, South Punjab and the university, in collaboration with the industry and the Department of Agriculture Engineering with align department of Agricultural Sciences, KFUEIT, are working on bio-pesticides for the betterment of cotton crop. This report presents the results of implementing the IPM practices and other key interventions that have been tested across the cotton-growing areas in Punjab. The survey tools included face-to-face interviews with farmers and field visits to both IPM and non-IPM blocks. I am confident that the outcomes of this collaborative survey will certainly encourage the wider adoption of the IPM strategy among stakeholders.

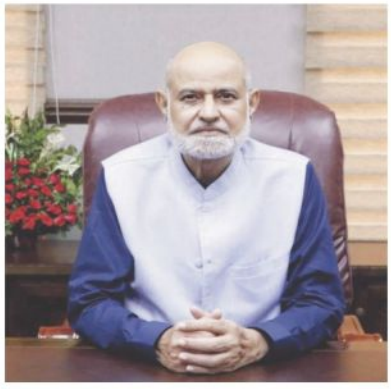
5. Vice Chancellor, University of Sargodha

Cotton is a major cash crop of Pakistan and plays a key role in country's economy. It is the largest industrial crop in Pakistan and shares about 1.0 and 4.5% to national gross domestic product (GDP) and to the value-added in agriculture sector, respectively. Cotton crop provides raw material to the country's largest agro-based industry, the textile industry. Its share in employment sector and earning of foreign exchange is about 17 and 60%, respectively. Despite the significance of cotton crop in Pakistan's agriculture, its area under cultivation and production are declining since last decade, particularly in Punjab province. University of Sargodha appreciates the initiative and dedicated efforts being taken by the Government of Punjab and particularly by the South Punjab Secretariat to revive and boost the cotton production in Pakistan. It is also very appreciable that integrated pest management (IPM) is being supported and implemented on large scale in the country with the help of Department of Agricultural Extension and Department of Pest Warning and Quality Control of Pesticides (Plant Protection Department). The nominated faculty members of the Department of Entomology, University of Sargodha surveyed different IPM demonstration plots of cotton in Sargodha Division and found a positive impact of this IPM-based campaign and promotion of cotton crop in the Division. We look forward to collaborate with the stakeholders of cotton and other major agricultural crops in order to enhance the research and development regarding IPM-based agricultural production.

6. Vice Chancellor, University of Layyah

Cotton is considered a cash crop that directly affects our farming community and the country's economy. For the last ten years, cotton growers have faced multiple challenges due to climate change, including diverse pest pressure, heat stress, uncertain rainfall, and flooding in South Punjab. Also, a positive difference in farmers' behavior regarding pesticide use against major and minor pests in cotton is being witnessed. They are gradually inclining towards integrated approaches for managing such enemies. So, in this scenario, integrated pest management (IPM) strategies have vast potential to improve cotton crop production. Our University and Agriculture Department and the industry and Department of Plant Protection are working passionately to develop a legacy in bio-pesticide use. In the short or long term, a variety of bio-pesticide products is expected to be available at the farmer's doorstep. The report commends the support and initiative of Mr. Saqib Ali Ateel, Secretary of Agriculture (South Punjab), his team, and University of Layyah in conducting this extensive survey for sustainable cotton production. This detailed report presents the outcomes of implementing IPM strategies and other vital interventions tested across the cotton-growing areas in South Punjab. The data were collected through a comprehensive survey by the Institute of Plant Protection and University of Layyah, Punjab, Pakistan. The survey tools included extensive interviews of cotton farmers and field visits of IPM and non-IPM blocks. The outcome of this collaborative report would undoubtedly encourage the broader adoption of the IPM strategy among cotton growers.

7. Vice Chancellor, Islamia University Bahawalpur



Cotton is fiber and cash crop with a significant impact on the national economy. It contributes around 1.4 percent of the value added agriculture sector and about 0.3 percent share in GDP. Cotton based products are leading export earner and the textile industry provides substantial Job opportunities. Cotton and IUB shares close ties as it's varieties occupies significant area in Punjab and Sindh province. Cotton production in Pakistan faces number of challenges of biotic and a biotic stress. Pest management through IPM provides a balanced approach to keep the pest population at non-economic-damage level, without compromising environment and beneficial fauna of cotton field. Government of Punjab launched a series of studies to validate experts at farmers' field and get feedback. I am delighted the IUB contributed in the Bahawalpur component of the IPM project. I hope the data generated in this study will be transformed into extension message for outreach activities and help farmer to get more yield. Last but not the least, I must recognize the efforts and untiring hard work of those who remained in cotton field during harsh weather and collected data. Pakistan Piandabad

4. Executive Summary

Cotton is an important cash and fiber crop of many countries including Pakistan. It employs about 7% of the labour and is source of income for more than 250 million people worldwide. However, climate change has negatively impacted its production not only in Pakistan but also worldwide. The rise in temperature, intermittent rainfall combined with high pest pressure has resulted in cotton decline in Pakistan. The lowest ever cotton production was recorded during cotton season 2022-2023. The other major factors included are, non-availability of pure and healthy seed, lack of resources for timely purchase of inputs (pesticides, fertilizers etc.), availability of fertilizers, quality of pesticides and pesticide resistance. In addition to this, most of farmers rely on pesticide dealers for cotton production and protection due to lack of knowledge. The dealers have their own interest which ultimately resulted in high input cost and less profit.

Keeping in view this scenario, the Secretary Agriculture South Punjab, Mr. Saqib Ali Ateel initiated a program in 2021 where IPM demonstration plots were managed by (Agriculture Extension and Pest Warning & Quality Control of Pesticides) in main cotton growing areas of South Punjab at Markaz level. The significant difference observed in IPM demo plots in term of yield and profit. The same practice was continued in 2022 at comparatively larger scale. The average per acre yield of IPM plots was 34.22 maunds per acre in 2021and 31.41 maunds per acre in 2022 and 38.89 maunds per acre in 2023. After two years of great achievement, it was decided to spread IPM demo plots throughout Punjab in 2023. In 2023, a total of 292 IPM demo plots were maintained in six divisions i.e., Bahawalpur, Dera Ghazi Khan, Faisalabad, Multan, Sargodha and Sahiwal. To determine the impact of IPM model, Agriculture Secretariat constituted a committee of faculty members of MNS-University of Agriculture, Multan, University of Agriculture, Faisalabad, Islamia University, Bahawalpur, Ghazi University, D.G. Khan, Khawaja Fareed-University of Engineering and Information Technology, Rahim Yar Khan, University of Sargodha and University of Layyah. The university teams conducted a comprehensive survey of IPM demo and non-IPM plots in their respective division and submitted a comprehensive report.

The results of third party validation survey indicated that 100% of the IPM farmers were provided guidance of cotton production and protection by the Agriculture Staff while 80-90% of non-IPM farmers received guidance from agriculture staff during 2023. Most of the IPM farmers (80-100%) followed the instruction of delaying pesticide application for first 60 days while this ratio was comparatively less for non-IPM farmers especially in Faisalabad and Sahiwal Divisions (10-13.95%) this might be due to early attack of Jassid. The major pests for which the IPM and non-IPM farmers applied pesticide spray were Whitefly, Jassid and Thrips in almost all divisions. In an answer to presence of natural enemies/beneficial fauna in cotton field, all IPM farmers were aware of beneficial fauna and their role in cotton protection while comparatively less number of non-IPM farmers had knowledge of beneficial fauna especially in Faisalabad, Sargodha and Sahiwal divisions (3.3-12%).

The fertilizer used by the farmers includes Urea, DAP, Nitrophos and CAN Guawara, Potassium and micronutrients (zinc, boron and sulfur etc.). The results of survey indicated that IPM farmers used more potassium fertilizers compared to non-IPM farmers. The fertilizer cost per acre was more for IPM farmers. Comparatively less fertilizer were used by the farmers of Sargodha division followed by Bahawalpur and Multan divisions resulting in the fertilizer lowest cost of 25168-28000, 21599-48000 and 24725-38476 respectively. The IPM farmers used 17-41% less chemical insecticides resulting in 30-60% less cost as compared to non-IPM farmers. However, IPM farmers used 2-4 sprays of bio-pesticides to protect their crops which caused 1200-4000 rupees expenses/acre. A large portion of the IPM and non-IPM farmers considered weather as the most harmful factor for cotton production followed by inferior quality seed and ineffectiveness of pesticides to manage whitefly and pink bollworm. More than 80% of the non-IPM farmers agreed with the positive effects of bio-pesticides except in Bahawalpur, Bahawalnagar and Multan where only 10, 30.76 and 40.49% farmers were in the favour of bio-pesticides positive effects. However, in case of IPM farmers,

majority of the farmers said that bio-pesticides are safer and have positive effects. However, only 16.6% the IPM farmers were agree with the positive effects of bio-pesticides in Rajanpur districts, where average yield was lowest in the Punjab. The per acre yield of non-IPM farmers ranged from 20-39 maunds (average 27.37 maunds) while of IPM farmers 24-64 maunds (average 41.89 maunds). All of the IPM farmers showed their willingness to adopt IPM model next year while the non-IPM farmers who were ready to practice IPM practice next year ranged from 65-100%.

Based on the findings of above survey, it is evident that IPM practices should be followed by all cotton farmers to minimize their expenses and get higher profits. However, Govt. must ensure the availability of IPM supportive products like yellow sticky traps, pheromone traps, PB ropes, bio-pesticides and bio-cards etc. for large scale applications. The Govt. also should take initiative to train and educate farmers about the positive effects of IPM practices on their lives, non-target organisms and the environment.

Prof. Dr. Shafqat Saeed, Dean Faculty of Agriculture and Environmental Sciences, MNS-University of Agriculture, Multan

3. BACKGROUND OF THE STUDY

The agricultural sector accounts for 22.9% of GDP and 37.4% of employment. It supplies raw materials to the industrial sector and guarantees food security. The long-term health of Pakistan's economy depends on this cash crop as well. Cotton is incredibly important to Pakistan's economy and the global economy as a whole. Because of its immense value to Pakistan's economy, it is commonly known as the "white gold" there. It was grown on more than 4 million acres in Punjab, Pakistan during 2022-2023. Pakistan is placed 5th among the countries that cultivate cotton since cotton is a significant contributor to the country's export revenue (Fiaz *et al*., 2021). Pakistan is the third largest exporter of raw cotton on the global market (Oliveira *et al*., 2001). Pakistan is also the country that produces the majority of the cotton goods used along the globe (Rehman *et al*., 2019). Cotton-related products such as lint, value addition of agricultural products, and 8% of the nation's oil seed production are all examples of these. Cotton production is mainly responsible for the foreign exchange revenues, which total to around US$ 12–15 billion per year (Yihdego *et al*., 2019).Cotton productivity dropped due to pest infestation and high production expenses, which prompted growers to switch to rice, sugarcane, and maize. Climate change reduces cotton output and quality. Due to its inability to adapt, climate change could adversely impact crop production (Figure 2). The average air temperature in Pakistan has risen by 0.2 to 0.6 °C over the past decade. Less day-night temperature difference will elevate nighttime temperature and hinder growth. Climate change is also reducing cotton production in Pakistan due to rainfall patterns. CO_2 improves photosynthesis, which boosts growth, but it also elevates temperatures, which hurts it (Abbas, 2020). These alterations harm cotton plant development at various stages. Cotton Plant

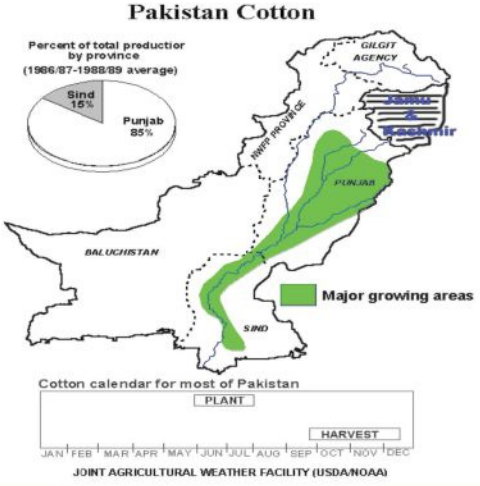


Figure 1. Major Cotton growing regions in Pakistan

Figure 2. Impact of Climate change on Agriculture in Pakistan

growth depends on daytime-nighttime temperature differences, according to Ahmad *et al.* in 2020. Unfortunately, the temperature fluctuation has lowered the country's global cotton production from fourth to fifth. Cotton cultivation is vital to Pakistan's economy, thus the financial consequences is expected.

Figure 3. Whitefly damage in cotton

A paradigm shift in climate has made whitefly (*Bemisia tabaci* (Hemiptera: Aleyrodidae) control unfeasible. It is a worldwide problem that affects cotton fields, decorative plants, food gardens, and even houseplants (Cuthbertson *et al*., 2015; Parola *et al*., 2022). It feeds on plant sap and then secretes honeydew, which makes the host plant more susceptible to fungal development, resulting in sooty mould on fruit and foliage. It has emerged as a major issue in tropical and subtropical locations, where it leads to significant yield losses (Arif *et al*. 2017; Islam *et al*., 2018). According to several studies (Czosnek *et al*., 2002; Liu *et al*., 2007; Gorman *et al*., 2010; Crowder *et al*., 2010; Sain *et al*., 2022), whiteflies differ genetically, vary in host range, mating behaviour, and transmit viruses such as Begomoviruses, Carlaviruses, Criniviruses, and Cotton leaf curl virus (CLCuV), which causes stunted plant growth, decreased yield, and poor quality products. It has a host range of approximately 600 plants and is responsible for a 50% decrease in cotton bolls; it is also the vector of the infamous cotton leaf curl virus (Oliveira *et al*. 2001; Ahmad *et al*. 2002). One major issue with *B. tabaci* is that it can transfer viruses, and the ability to do so varies substantially among all mitotypes. The second point is that different management solutions have varied effects on different mitotypes. In Pakistan, *B. tabaci* populations include three distinct mitotypes: MEAM-1, Asia-1, and Asia II-1. Elsewhere, five mitotypes have been identified: MEAM-1, Asia-1, Asia II-1, Asia II-5, and Asia II-7 (Ahmed *et al*., 2010; Dinsdale *et al*., 2010; Ashfaq *et al*., 2014).

The majority of pesticides no longer work against whiteflies and instead kill beneficial insects and microbes. A frighteningly high risk of pesticide exposure to both people and the environment can arise from the use of improper spraying equipment and methods, which can lead to a 50% dispersion or waste of pesticides.

Figure 4. Integrated Pest Management

Together, researchers and farmers have collaboratively developed Integrated Pest Management (IPM) plans to lessen the impact of some insect pests while also reducing their negative impact on the environment. However, as the weather is always changing, some IPM techniques are no longer viable or successful. The prompt involvement of academics is crucial in this matter. Therefore, it is imperative that researchers focus on closing the gap between the necessary changes to IPM tactics and their present ineffectiveness due to climate change.

Heuskin *et al*. (2011), Andrew and Hill (2017), among others, suggest that changing the crop's sowing period, adjusting pest threshold levels, using robust crop types, conserving biodiversity, using behaviour moderating substances, and wisely using insecticides can all contribute to this goal. The government of Punjab has chosen to conduct bio-pesticide trials at the provincial level in an effort to find an environmentally friendly and economically viable solution to the problems associated with cotton crop decline, ineffective existing insecticides, and rising production costs. The trials were carried out at farmer's fields by the Pest Warning & Quality Control of Pesticides (PWQCP) and Agriculture Extension & Adaptive Research (AE & AR).

6. Materials and Method

The surveys were conducted throughout the Punjab for third party validation of the results of IPM trials conducted by Agriculture Extension and Pest Warning & Quality Control of Pesticides (PWQCP) Departments at farmer's field. The main steps included

- Formation of Cotton Survey Committee,
- Development of Questionnaire and
- Selection of Sites.

The detailed methodology is given below:

6.1: Formation of Cotton Survey Committee

In Pursuance of the Government of the Punjab, Agriculture Department, South Punjab and MNS- University of Agriculture, Multan constituted a "Cotton Survey Committee" for third party validation of the IPM plots/blocks laid by agriculture department for cotton season 2023 (Figure 5). Respondents were belonging to Multan (n=132), Lodhran (n=109), Khanewal (n=176), Vehari (n=229), Bahawalpur (n=56), Rajanpur (n=60), Muzaffargarh (n=86), and Dera Ghazi Khan (n=191).

Figure 5. South Punjab Map showing pinned survey locations

6.2: Questionnaire Development

Data were collected to observe the impact of IPM practices on the attributes of adjacent farmers. The study was carried out using a structured questionnaire developed by the Agriculture Department, Multan and Institute of Plant Protection, MNS-University of Agriculture, Multan (Figure 6).

ماڈل کے متعلق سوالنامہ IPM کسان بھائیوں سے

نام کاشتکار_____رابطہ نمبر_____

مکمل پتہ_____آئی پی ایم (ہاں) (نہیں)

تحصیل_____ضلع_____

نام وارئٹی_____تاریخ کاشت_____

1 کیا آپ کو محکمہ زراعت نے کپاس کے متعلق کوئی مشورہ دیا ہے؟ (ہاں) (نہیں)

2 آپ کپاس کی کاشت کے متعلق کہاں سے معلومات لیتے ہیں؟

محکمہ زراعت(_____) زرعی کمپنی(_____)

ٹیلی ویژن(_____) ٹیلی فون(_____)

3 کیا آپ بایو پیسٹی سائیڈ (کورتمہ، نیم، اک، مورنگا وغیرہ) کے متعلق معلومات رکھتے ہیں؟ (ہاں) (نہیں)

4 کیا آپ نے پہلا سپرے 60 دن تک نہ کرنے پر عمل کیا؟ (ہاں) (نہیں)

5 آپ نے پہلا کیمیکل سپرے کب کیا اور کس کیڑوں کے تدارک کے لئے کیا؟

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6 کیا آپ کی کھیت میں دوست کیڑے (کرائی سوپرلا لیڈی برڈ بیٹل، پیلا بھونڈ، ٹرائیکو گراما) موجود ہیں؟

(ہاں) (نہیں)

7 آپ نے اب تک فصل پر کون کونسی اور کتنی کھادیں استعمال کی ہیں؟

1_____2_____3_____4_____5_____

8 کھادوں کا کل خرچہ فی ایکڑ کتنا ہے؟_____

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9 اس سال کتنے سپرے کئے ہیں؟

بایو پیسٹی سائیڈ(_____) کل خرچہ(_____)

کیمیکل سپرے(_____) کل خرچہ(_____)

10 پچھلے سال کتنے سپرے کیے؟

بایو پیسٹی سائیڈ(_____) کل خرچہ(_____)

کیمیکل سپرے(_____) کل خرچہ(_____)

11 آپ کے خیال میں کپاس کی فصل کو سب سے زیادہ کس نے نقصان پہنچایا؟

پیسٹی سائیڈ(_____) سیڈ(_____) موسم(_____)

بایو پیسٹی سائیڈ(_____) یا کوئی اور وجہ(_____)

12 کیا آپ بایو پیسٹی سائیڈ کے مثبت اثرات سے متفق ہیں؟ (ہاں) (نہیں)

13 اوسط پیداوار فی ایکڑ کتنی ہے؟_____

14 کیا اگلے سال آئی پی ایم ماڈل پر عمل کریں گے؟ (ہاں) (نہیں)

Figure 6. Questionnaire used for assessment of farmer's perception about IPM.

6.3: Data Collection

Data were collected by the following universities in their respective areas;

1. MNS-University of Agriculture, Multan (Lodhran, Multan, Khanewal and Vehari districts)
2. University of Agriculture, Faisalabad (Faisalabad, Jhang, Toba Tek Singh, Okara, Pakpattan and Sahiwal districts)
3. Khawaja Fareed University of Information, Engineering and Technology, Rahim Yar Khan (Rahim Yar Khan district)
4. Islamia University of Bahawalpur (Bahawalnagar and Bahawalpur districts)
5. University of Sargodha (Bhakkar and Mianwali districts)
6. University of Layyah (District Layyah)
7. Ghazi University D.G Khan (District D.G Khan, Muzafar Garh, Rajan Pur)

6.4: Data Management

The university wise reports of this survey were provided the Agriculture Secretariat (South Punjab) while MNS-UAM compiled the data from all other universities' reports. The data on farmers' knowledge and practices was scored by following the methodology of Koenraadt *et al*. (2006). Briefly, question was asked about the farmers whether they belong to IPM block or not (if he said yes; score = 1, if he said no Score = 0,). Similarly, questions about source of information were labeled according to the input "1" for the source of information mentioned by the farmer while "0" for rest of the sources. Similarly, different pests were tagged with different digits to easily analyze the data. Similarly, binary digit response was recorded for all the other questions like use of sticky traps, bio-cards, type of fertilizers, expenses, number of sprays etc.

6.5: Statistical Analysis

The data were analyzed by chi-square test of association using SPSS software (Version 10.0 for Windows, SPSS Inc., Chicago, USA) (Hosmer *et al*. 2000).

7. RESULTS

The results of this report are presented according to the questions for which the data were collected from all cotton growing areas in Punjab.

7.1: Agriculture Department and Farmers' Guidance

The data indicates the percentage of respondents in each location who received advice about cotton from the Agriculture Department in both IPM and non-IPM fields (Fig.7).

In the non-IPM fields across various locations, the percentage of respondents receiving advice from the Agriculture Department about cotton ranges from approximately 76.67% to 99%. The lowest reported percentage is in Toba Tek Singh (76.67%), while the highest is in Muzaffargarh (99%). For IPM fields, the percentage of respondents receiving advice about cotton from the Agriculture Department is consistently 100% across all locations. This implies that, according to the data collected, all respondents in IPM fields reported receiving advice about cotton from the Agriculture Department.

Based on the data collected, it's evident that in the surveyed areas, there's a notably higher incidence of advice provision from the Agriculture Department in IPM fields compared to non-IPM fields. In IPM fields, the advice provision is reported at 100% consistently, indicating more comprehensive guidance from the Agriculture Department in these areas concerning cotton farming practices compared to non-IPM fields, where the advice provision shows some variability among locations, with percentages ranging from approximately 76.67% to 99%.

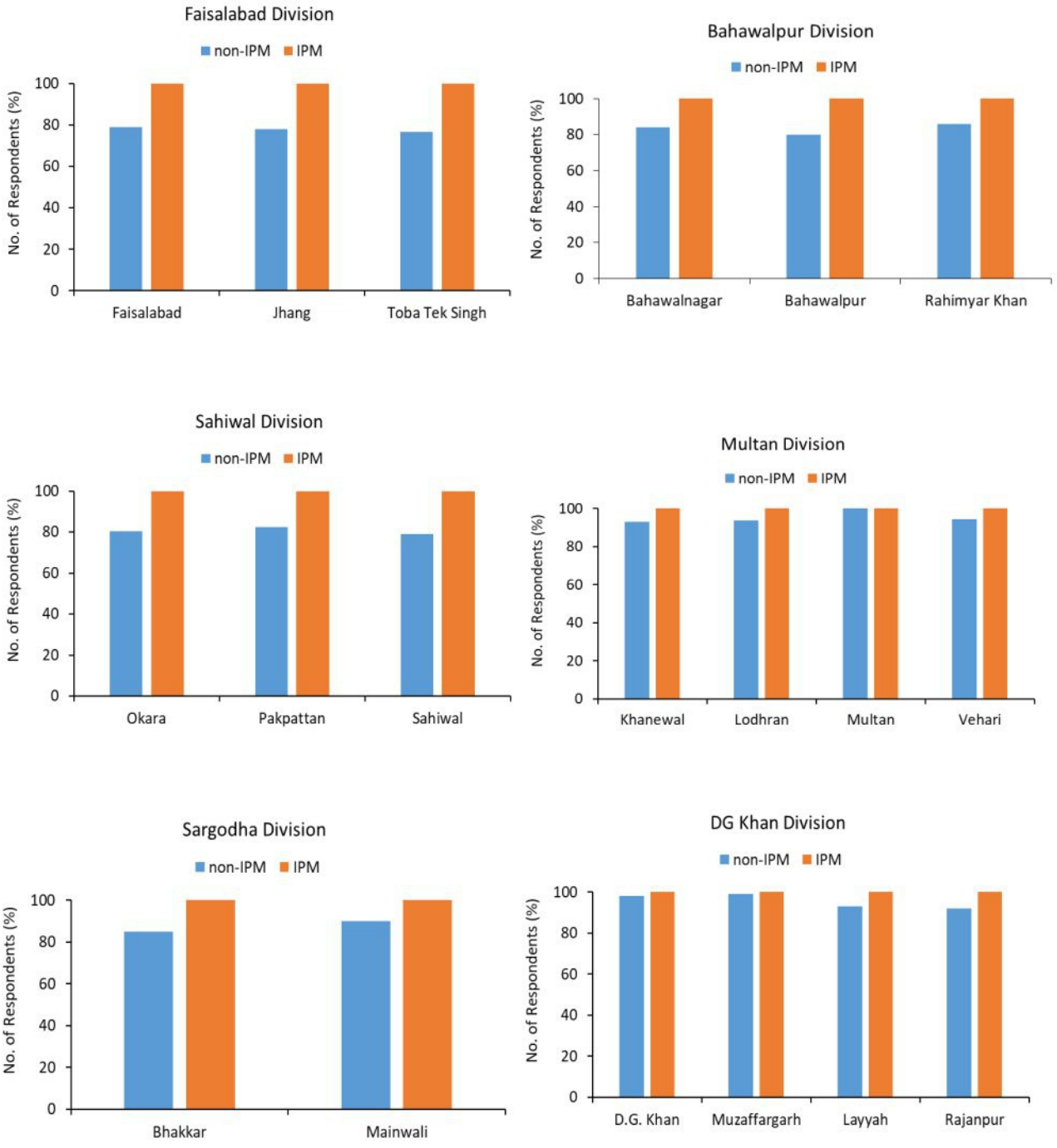


Figure 7. Comparison of advice provision by agriculture department to IPM vs. Non-IPM cotton farmers

7.2: Information Sources of Cotton Farmers

This data illustrates the sources from which farmers acquire information about cotton across different locations categorized into Agri. Dept. (Agriculture Department), Agri. Company, TV, and Social Media for non-IPM fields (Fig.8a). Across different locations in non-IPM fields, there's substantial diversity in the sources from which farmers gather information about cotton. The Agriculture Department appears to be a significant source in most areas, but there's considerable variability in reliance on agricultural companies, TV, and social media platforms for information. Certain regions show higher dependence on specific sources compared to others, indicating that the availability and accessibility of information might vary significantly based on location and the effectiveness of communication channels.

7.2.1: Non-IPM Farmers

Agriculture Department (Agri. Dept.):
The percentage of farmers obtaining information from the Agriculture Department varies across locations, with figures ranging from approximately 57% to 100%. The highest percentages are recorded in Multan and Vehari, both reporting 100%, while the lowest is in Rahim Yar Khan at 57%.

Agri.Company:
Farmers receive information from agricultural companies, with percentages varying significantly across locations. The range is diverse, with values ranging from approximately 0% to around 100%. Multan reported the highest at 100%, whereas Vehari reported 0%.

TV:
The utilization of television as a source of information displays varied percentages across locations, ranging from 0% to around 71%. D.G. Khan showed the highest percentage at 71%, while Multan and Vehari reported 0%.

Social Media:
Farmers sourcing information from social media platforms display a broad spectrum, varying from approximately 0% to around 26%. The highest reported percentage is in Layyah at 26%, while Multan and Vehari once again report 0%.

Non-IPM Plots

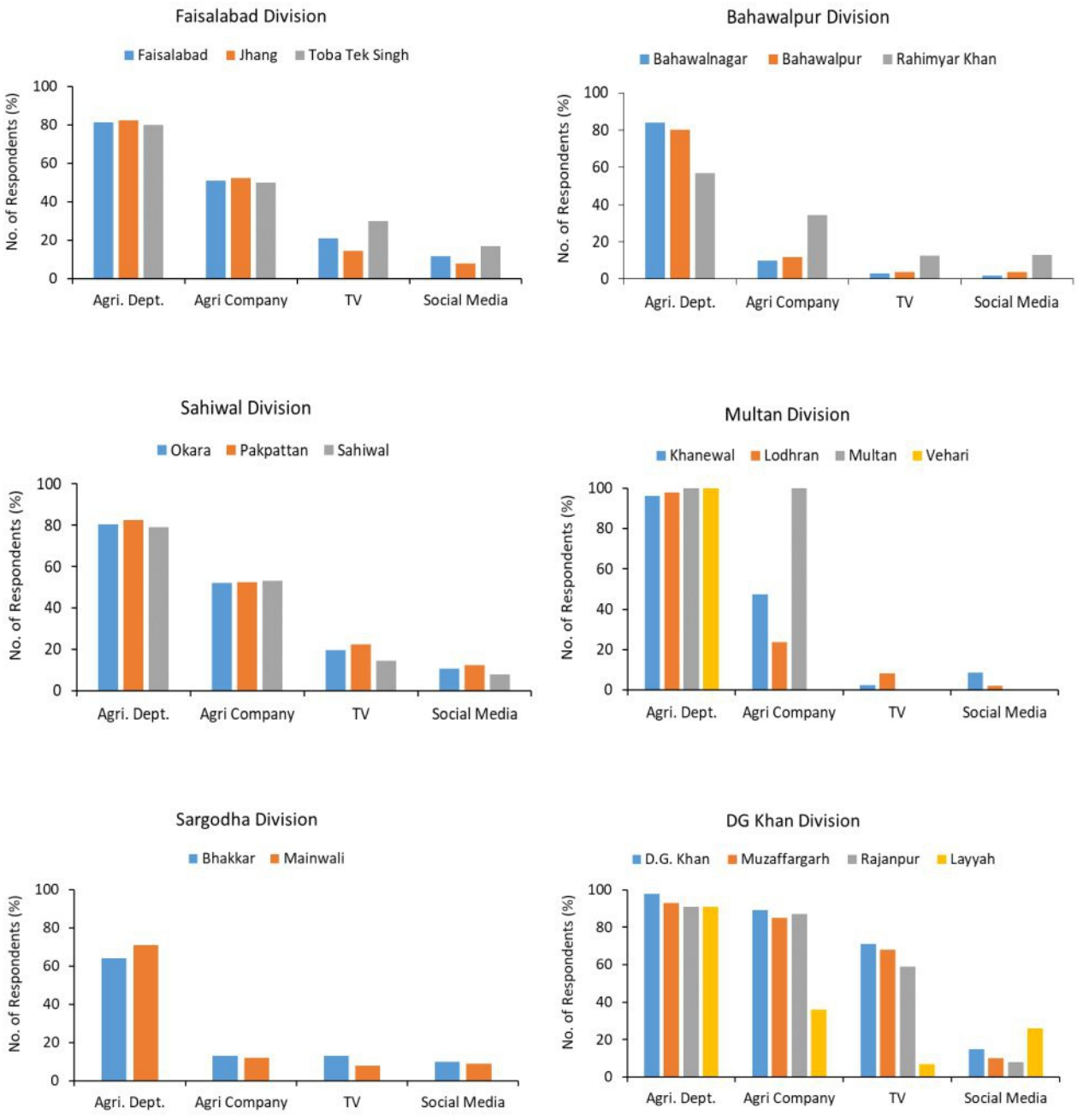


Figure 8(a). Comparison of information sources of farmers following Non IPM practices in cotton

7.2.2: IPM Farmers

The data of IPM plots represent the sources from where farmers acquire information about cotton across different locations, categorized into Agriculture Department (Agri. Dept.), Agricultural Company, TV, and Social Media (Fig. 8b). In the surveyed IPM fields, the Agriculture Department stands out as the primary and consistent source of information about cotton farming practices, with all locations reporting 100% reliance on this source. However, the reliance on agricultural companies, TV, and social media varies significantly across different locations, indicating disparities in the accessibility and utilization of these alternative sources of information among farmers practicing IPM methods in different regions.

Agriculture Department (Agri. Dept.):

In IPM fields, the percentage of farmers obtaining information from the Agriculture Department consistently stands at 100% across most locations surveyed. This indicates that in the reported IPM areas, all surveyed farmers relied on the Agriculture Department for information about cotton.

Agri Company:

The reliance on agricultural companies for information shows considerable variability across locations, ranging from 0% to approximately 81.25%. Khanewal reports the highest reliance on agricultural companies at 81.25%, while some locations, such as Faisalabad, Jhang, and Toba Tek Singh, show no reported reliance on these companies among surveyed farmers in IPM fields.

TV:

TV as a source of information demonstrates sporadic usage, with some locations reporting no reliance on television for cotton-related information in IPM fields, while others report varying percentages up to 14.28%. round figure

Social Media:

Similar to TV, social media utilization varies across locations, with percentages ranging from 0% to around 28.57%. Layyah reports the highest reliance on social media at 28.57%, whereas some locations report no reliance on social media for acquiring information about cotton in IPM fields.

IPM Plots

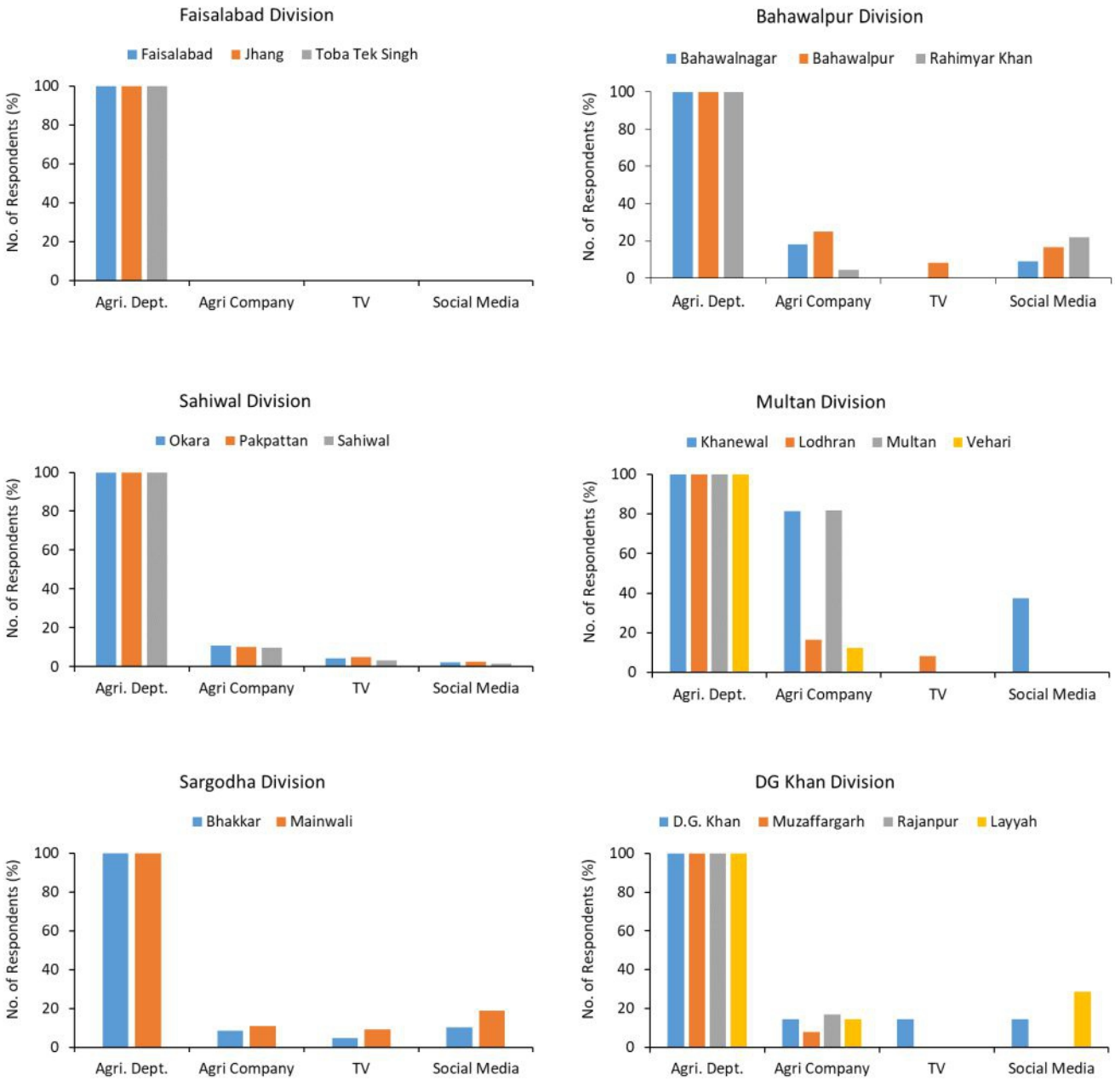


Figure 8(b). Comparison of information sources of farmers following IPM practices in cotton

7.3: Information about Bio-Pesticides

The data strongly indicates a significant difference in awareness regarding bio-pesticides between farmers following IPM and non-IPM practices in cotton farming (Fig. 9). IPM farmers universally have information about bio-pesticides, marking a comprehensive understanding of alternative pest management methods. On the other hand, among non-IPM farmers, the awareness levels vary widely, with some locations showing considerably lower percentages of awareness regarding bio-pesticides. This highlights the potential knowledge gap among non-IPM farmers regarding these environmentally friendly pest control methods, suggesting a need for increased education and information dissemination in those areas.

7.3.1: Non-IPM Farmers: Across various divisions and locations, the percentage of non-IPM farmers who have information regarding bio-pesticides ranges widely from 25% to 97.65%. Notably, there is variability in awareness among non-IPM farmers regarding bio-pesticides, with some areas having lower awareness percentages compared to others.

7.3.2: IPM Farmers: In contrast, IPM farmers consistently show higher awareness percentages, with all locations reporting 100% awareness regarding bio-pesticides. This suggests that among farmers following IPM practices in cotton, there is universal awareness or information available about bio-pesticides.

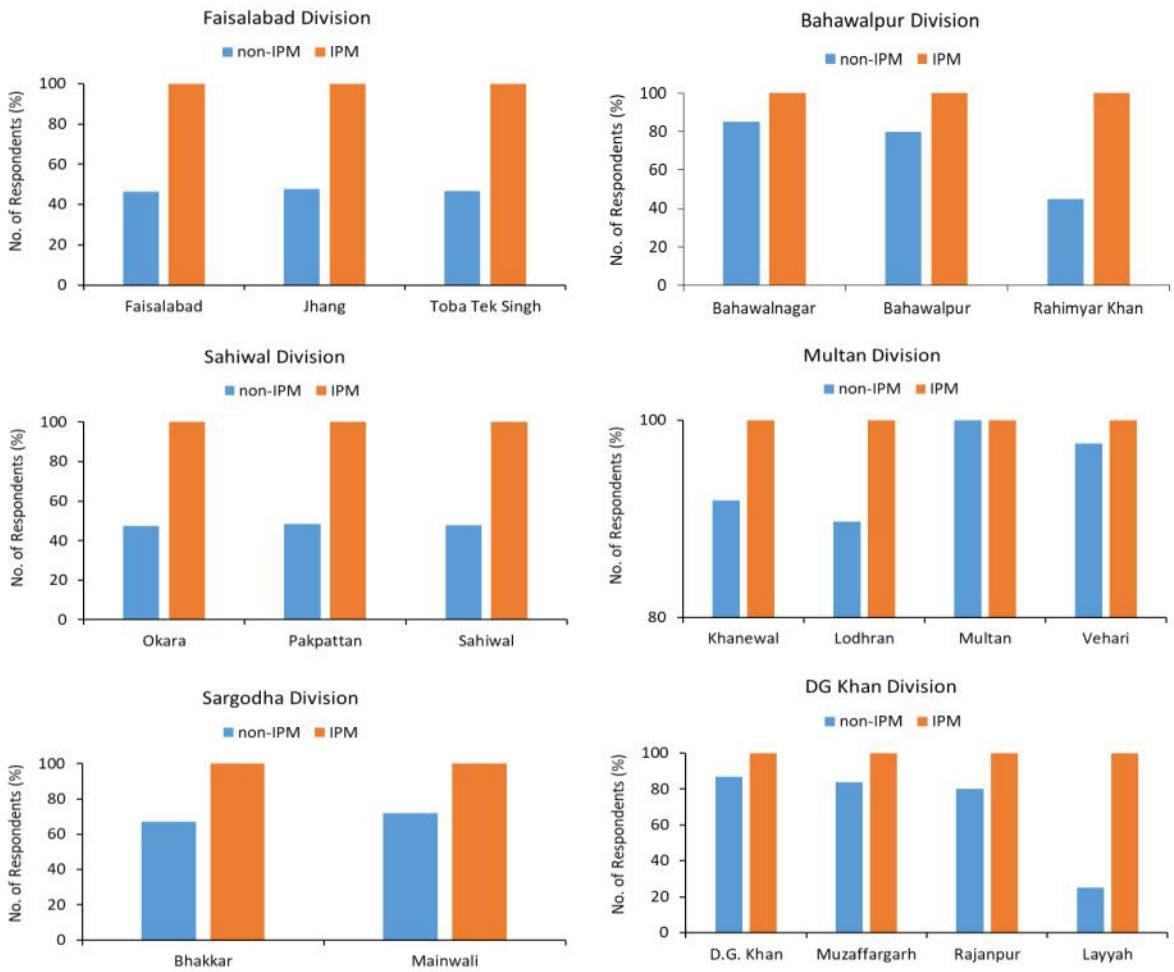


Figure 9(b). Comparison of bio-pesticides knowledge of farmers following IPM and Non-IPM practices

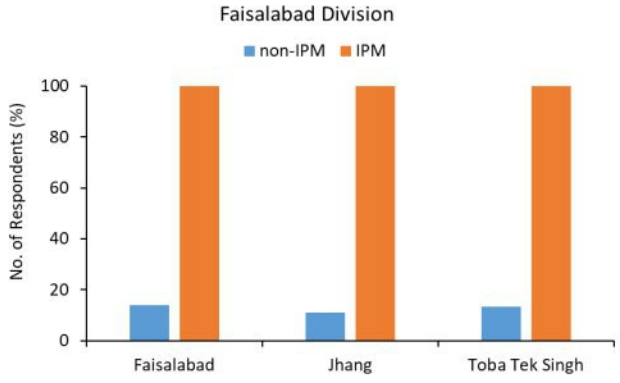
7.4: Delay of 1st Pesticide Spray for 60 Days

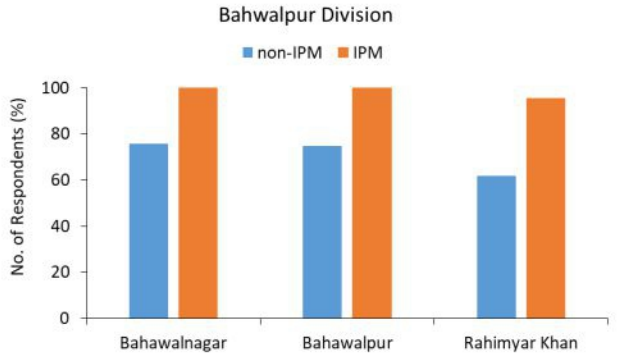
The data highlights a substantial difference in compliance with instructions regarding refraining from pesticide spraying until 60 days after sowing between farmers following IPM and non-IPM practices in cotton farming (Fig. 10).

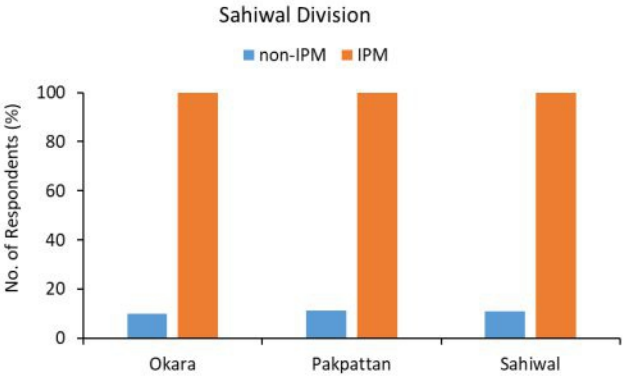
7.4.1: Non-IPM Farmers: Across various divisions and locations, the percentage of non-IPM farmers who complied with the instructions of not spraying pesticides till 60 days after sowing ranges widely from as low as 10% to as high as 97.65%. There is significant variability in compliance among non-IPM farmers, with some areas having substantially lower compliance rates compared to others. Compliance levels among non-IPM farmers vary significantly, suggesting a potential lack of awareness, understanding, or adherence to the recommended practice of refraining from pesticide spraying during the specified period. Some areas show notably low compliance rates, indicating a potential need for improved education and guidance regarding proper pest management practices.

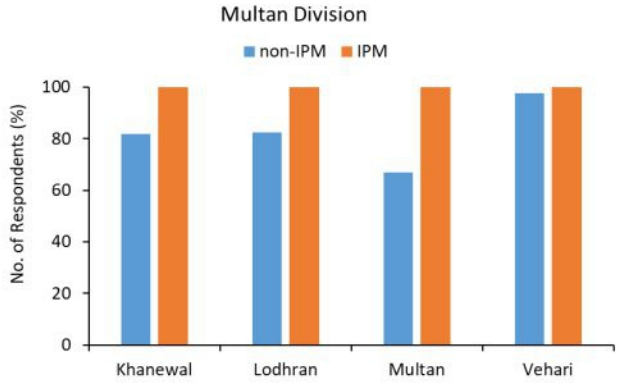
7.4.2: IPM Farmers: In contrast, IPM farmers generally exhibit higher compliance rates, with most locations reporting 100% compliance. However, there are a few instances where some IPM farmers had slightly lower compliance rates (e.g., 92.3% in Muzaffargarh and 83.33% in Layyah). Generally, IPM farmers display higher compliance rates, indicating a stronger adherence to recommended practices. However, a few locations show slightly lower compliance rates among IPM farmers, indicating a need for continued education and reinforcement of proper guidelines even within IPM practices.

Overall, these findings suggest that there's a need for enhanced education and support programs to ensure better compliance with recommended practices, especially among non-IPM farmers, to promote more sustainable and environmentally friendly pest management practices in cotton farming.









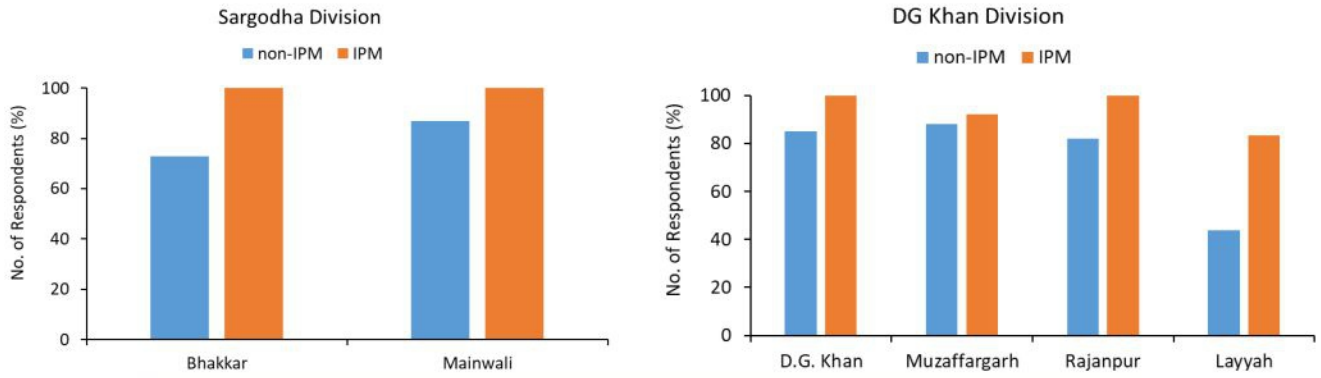


Figure 10. Comparison of compliance to avoid pesticide spraying till 60 days by farmers following IPM and Non-IPM practices

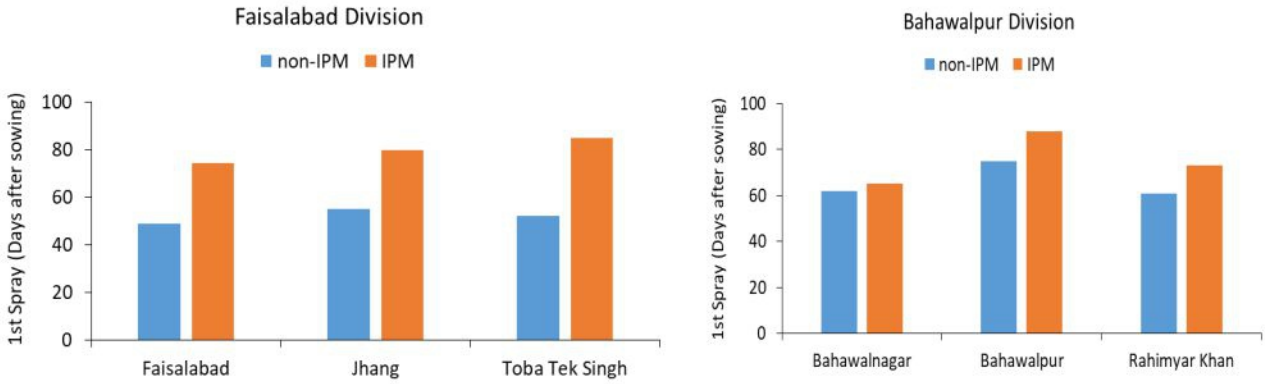
7.5: Timing of 1st Application of Pesticide Spray

The data suggests that there's variability in the timing of the first pesticide spray among both IPM and non-IPM farmers across different divisions (Fig. 11). However, in several instances, IPM farmers seem to have a wider range or variability in the timing of their first pesticide application compared to non-IPM farmers.

7.5.1: Non-IPM Farmers: The data reveals that the timing for the first pesticide spray by non-IPM farmers varies across divisions and locations, with days ranging from as low as 43.75 to as high as 75 days. There is notable variability in the timing of the first pesticide application among non-IPM farmers.

7.5.2: IPM Farmers: Similarly, the timing for the first pesticide spray by IPM farmers also varies across locations with days ranging from 63.5-96 for 1st application of pesticides. In general, IPM farmers tend to have a wider range in their first pesticide spray timings compared to non-IPM farmers.

This variability might stem from different factors such as pest pressure, crop conditions, variations in farmer practices, or differences in the understanding and implementation of pest management strategies. Further analysis or on-ground investigations could reveal more insights into why these variations exist and whether they impact pest control effectiveness or environmental considerations.



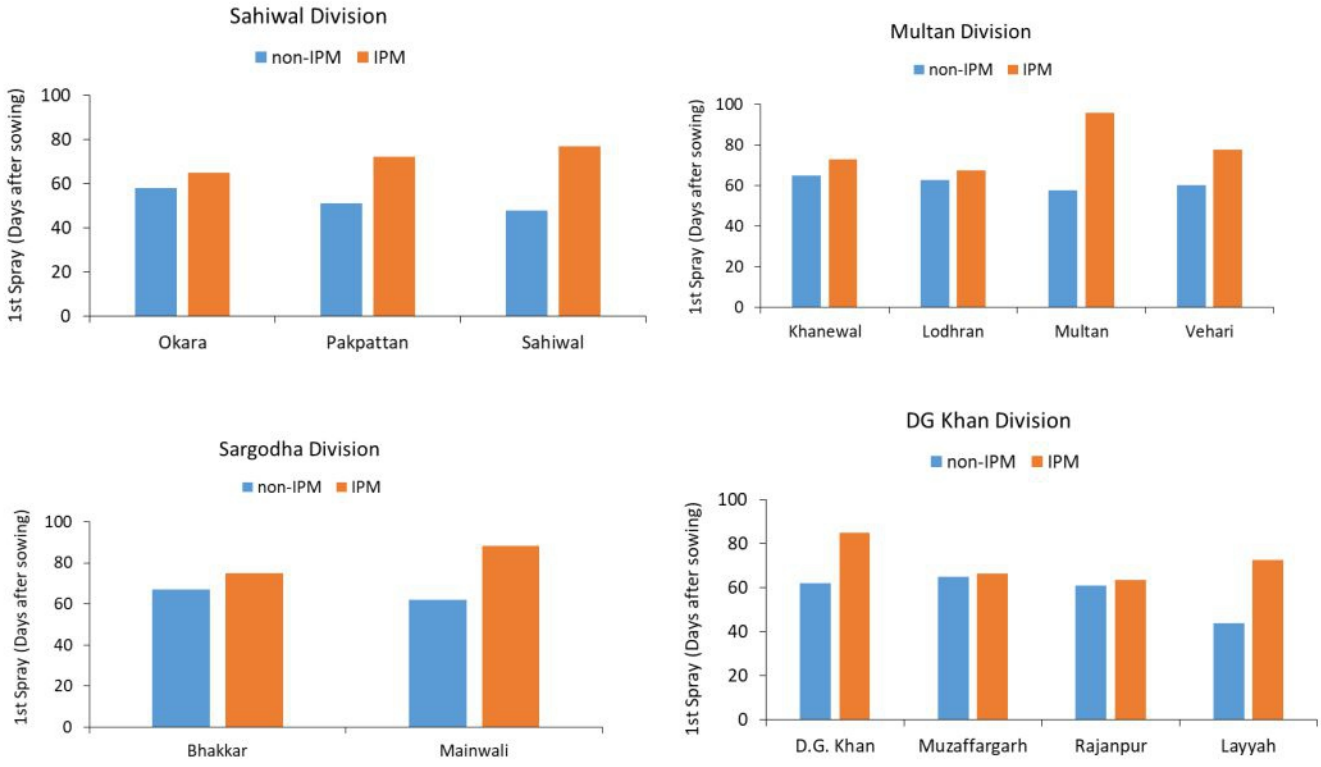


Figure 11. Comparison of first pesticide spraying by farmers following IPM and Non-IPM practices

7.6: Insect Pest for Which 1st Chemical Spray was Applied

The data highlights the primary pests for which farmers, categorized into Non-Integrated Pest Management (Non-IPM; Fig. 12 (a) and Integrated Pest Management (IPM; Fig. 12 (b) practices, conducted their initial chemical sprays in cotton farming. The identified pests include Whitefly, Jassid, Thrips, Aphid, and Others, and the data is segregated across various divisions and locations.

7.6.1: Non-IPM Farmers [Fig. 12(a)]:

Pest Targets: Across different divisions and locations, non-IPM farmers utilized chemical sprays primarily targeting Whitefly, Jassid, Thrips, and Aphid infestations in cotton fields.

Varied Percentages: The percentages varied significantly among locations. For instance, in Bahawalpur Division, Rahim Yar Khan showed a prominent focus on multiple pests with high percentages across Whitefly, Jassid, Thrips, and Aphid, while other locations like Multan Division's Lodhran and Multan emphasized Jassid and Thrips with a lower emphasis on Whitefly and Aphid comparatively.

Regional Variations: Each region displayed unique pest control priorities, likely influenced by local climatic conditions, historical pest prevalence, and agricultural practices prevalent in those areas.

7.6.2: IPM Farmers [Fig. 12(b)]:

Similar Pest Focus: IPM farmers, much like non-IPM farmers, concentrated their initial chemical sprays on Whitefly, Jassid, Thrips, and Aphid, albeit with varying percentages in different locations.

Differences in Approach: While the pests targeted were similar, the percentages differed. For instance, in Multan Division, Khanewal exhibited a more balanced approach among Whitefly, Jassid, and Thrips compared to other regions.

The data indicates a fundamental alignment in pest control strategies between non-IPM and IPM farmers, targeting common cotton pests. However, the distribution of pest percentages highlights nuanced differences in the approach to pest management and priorities across divisions and locations. Non-IPM farmers seemed to address multiple pests in varying proportions, often emphasizing one or two dominant pests prevalent in their respective regions. This might indicate a more reactive approach to pest management, focusing on prevalent immediate threats. Whereas, IPM farmers also targeted similar pests but often with more balanced percentages across the pests. This approach aligns with the integrated pest management methodology, emphasizing a holistic and sustainable strategy that utilizes multiple pest management techniques to maintain pest populations below economically damaging levels. The differences observed among divisions and locations suggest that local factors, including environmental conditions, pest prevalence, and perhaps the level of awareness or access to integrated pest management practices, play pivotal roles in determining farmers' pest control strategies.

In essence, while both non-IPM and IPM farmers address similar pests during initial chemical sprays, the varying percentages and pest emphases demonstrate diverse pest management strategies influenced by regional factors and the applied farming practices

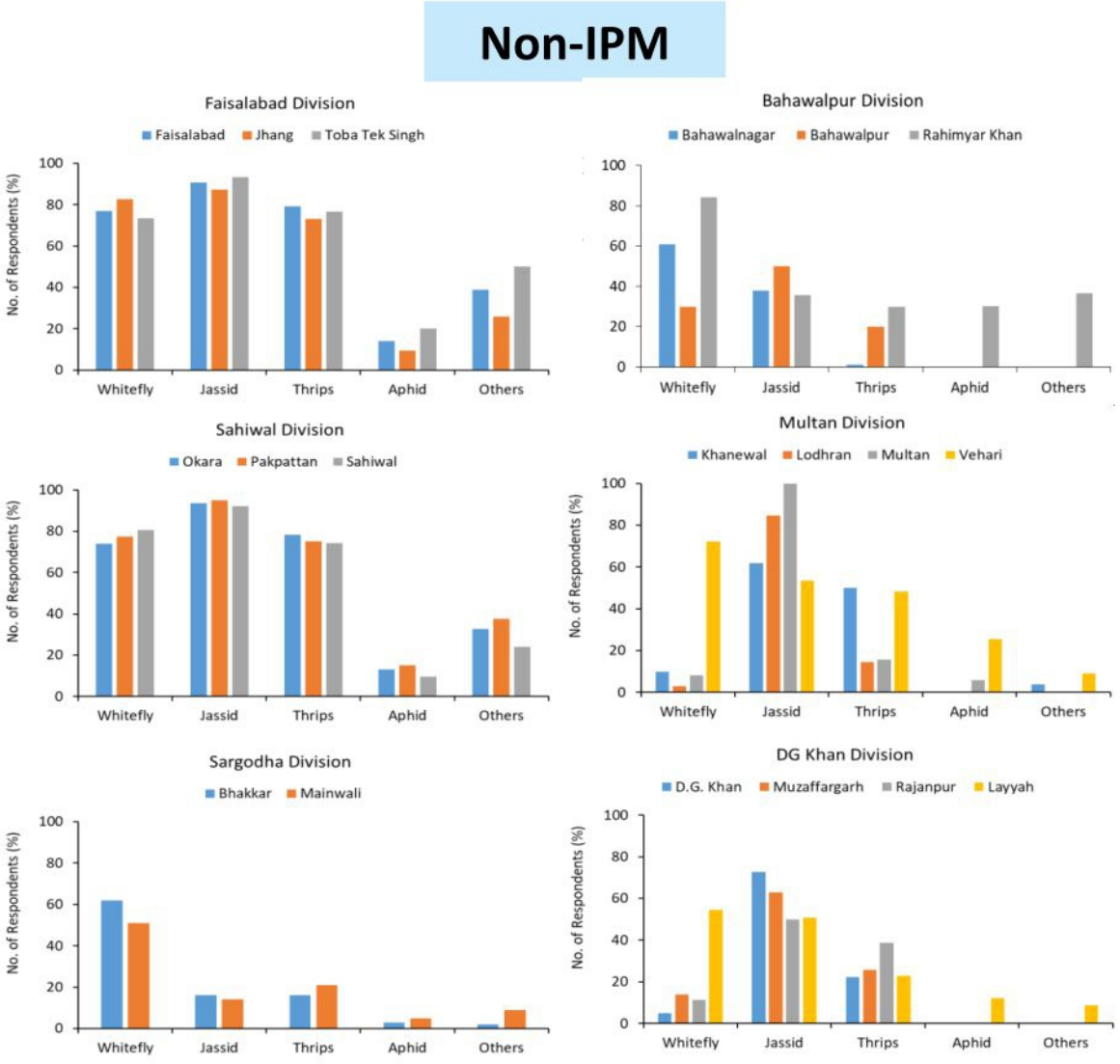


Figure 12(a). Pests for which first spray was performed by farmers following Non-IPM practices in cotton

IPM Plots

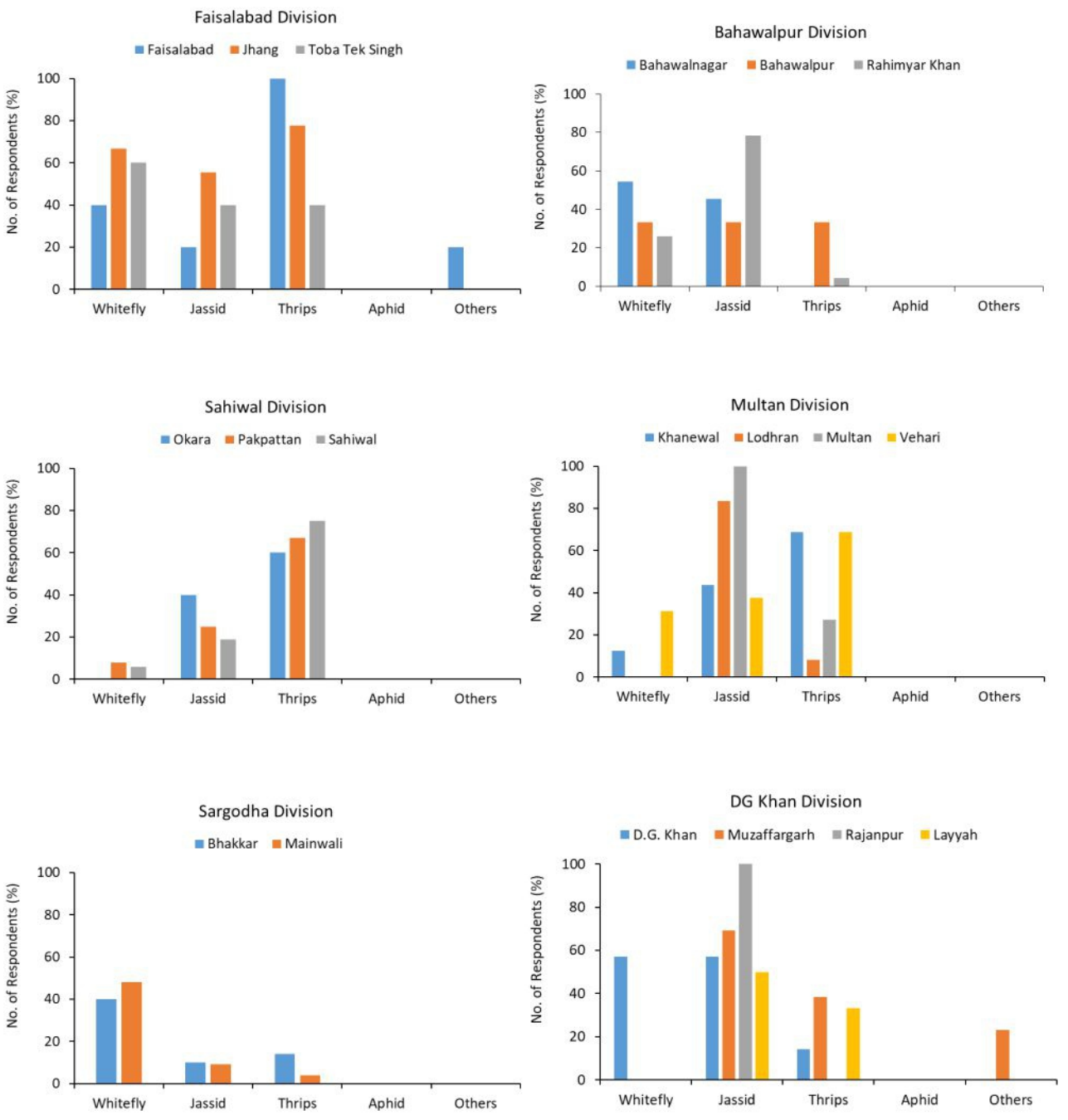


Figure 12(b). Pests for which first spray was performed by farmers following IPM practices in cotton

7.7: Presence of Natural Fauna in Cotton Field

The data showcases the presence of beneficial insects observed by farmers who practice Non-Integrated Pest Management (Non-IPM) and Integrated Pest Management (IPM) methods in cotton fields (Fig. 13).

7.7.1: Non-IPM Farmers:

Varied Presence: Non-IPM farmers reported a wide range of percentages indicating the presence of beneficial insects, with numbers varying from as low as 3.33% to around 98.75% across different divisions and locations.

Lower Observations: In several locations, such as Bhakkar, Mainwali, and certain parts of Faisalabad Division, a notably lower presence of beneficial insects was reported, around or below 25%.

7.7.2: IPM Farmers:

Consistent Presence: IPM farmers generally reported higher percentages, often at or close to 100% in most divisions and locations.

Enhanced Observations: Regions like Multan, DG Khan, and Sahiwal exhibited consistently higher observations of beneficial insects among IPM farmers compared to their non-IPM counterparts.

The data indicates that there's a discernible difference in the reported presence of beneficial insects between non-IPM and IPM practices among cotton farmers. Non-IPM farmers exhibited varied observations, with some locations reporting significantly lower percentages, potentially suggesting a lesser presence of beneficial insects. On the other hand, farmers following IPM practices generally reported higher percentages of beneficial insects across divisions, indicating a more consistent and potentially healthier ecosystem within their cotton fields.

The disparity in the reported presence of beneficial insects could potentially signify the effectiveness of integrated pest management in fostering a more conducive environment for beneficial insects, contributing to a more balanced ecosystem within the cotton fields.

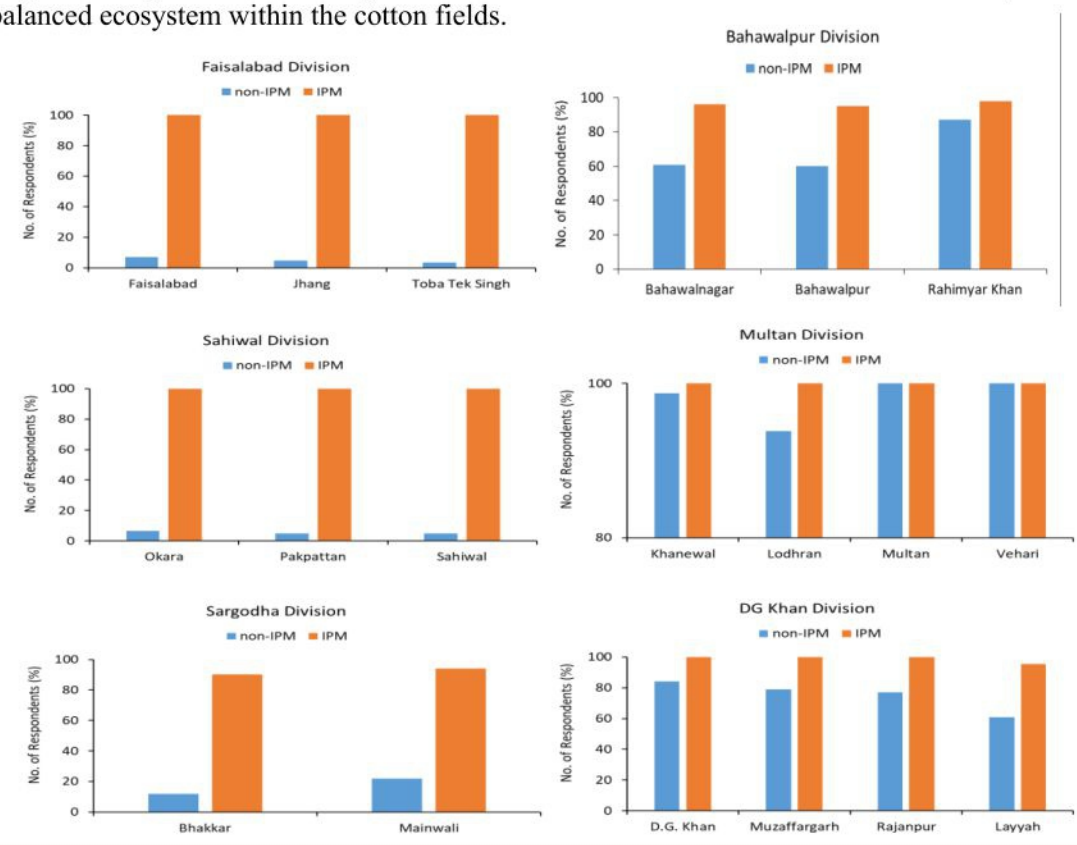


Figure 13. Comparison of beneficial insects present in cotton field where IPM and Non-IPM practices were adopted.

7.8: Fertilizers used by Cotton Farmers

Figures 14 a & b shows the types of fertilizers used by farmers practicing Non-Integrated Pest Management (Non-IPM) and Integrated Pest Management (IPM) methods in cotton fields across various divisions and locations. Farmers under Non-IPM methods showcased diverse but often limited fertilizer usage, focusing predominantly on DAP, Urea, and sometimes Nitrophos with varying levels of other supplements based on divisions and locations. Farmers following IPM practices exhibited more consistent usage of primary fertilizers such as DAP, Urea, and sometimes Nitrophos, often accompanied by a broader range of supplementary fertilizers across different divisions.

7.8.1: Non-IPM Farmers' Fertilizer Usage [Fig. 14(a)]:

Bahawalpur Division:

The usage of various fertilizers varied: DAP (Diammonium phosphate), Urea, and Nitrophos were the primary fertilizers used. Other fertilizers such as CAN Guawara, Potassium, Zinc, Boron, and other types were also utilized, albeit in smaller proportions. Rahim Yar Khan had similar trends, with relatively balanced usage of Urea, Nitrophos, and other supplemental fertilizers.

Multan Division:

Khanewal and Lodhran showcased varied but significant usage of DAP, Urea, and Nitrophos, while Vehari primarily emphasized Potassium and Zinc alongside other fertilizers.

DG Khan Division:

D.G. Khan, Muzaffargarh, Rajanpur, and Layyah demonstrated a diverse utilization of fertilizers, including DAP, Urea, NP (Nitrophos), CAN Guawara, Potassium, Zinc, Boron, and others, although proportions differed.

Other Divisions:

Sargodha's Divisions Districts Bhakkar and Mainwali exhibited variations in fertilizer usage, with significant focus on Urea, NP, and other supplements.

Faisalabad's divisions reported higher usage of DAP and Urea with significant utilization of various other fertilizers.

Sahiwal Division:

Okara, Pakpattan, and Sahiwal depicted diverse fertilizer utilization, including DAP, Urea, and some Nitrophos, Potassium, and other supplementary types.

7.8.2: IPM Farmers' Fertilizer Usage [Fig. 14(b)]:

Bahawalpur Division:

IPM farmers emphasized similar primary fertilizers: DAP, Urea, and Nitrophos, with varied but consistent usage across different locations.

Multan Division:

Khanewal, Lodhran, Multan, and Vehari illustrated prevalent usage of DAP, Urea, and Nitrophos with minor usage of other fertilizers.

DG Khan Division:

D.G. Khan, Muzaffargarh, Rajanpur, and Layyah divisions demonstrated significant usage of various fertilizers, especially DAP, Urea, NP, CAN Guawara, Potassium, Zinc, Boron, and others, albeit in different proportions.

Other Divisions:

Sargodha's Bhakkar and Mainwali divisions displayed varying fertilizer usage emphasizing Urea, NP, and other supplements.

Faisalabad's divisions continued their higher usage of DAP and Urea alongside other fertilizer types.

Sahiwal Division:

Okara, Pakpattan, and Sahiwal highlighted diverse fertilizer usage, primarily focusing on DAP, Urea, and minor Nitrophos, Potassium, and other supplementary types.

Overall, the fertilizer usage patterns differed between Non-IPM and IPM farmers, with IPM practices showing more consistency and often a broader spectrum of fertilizers employed, potentially indicating a more diverse and potentially balanced nutrient management approach in cotton farming.

Non-IPM Plots

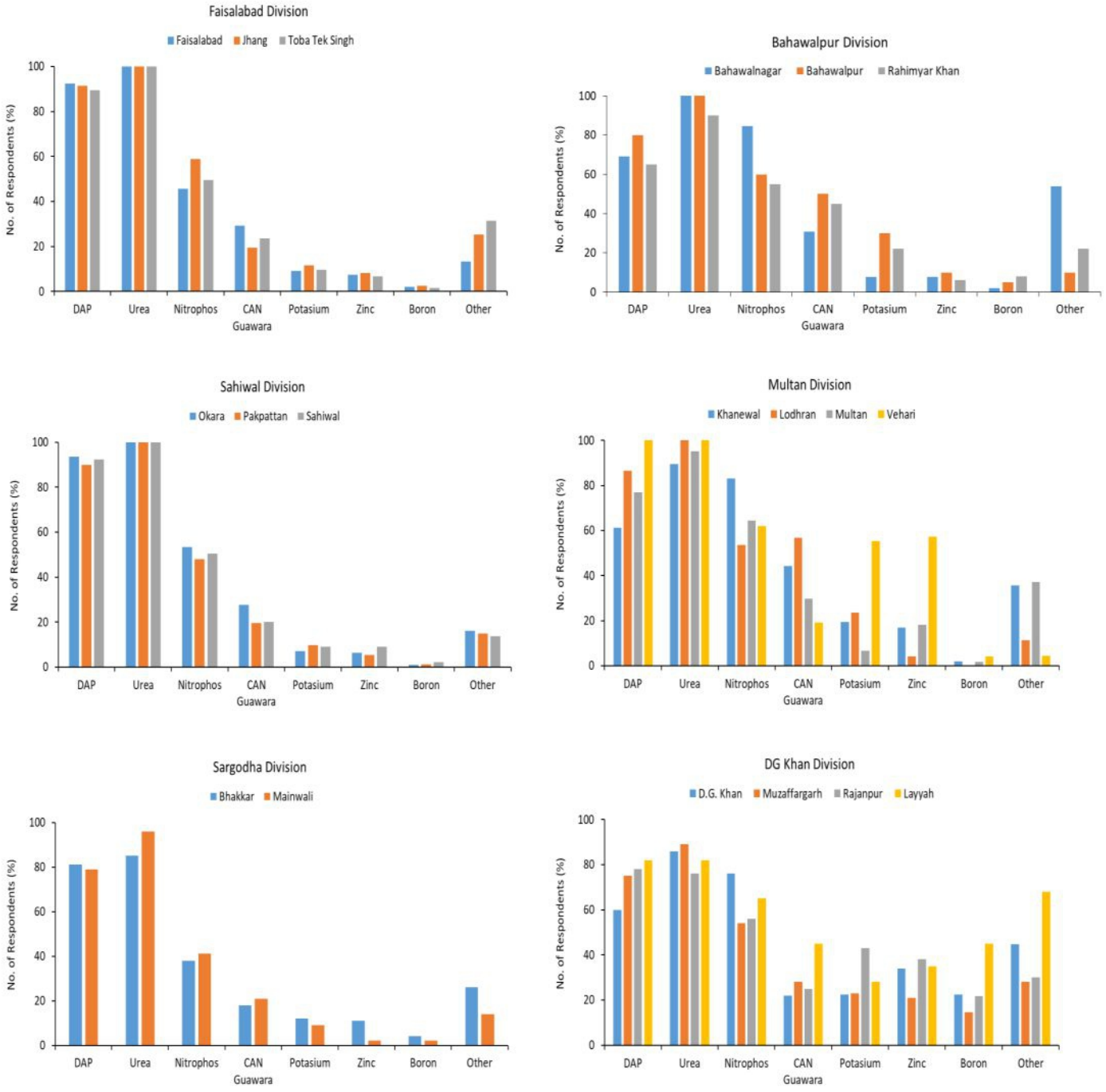


Figure 14(a). Different fertilizers application by farmers following Non-IPM practices in cotton

IPM Plots

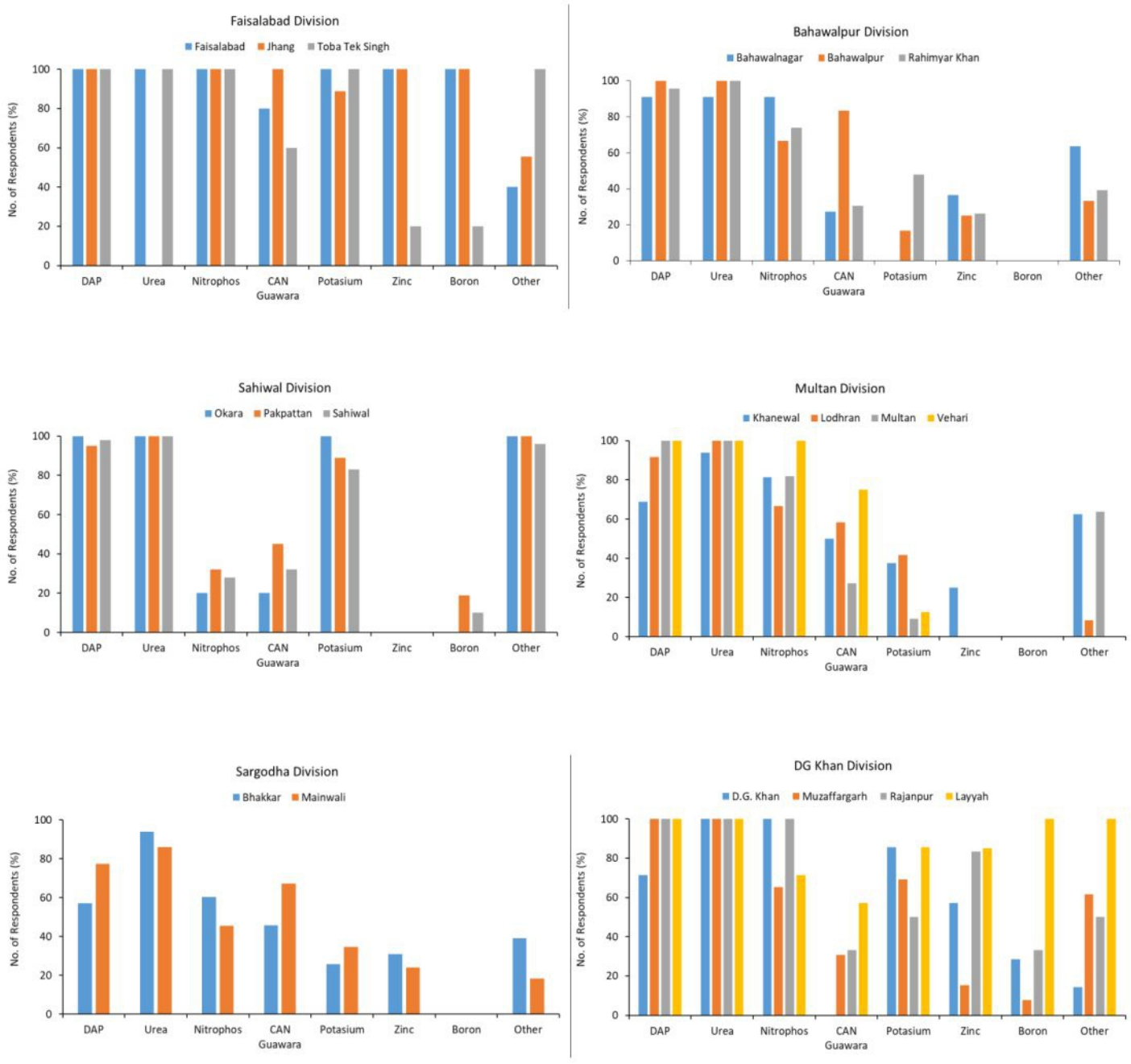


Figure 14(b). Different fertilizers application by farmers following IPM practices in cotton

7.9: Cost of Fertilizers (per acre) Used by Farmers

The cost of fertilizers per acre varied widely across different divisions and locations for both Non-IPM and IPM farmers (Fig. 15).

7.9.1: General Trends in Fertilizer Costs:

IPM vs. Non-IPM Farmers: Overall, IPM farmers tended to incur slightly higher fertilizer costs per acre compared to Non-IPM farmers. This suggests potential disparities in fertilization approaches or the types of fertilizers utilized within these practices across diverse regions.

Sargodha Division: Notably, the Sargodha division exhibited generally lower fertilizer costs compared to other regions for both Non-IPM and IPM farmers, indicating potential cost-effectiveness or unique agricultural practices in this area.

7.9.2: Non-IPM Farmers' Fertilizer Cost per Acre:

Cost Variations: Among Non-IPM farmers, the cost of fertilizer inputs displayed considerable variation, ranging from 21,000 rupees per acre in Bahawalnagar district to 52,000 rupees per acre in Toba Tek Singh district. The Faisalabad division generally reported higher fertilizer input costs compared to other regions among Non-IPM farmers.

7.9.3: IPM Farmers' Fertilizer Cost per Acre:

Cost Variability: Conversely, IPM farmers generally bore higher costs for fertilizer inputs compared to Non-IPM farmers. Fertilizer expenses among IPM practitioners varied from 24,000 rupees per acre in Mianwali district to 60,000 rupees per acre in Toba Tek Singh district. Similar to Non-IPM farmers, the Faisalabad division recorded higher fertilizer input costs among IPM practitioners.

The analysis underscores the wide variations in fertilizer costs per acre among both Non-IPM and IPM farmers across diverse divisions. The differences in cost patterns suggest potential regional disparities in fertilization strategies, soil conditions, or preferences for specific types of fertilizers.

In conclusion, the observed disparities in fertilizer costs per acre among Non-IPM and IPM farmers signify regional variations in fertilization practices. Understanding and addressing these differences are crucial for optimizing fertilizer usage, enhancing cost-effectiveness, and promoting sustainable agricultural practices across different regions.

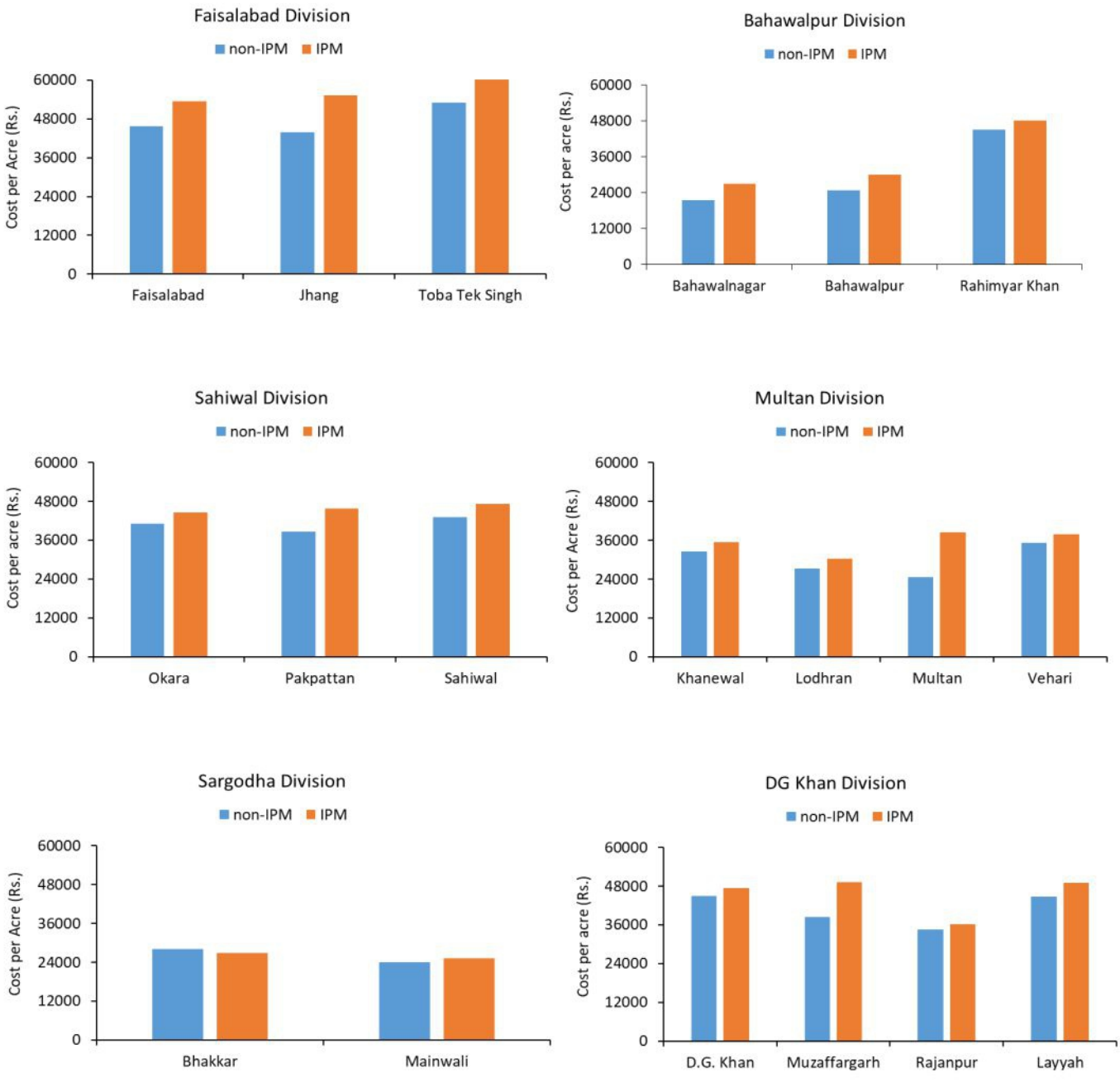


Fig. 15. Comparison of fertilizers' cost per acre applied by farmers following IPM and Non-IPM practices

7.10: Numbers of Sprays Applied by Farmers

Several regions, both in Non-IPM and IPM practices, showed an increase in bio-pesticides usage, mainly in specific divisions like Bahawalnagar, Bahawalpur, and Rahim Yar Khan. While, decreases in bio-pesticides application were observed in selected regions across both farming practices, particularly in Multan and DG Khan divisions for Non-IPM and IPM farmers.

For chemical pesticides, there were fluctuations and mixed trends in chemical pesticide usage, with no clear pattern of consistent increase or decrease evident across the surveyed divisions for both Non-IPM and IPM farmers.

7.10.1: Non-IPM Farmers [Fig. 16(a)]:

Bio-pesticides:

Notably, D.G. Khan and Bahawalpur divisions showed a substantial increase in bio-pesticides usage, rising from zero in 2022 to average of 2.0 and 1.75 in 2023, respectively. Other divisions also showed slight increase in usage of bio-pesticides in 2023 compared to 2022.

Chemical Pesticides:

Of the two divisions witnessed substantial increase in bio-pesticides, only D. G. Khan division had lower use of chemical pesticides in 2023 compared to 2022. Whereas in Bahawalpur division, the usage of chemical pesticides also increased in 2023 along with use of bio-pesticides. Chemical pesticide usage also decreased in Sargodha and Sahiwal divisions in 2023 compared to 2022, where slight increase in use of bio-pesticides was observed.

7.10.2: IPM Farmers [Fig. 16(b)]:

Bio-pesticides:

In Bahawalpur Division, Bahawalnagar and Bahawalpur displayed an increase in bio-pesticides application, showcasing an upward trend in both regions. Rahim Yar Khan adopted bio-pesticides in 2023, having none in 2022. Similarly, Khanewal, Lodhran, Multan, and Vehari showed varied patterns in bio-pesticides usage, with some areas increasing their application. Locations like D.G. Khan, Muzaffargarh, Rajanpur, and Layyah also displayed consistent increase in bio-pesticides use.

Chemical Pesticides:

Similar to the Non-IPM farmers, IPM farmers displayed mixed patterns in chemical pesticide usage across different divisions, indicating no consistent increase or decrease.

In summary, both Non-IPM and IPM farmers showed varied trends in bio-pesticides and chemical pesticide usage across different divisions and locations, indicating diverse pest management strategies or changes in farming practices from 2022 to 2023.

Non-IPM

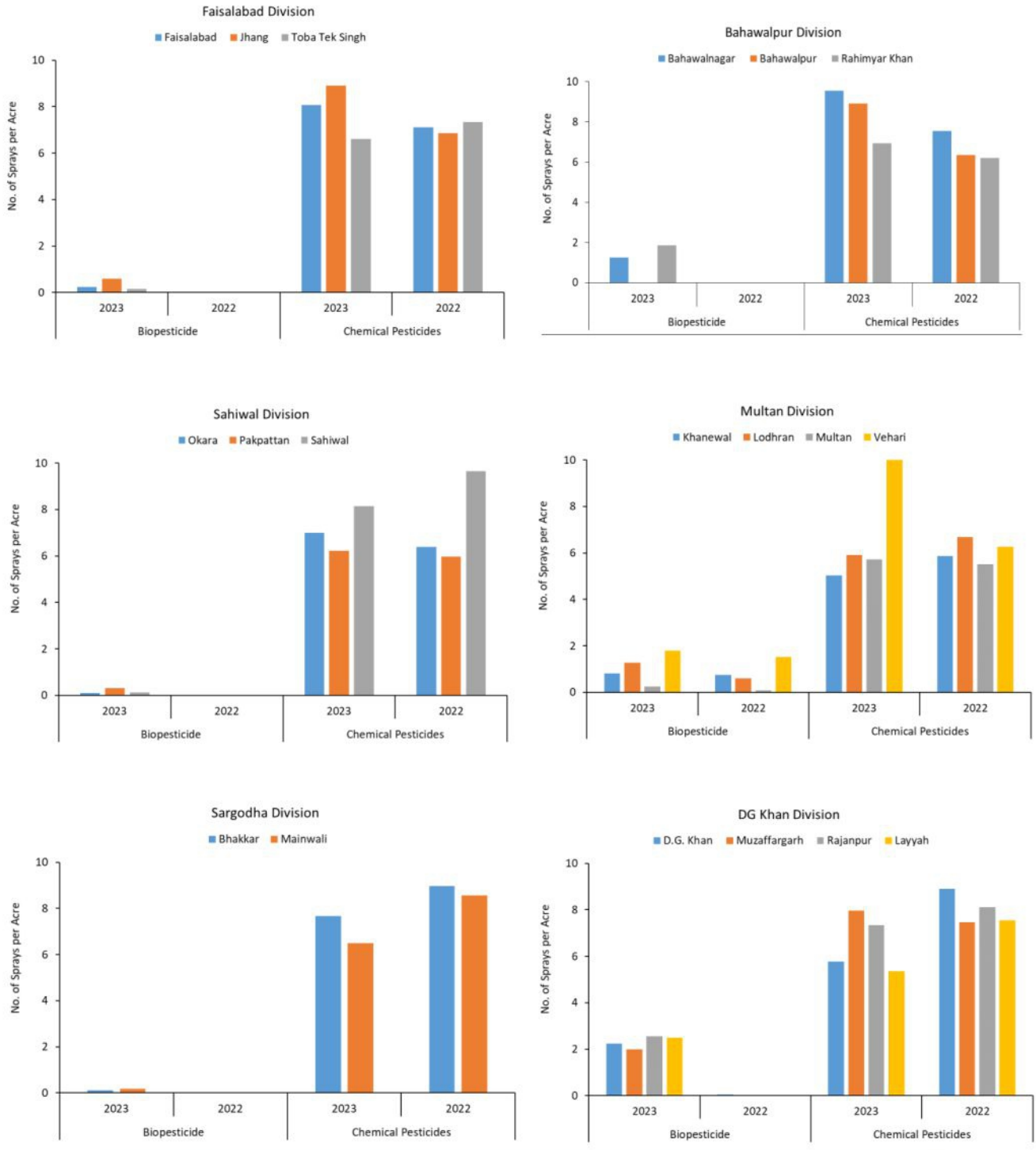


Fig. 16(a). Spray application by farmers following Non-IPM practices in cotton

IPM Plots

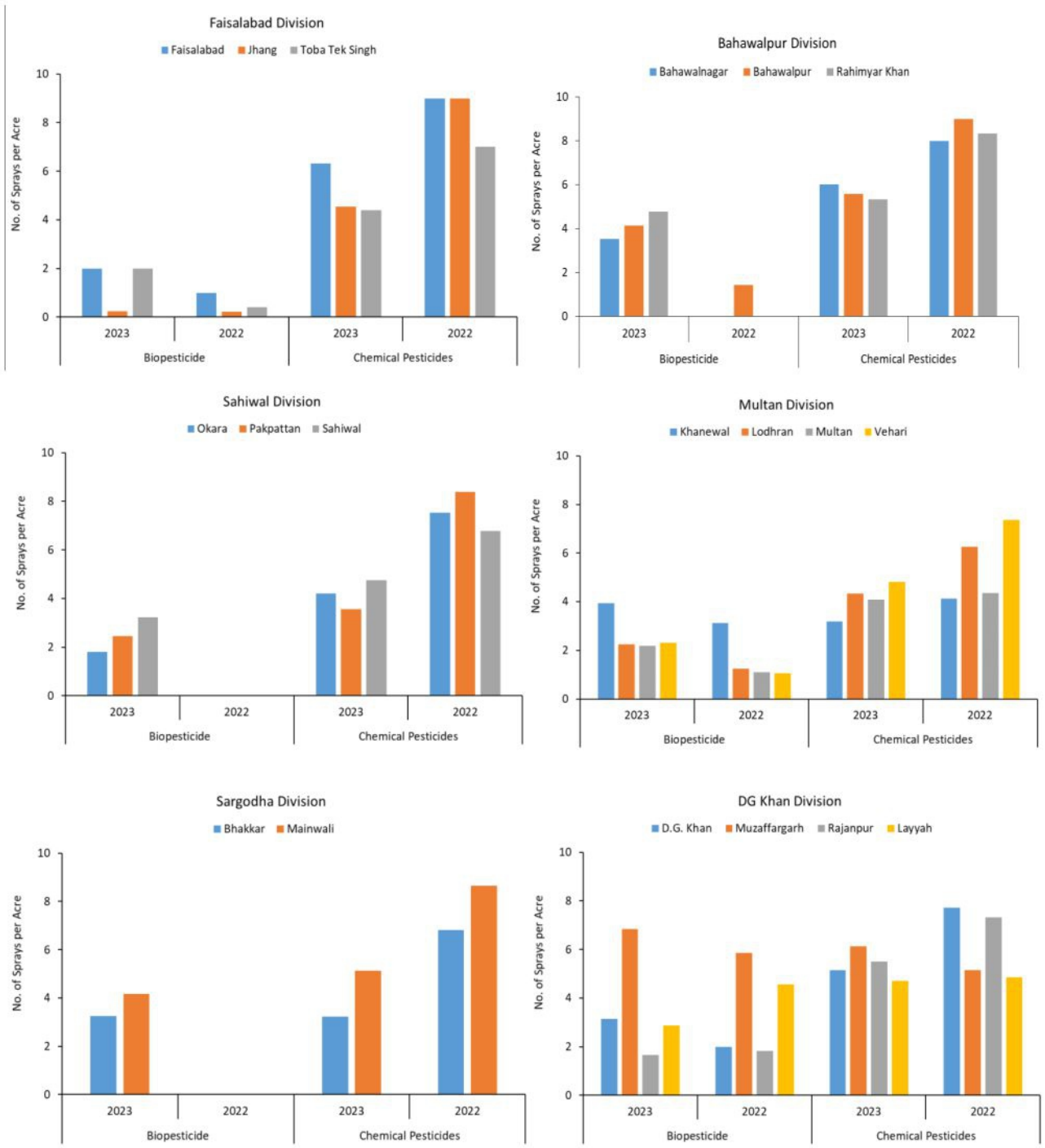


Fig. 16(b). Spray application by farmers following IPM practices in cotton

7.11: Cost of Sprays (per acre) Applied by Farmers

Figures 17(a) and 17(b) present an analysis of the cost variations associated with spray applications among farmers practicing Non-Integrated Pest Management (Non-IPM) and Integrated Pest Management (IPM) methods in cotton fields across different divisions and locations in Pakistan. This assessment aims to elucidate the trends and fluctuations in costs related to bio-pesticides and chemical pesticides over the years 2022 to 2023.

7.11.1: Non-IPM Farmers' Spray Application Costs [Fig. 17 (a)]:

Bio-pesticides Expenses: Bahawalnagar, Bahawalpur, and Rahim Yar Khan divisions observed notable increases in bio-pesticides costs from 2022 to 2023 among Non-IPM farmers. However, the Multan and DG Khan divisions showcased minor fluctuations or decreases in bio-pesticides expenses, with varied trends across specific areas. Sargodha, Faisalabad, Toba Tek Singh, and Sahiwal divisions maintained consistent bio-pesticides expenses throughout the analyzed period.

Chemical Pesticide Costs: Diverse trends were observed among divisions regarding the cost of chemical pesticides. Fluctuations, both increases, and decreases, were notable in regions like Multan, DG Khan, Sargodha, Faisalabad, and Sahiwal divisions.

7.11.2: IPM Farmers' Spray Application Costs [Fig. 17 (b)]:

Bio-pesticides Expenses: Similar to Non-IPM farmers, Bahawalnagar, Bahawalpur, and Rahim Yar Khan divisions experienced increased bio-pesticides costs for IPM practitioners. However, divisions like Multan and Vehari witnessed minor fluctuations or decreases in bio-pesticides expenses. Varied trends were noted in DG Khan, Sargodha, Faisalabad, Toba Tek Singh, and Sahiwal divisions, displaying either increased, decreased, or consistent bio-pesticides expenses.

Chemical Pesticide Costs: Considerable variations in the cost of chemical pesticides were observed across divisions for IPM farmers, showcasing changes in expenses through increases, decreases, or maintaining stability over the studied period.

The analysis indicates that both Non-IPM and IPM farmers experienced diverse changes in bio-pesticides and chemical pesticide costs across various divisions from 2022 to 2023. The trends were not uniform and showcased region-specific fluctuations, highlighting the absence of a consistent pattern in cost dynamics across all areas.

In conclusion, the observed fluctuations in bio-pesticides and chemical pesticide costs among Non-IPM and IPM farmers underscore the variability in cost dynamics within different divisions. These findings highlight the need for tailored strategies and interventions to address cost challenges specific to each region while ensuring sustainable pest management practices.

Non-IPM Plots

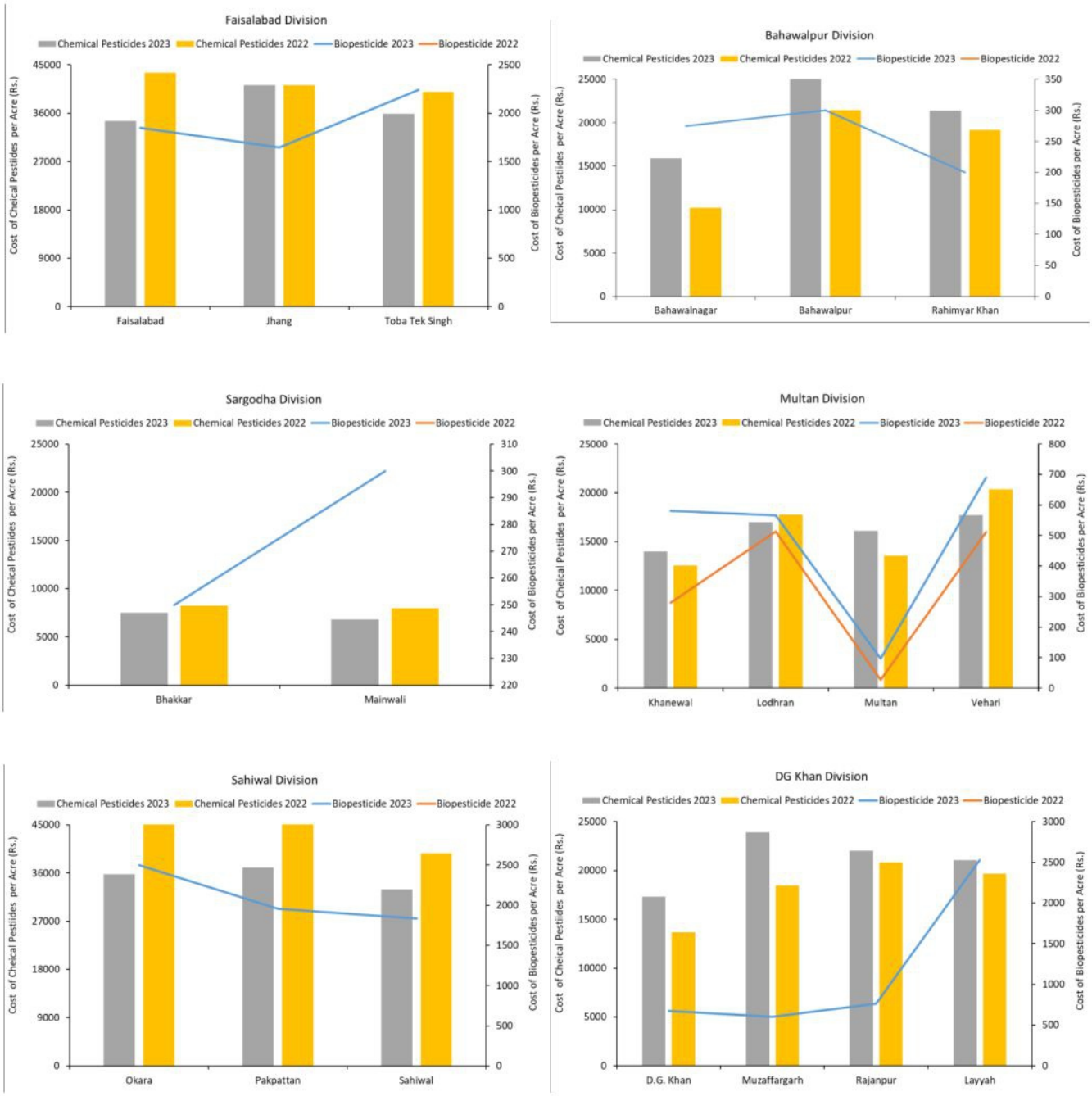


Fig. 17(a). Cost of spray application by farmers following Non-IPM practices in cotton

IPM Plots

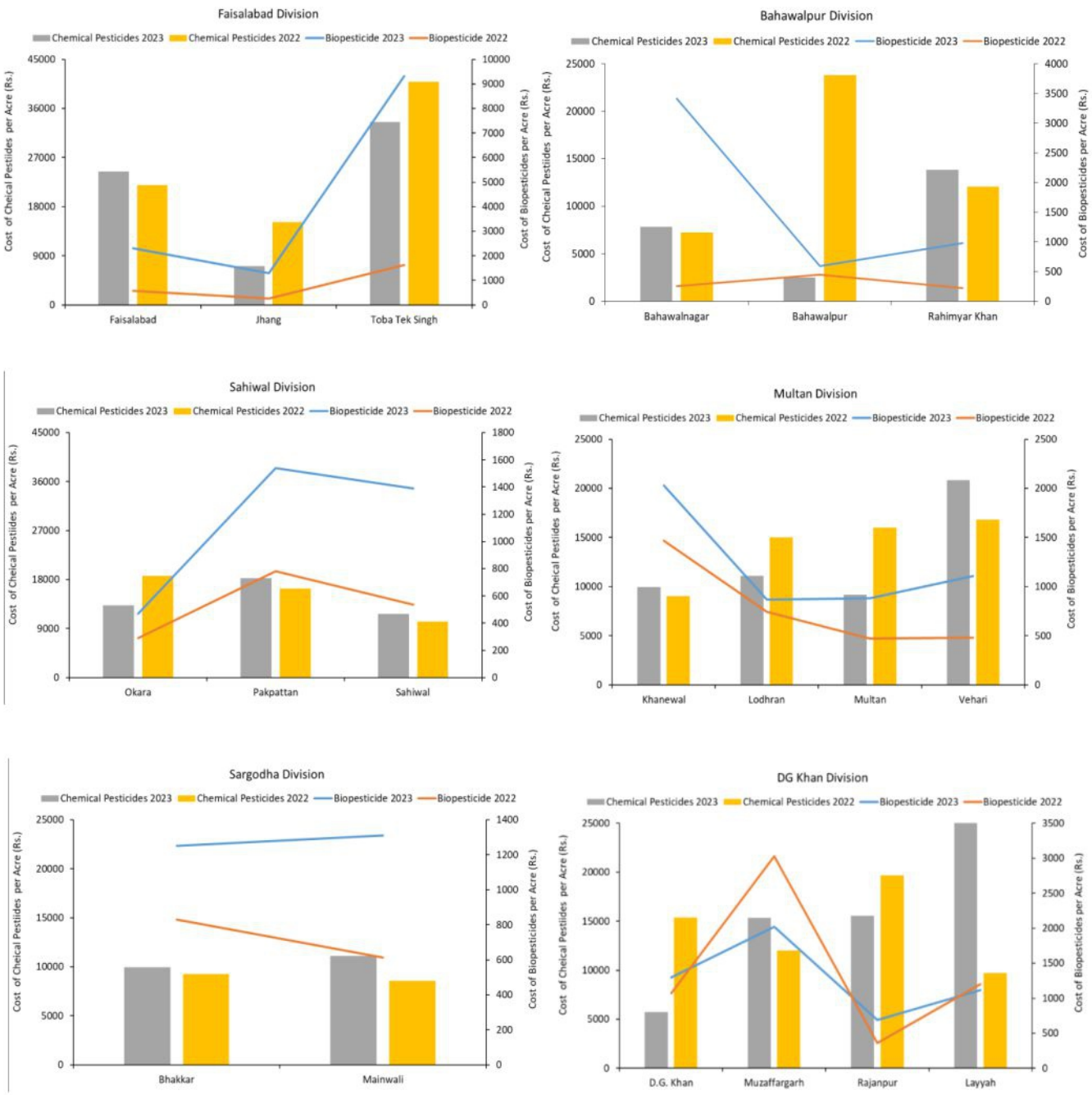


Fig. 17(b). Cost of spray application by farmers following IPM practices in cotton

7.12: Most Harmful Factor for Cotton Crop

This analysis focuses on identifying and comparing the most detrimental factors affecting cotton cultivation among farmers employing Integrated Pest Management (IPM) practices and those following conventional Non-IPM methods across diverse divisions in Pakistan. The study aims to elucidate the varying perceptions and priorities concerning factors impacting cotton crop growth among these farmer groups.

7.12.1: Detrimental Factors among Non-IPM Farmers [Fig. 18 (a)]:

Weather Impact: Across regions such as Faisalabad, Sahiwal, Multan, and D.G. Khan, over 80% of Non-IPM farmers cited weather as the most troublesome factor affecting their cotton crops. They highlighted how weather conditions significantly influenced crop yield and overall growth.

Seed Quality Concerns: In these same regions, ranging from 30% to 70% of Non-IPM farmers identified the non-availability of good quality seeds as the second most critical factor affecting crop growth. This concern emphasized the pivotal role of seed quality in ensuring successful crop yields.

Regional Variation: Notably, in the Bahawalpur division, most farmers considered chemical pesticides as the primary factor affecting their cotton crops, except in Rahim Yar Khan, where weather was deemed the most significant factor by farmers.

7.12.2: Detrimental Factors among IPM Farmers [Fig. 18 (b)]:

Weather Impact Consensus: IPM farmers across almost all regions unanimously agreed that weather played the most crucial role in affecting their cotton crops, with percentages varying from 10% to 100%. This unanimous consensus emphasized the universal impact of weather on cotton cultivation regardless of the adoption of IPM practices.

Seed Quality Importance: Similar to Non-IPM farmers, IPM practitioners ranked the availability of quality seeds as the second most important factor influencing crop growth. This shared concern underscored the significance of seed quality in achieving favorable crop outcomes.

Pesticide Concerns: Chemical pesticides were ranked as the third most critical factor impacting cotton crop growth among IPM farmers across these regions, showcasing the recognition of the potential adverse effects of chemical inputs despite employing IPM practices.

The findings highlight a common consensus among both Non-IPM and IPM farmers regarding the significant influence of weather on cotton crop yields. Additionally, the shared recognition of the importance of quality seeds emphasizes a unified concern among farmers irrespective of their pest management approach.

However, regional variations, notably in Bahawalpur and Rahim Yar Khan, showcase divergent opinions among Non-IPM farmers regarding the primary detrimental factor, underscoring the localized challenges faced by farmers in specific regions.

In conclusion, the data highlights weather, seed quality, and chemical pesticides as significant factors impacting cotton cultivation among Non-IPM and IPM farmers across diverse regions. Understanding these factors and addressing regional variations is crucial for implementing targeted interventions and promoting sustainable cotton cultivation practices.

7.12.3: Comparative Insights:

Weather Impact:

Both IPM and Non-IPM farmers across divisions indicate weather as the primary harmful factor for cotton.

Chemical Pesticides:

Non-IPM farmers cite chemical pesticides as a significant issue, especially in Rahim Yar Khan, with lower concerns in IPM practices.

Bio Pesticides and Seed Quality:

Generally, the impact of bio pesticides and seed quality appears minimal compared to weather and chemical pesticides for both IPM and Non-IPM farmers.

Non-IPM Plots

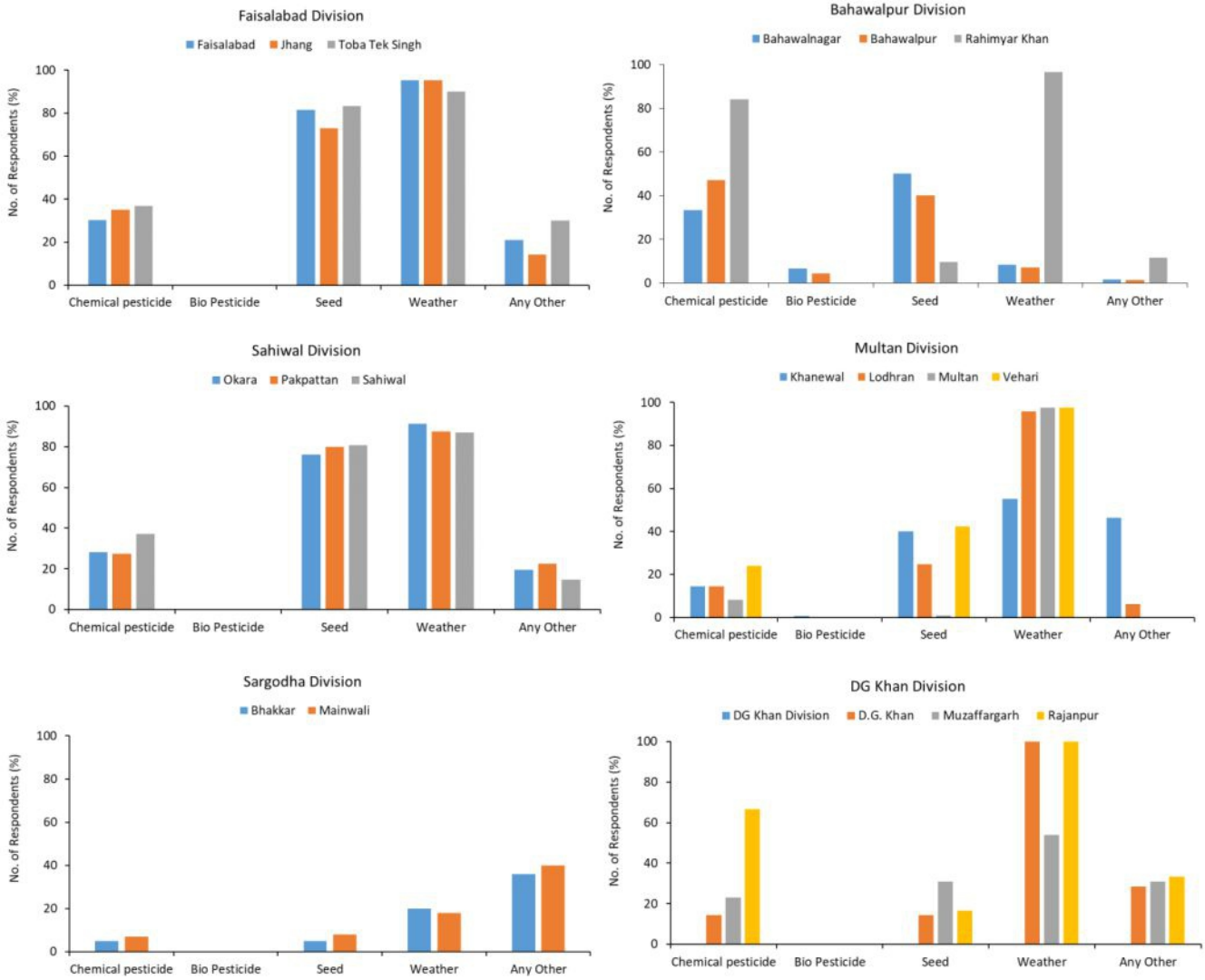


Fig. 18(a). Harmful factors for farmers following Non-IPM practices in cotton

IPM Plots

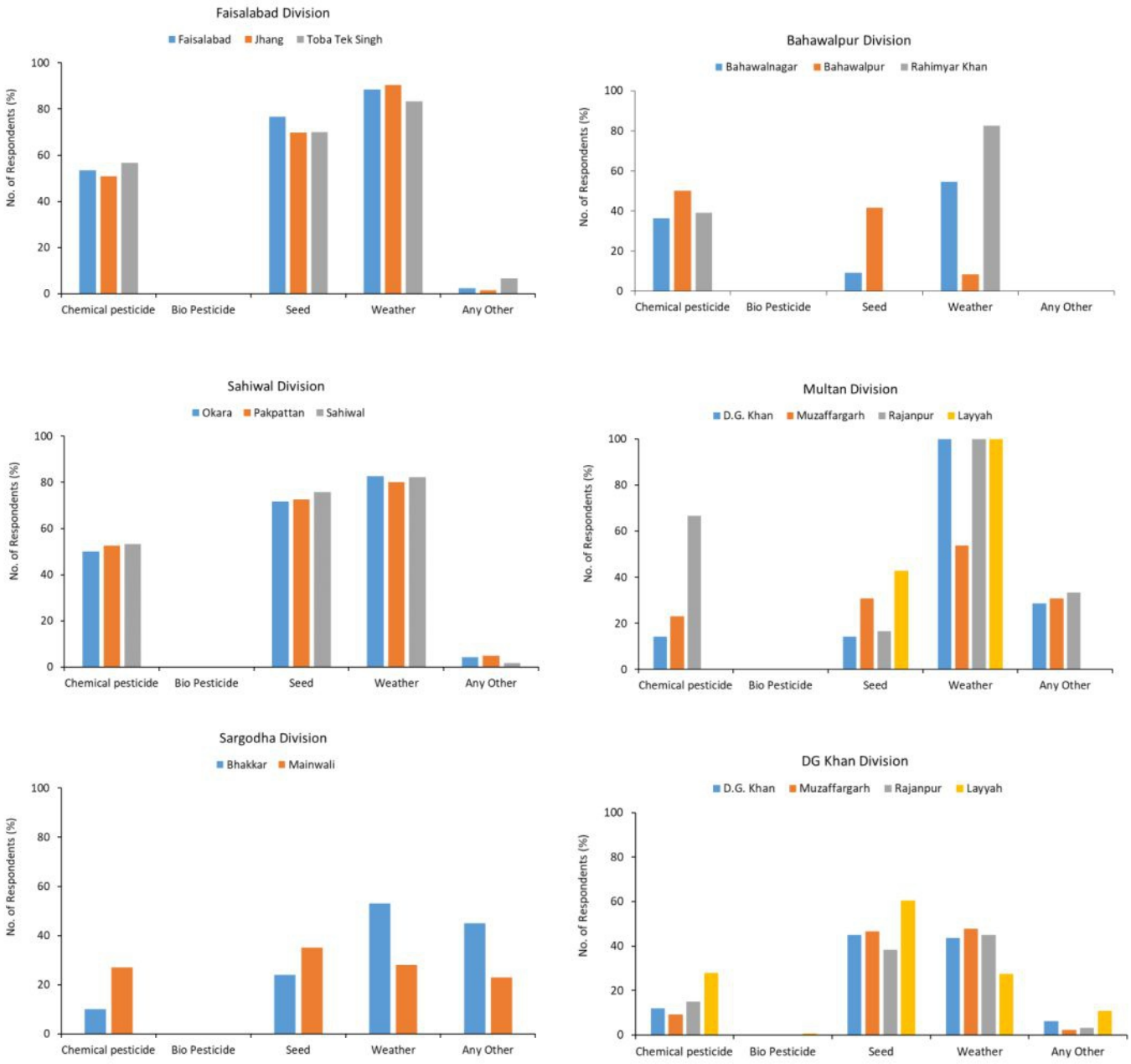


Fig. 18(b). Harmful factors for farmers following IPM practices in cotton

7.13: Positive Effects of Bio-Pesticides

This comparative analysis highlights the discernible impacts of bio-pesticides on cotton farming, showcasing the differences between Integrated Pest Management (IPM) and non-IPM farming practices across diverse divisions (Fig. 19). The investigation aims to underscore the advantages of employing IPM strategies in enhancing the efficacy and positive effects of bio-pesticides in cotton cultivation.

The data obtained from various divisions indicates a notable contrast in the response of farmers towards bio-pesticides under different farming methodologies.

7.13.1: IPM Farmers' Response:

Farmers adopting IPM practices across numerous divisions have shown a substantial inclination towards recognizing the positive impact of bio-pesticides on cotton production. An overwhelming majority, ranging from 70% to 100% across divisions, reported favorable outcomes from the use of bio-pesticides. Notably, in the D.G. Khan division, specifically in Rajanpur district, only a mere 18% of farmers expressed conviction regarding the positive effects of bio-pesticides on their cotton crops, deviating from the prevalent trend observed in other divisions.

7.13.2: Non-IPM Farmers' Response:

Conversely, among non-IPM farmers utilizing bio-pesticides, a significant majority of over 80% reported witnessing positive effects across most divisions, underscoring the efficacy of bio-pesticides.

However, exceptions were identified in Bahawalpur division and Multan district within the Multan division. In Multan district, merely 30% of non-IPM farmers acknowledged the positive impacts of bio-pesticides, while Bahawalnagar and Bahawalpur districts in the Bahawalpur division reported only 25% and 10% of farmers respectively, convinced of the favorable effects of bio-pesticides.

The comprehensive analysis suggests a strong correlation between the adoption of IPM practices and the acknowledgment of the positive impacts of bio-pesticides in cotton farming. While IPM farmers generally reported favorable effects across divisions, inconsistencies were observed among non-IPM farmers, particularly in specific districts such as Rajanpur in the D.G. Khan division and certain areas of Bahawalpur and Multan divisions.

Comparative Insights:

IPM Advantages: IPM farmers generally report higher positive effects from bio-pesticides across divisions.

Uniformity in IPM Impact: In several divisions like Bahawalpur, Sargodha, and Sahiwal, IPM farmers consistently report 100% positive effects from bio-pesticides.

Differential Impact in Layyah and Rajanpur: While IPM practices showcase lower positive effects in Layyah and Rajanpur, non-IPM farmers in these areas indicate comparatively higher efficacy.

Varied Impact in Lodhran and Jhang: Non-IPM farmers in Lodhran report slightly higher efficacy than their IPM counterparts, while in Jhang, IPM farmers show a lower impact.

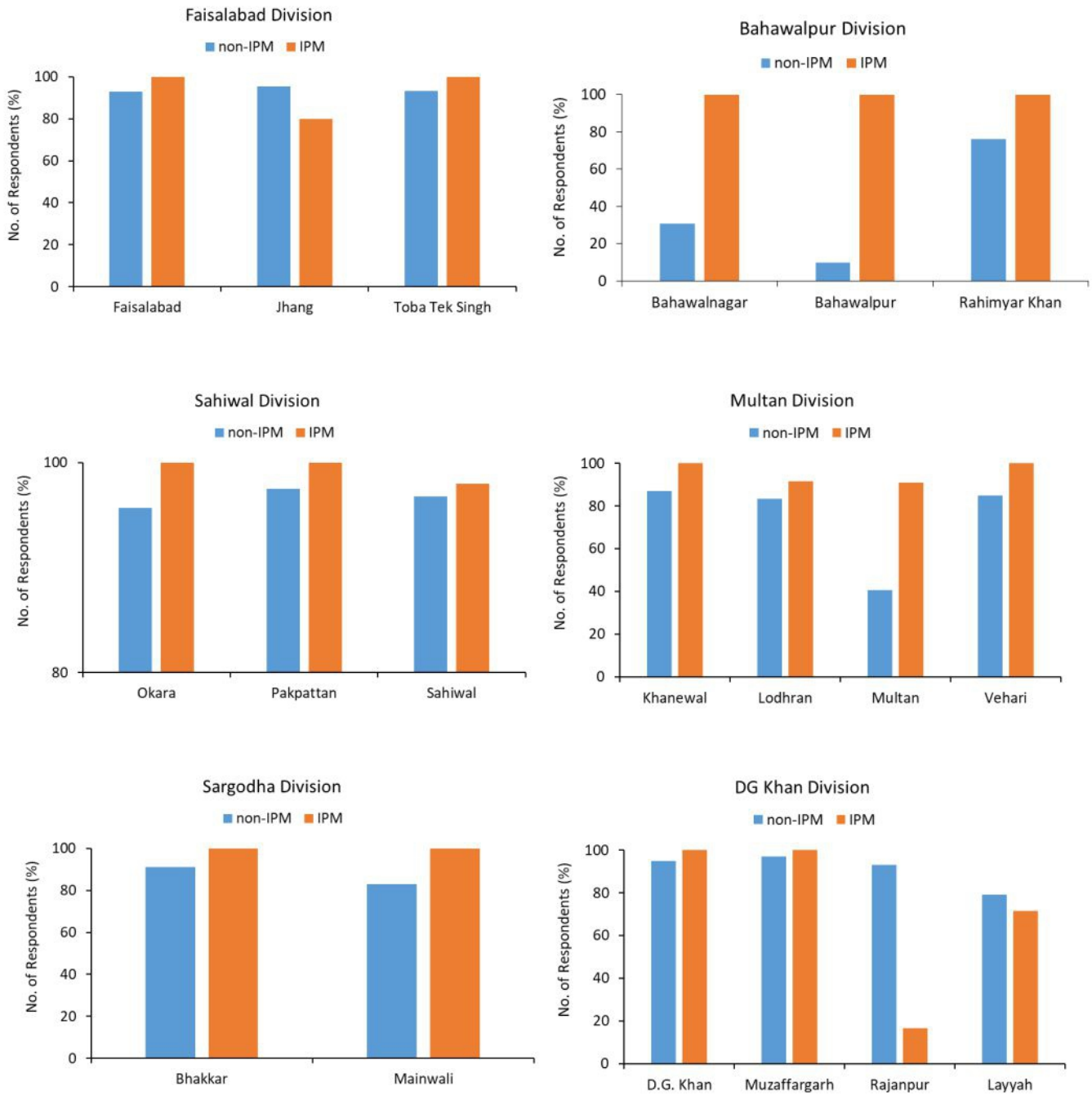


Fig. 19. Comparison on positive effects of bio-pesticides between the farmers following IPM and Non-IPM practices

7.14: Cotton yield per acre (in maunds)

The assessment conducted on cotton yield per acre sheds light on the disparities in agricultural productivity observed between farmers implementing Integrated Pest Management (IPM) techniques and those adhering to conventional Non-IPM practices. The question aims to discern the yield differentials and implications for crop productivity across various agricultural divisions.

7.14.1: Yield Disparity Between IPM and Non-IPM Farmers:

The comprehensive analysis of the data unequivocally demonstrates a substantial contrast in yield between farmers practicing IPM and those utilizing Non-IPM methods across all divisions (Refer to Figure 20).

IPM Farmers' Yield:

The data unveils that farmer embracing IPM techniques consistently achieved higher yields, with the range spanning between 25 to 50 maunds per acre. This substantial yield range signifies the efficacy of IPM strategies in bolstering cotton production.

Non-IPM Farmers' Yield: In stark contrast, farmers employing Non-IPM practices exhibited comparatively lower yields, with their production ranging between 22 to 33 maunds per acre across all divisions. This discrepancy in yield emphasizes the potential limitations or inefficiencies associated with conventional pest management approaches.

The observed trend of higher yields among IPM farmers compared to their Non-IPM counterparts underscores the tangible benefits of adopting integrated pest management techniques in cotton cultivation. The substantial yield differentials, ranging from 3 to 17 maunds per acre, signify the potential yield gains that can be attained through the implementation of sustainable and holistic pest management practices.

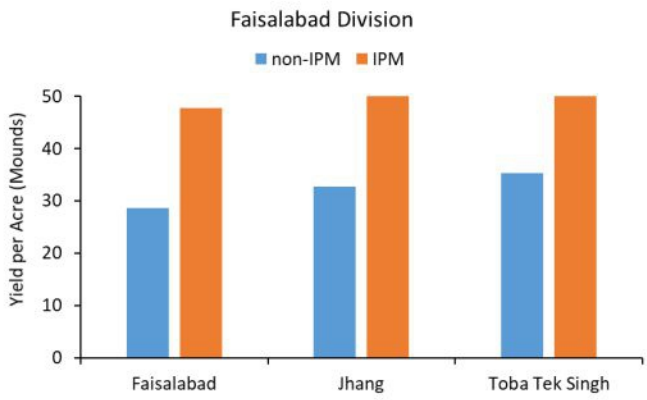
This disparity in yield not only highlights the immediate advantages of IPM in enhancing cotton productivity but also underscores the long-term sustainability and economic viability associated with embracing environmentally friendly and integrated approaches to pest control.

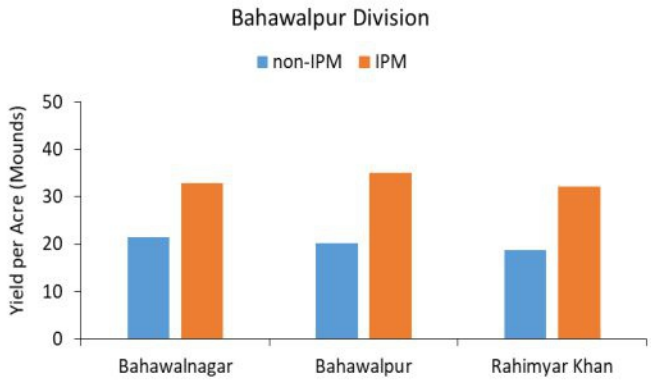
7.14.2: Comparative Insights:

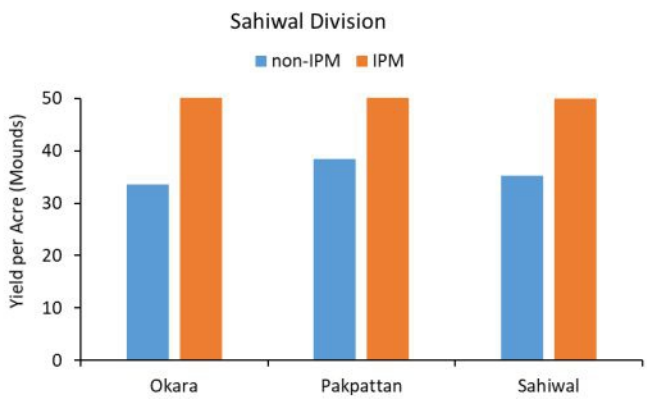
IPM Advantage: In most divisions, IPM farmers demonstrate higher cotton yields per acre compared to Non-IPM farmers.

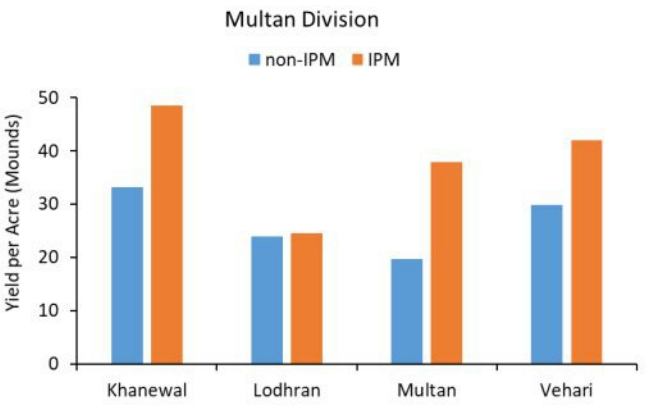
Significant Disparities: Noticeable differences in yields exist, especially in divisions like Multan, DG Khan, Faisalabad, and Sahiwal, where IPM practices significantly outperform Non-IPM practices.

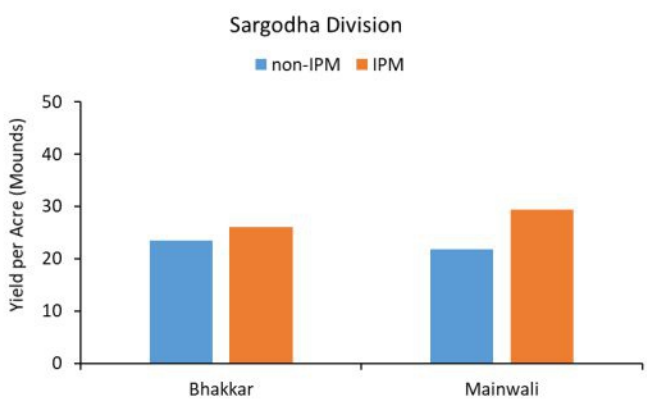
Variances in Non-IPM Favor: However, some divisions like Lodhran, Mainwali, and Rahim Yar Khan display somewhat comparable yields between Non-IPM and IPM farmers, albeit with variations.











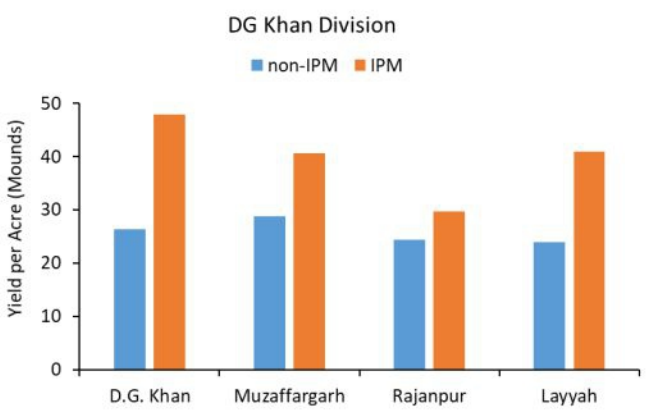


Fig. 20. Comparison of per acre yield between farmers following IPM and Non-IPM practices

7.15: Adoption of IPM Model in Next Season 2024-25

The valuation conducted on the willingness of farmers, comparing those adhering to Integrated Pest Management (IPM) practices and those following conventional Non-IPM practices, aims to gauge their receptiveness towards adopting the IPM model in future cotton growing seasons. This question explores the perspectives of farmers across divisions regarding the potential continuation of IPM practices and its implications for sustainable agricultural methods.

The data gathered unveils a stark contrast in the willingness of farmers to repeat the IPM model in the upcoming cotton growing seasons (Fig. 21).

7.15.1: IPM Farmers' Response:

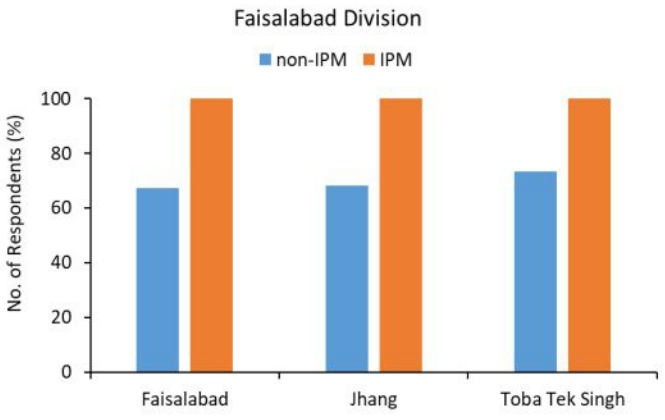
A unanimous and resounding 100% of farmers who actively implemented IPM practices in 2023 expressed complete willingness to continue employing the IPM model in the subsequent seasons. This unequivocal commitment underscores the strong satisfaction and confidence among IPM farmers in the efficacy of this approach.

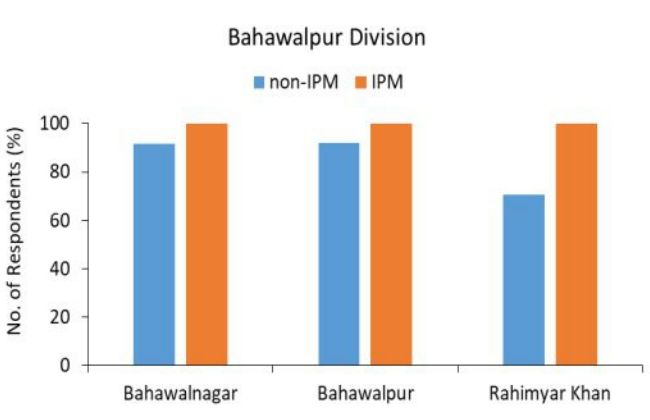
7.15.2: Non-IPM Farmers' Response:

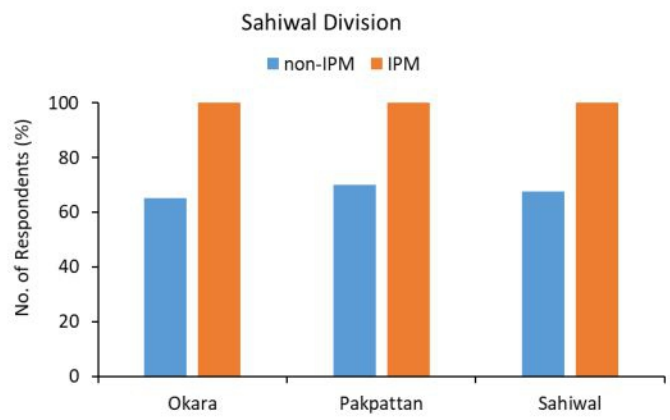
In contrast, farmers adhering to Non-IPM practices exhibited a varied response, ranging from 62% to 100%, regarding their willingness to adopt the IPM model in the future. This wide spectrum of responses signifies diverse inclinations among Non-IPM farmers, indicating differing levels of acceptance and readiness to transition towards integrated pest management.

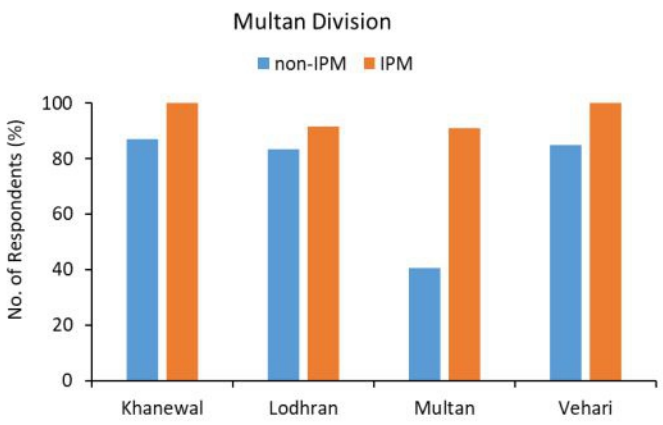
The data reflects a notable inclination among both Non-IPM and IPM farmers across divisions to embrace the Integrated Pest Management model, albeit with differing degrees of enthusiasm. The exceptionally high acceptance rate and unwavering commitment displayed by IPM farmers emphasize the success and perceived benefits of adopting sustainable, eco-friendly agricultural practices. This pronounced trend towards the IPM approach among farmers, especially among those already practicing IPM, bodes well for the future of sustainable agriculture. The positive trend indicates a shift towards environmentally conscious and integrated pest management methods, which can contribute significantly to long-term agricultural sustainability and reduced environmental impact.

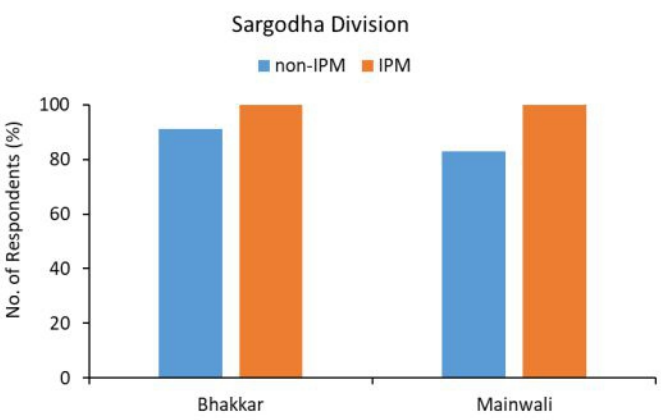
In conclusion, the data underscores the overwhelming willingness of IPM farmers to continue embracing the Integrated Pest Management model, showcasing their confidence in its efficacy. While Non-IPM farmers exhibit varying levels of readiness, the positive trend towards adopting IPM practices overall signifies a promising shift towards sustainable and eco-friendly agricultural methodologies.

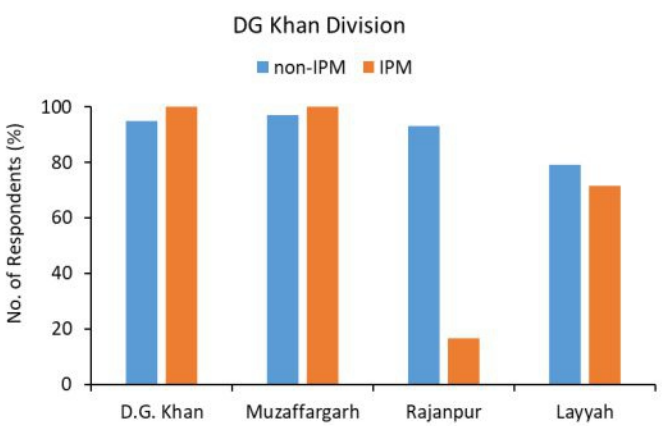

Faisalabad Division
non-IPM
IPM
No. of Respondents (%)
0
20
40
60
80
100
Faisalabad
Jhang
Toba Tek Singh


Bahawalpur Division
non-IPM
IPM
No. of Respondents (%)
0
20
40
60
80
100
Bahawalnagar
Bahawalpur
Rahimyar Khan


Sahiwal Division
non-IPM
IPM
No. of Respondents (%)
0
20
40
60
80
100
Okara
Pakpattan
Sahiwal


Multan Division
non-IPM
IPM
No. of Respondents (%)
0
20
40
60
80
100
Khanewal
Lodhran
Multan
Vehari


Sargodha Division
non-IPM
IPM
No. of Respondents (%)
0
20
40
60
80
100
Bhakkar
Mainwali


DG Khan Division
non-IPM
IPM
No. of Respondents (%)
0
20
40
60
80
100
D.G. Khan
Muzaffargarh
Rajanpur
Layyah

8. RECOMMENDATIONS

Delayed 1st Spray: First spray of synthetic pesticides should be delayed at least 60 days after germination of the crop.

Plant-Based Insecticide: For sucking insect pests, only plant-based insecticides would be recommended and sprayed, following regular pest scouting.

Use of IPM Tools: IPM tools like yellow sticky traps, light traps, and sex pheromone traps/PB ropes should be used. After 60 days, environmentally safe synthetic pesticides may be recommended especially for chewing insect pests and bollworms

Use of Bio-pesticides: The use of bio-pesticides should be encouraged at initial stages of crops

Pyrethroids in August: Pyrethroids should not be used till the month of August.

Biological Control: Efforts to sustain and flourish biological control fauna would be made.

Mixtures Prohibited: Use of pesticide mixtures should strictly be prohibited till August. The mixing of more than two pesticides should be avoided

Quality Seeds: Quality seeds of only approved varieties should be allowed for marketing with minimum Bt. Toxin 01µg/g

Rational Use of Fertilizer: Use of fertilizers should be rational based on soil analysis, especially nitrogenous ones.

Support Price: Support price of seed cotton should also be announced every year prior to start of sowing season.

Subsidy on Boll Pickers: Subsidy on boll pickers should be announced to eradicate leftover bolls

Bio-control Labs: Biological control laboratories should be established at Tehsil level for mass culture of beneficial insects like Orius bug, *Encarsia* sp./ *Eretmocerus* sp./ *Trichogramma* sp./*Chrysoperla* sp.

9- FOCAL PERSON NOMINATED BY VICE CHANCELLORS OF DIFFERENT UNIVERSITIES FOR THIRD PARTY VALIDATION / SURVEY OF COTTON IPM BLOCKS LAID BY AGRI. DEPARTMENT (Ext. & PWQCP) FOR COTTON SEASON 2023-24

Sr. #	Name of University	Focal person nominated by VCs for cotton IPM plot Survey	District/Divi. allocated for IPM plot survey	Cell Number	E-Mail address	Contact # Directors Extension Punjab	Contact # Director PWQCP cotton zone
1-	MNS-University of Agri. Multan	Dr. Muqarrab Ali, Associate Professor	Multan Division	03006752253	muqarrab.ali@mnsuam.edu.pk	Director Ext. Multan **Mr. Shahzad Sabir** 03006632304	Director PWQCP Cotton zone Multan **Dr. Ghulam Abbas** 03346197889
2-	Islamia University Bahawalpur	Dr M. Iqbal Bandaisha, Director National Cotton Breeding Institute, IUB	District Bahawalpur & Bahawalnagar	03006895906	oric@iub.edu.pk muhammadiqbal999@hotmail.com	Director Ext. Bahawalpur Division **Mr. M. Jamil Ghauri** 03007810304	Director PWQCP Cotton zone Multan **Dr. Ghulam Abbas** 03346197889
3-	University of Agri. Faisalabad	Dr. Dildar Khan Gogi, Associate professor	Faisalabad & Sahiwal Division	0345-7941061	drmadgogi@uaf.edu.pk	Director Ext Faisalabad Division **Ch Abdul Hameed** 03004419455 Director Ext. Sahiwal Division **Mr. Shahbaz Akhtar** 03454309136	Director PWQCP Cotton zone Multan **Dr. Ghulam Abbas** 03346197889
4-	Khawaja Farid UEIT R Y Khan	Dr Habib Ali, Assistant Professor	District RY Khan	03106084708	habib.ali@kfueit.edu.pk	Director Ext. Bahawalpur Division **Mr. M. Jamil Ghauri** 03007810304	Director PWQCP Cotton zone Multan **Dr. Ghulam Abbas** 03346197889
5-	University of Sargodha	Dr. Muhammad Asam Riaz, Assistant Professor	Sargodha Division	03336629095	asam.riaz@uos.edu.pk	Director Ext Sargodha **Mr. Shahid Hussain** 03007685324	Director PWQCP Cotton zone Multan **Dr. Ghulam Abbas** 03346197889
6-	University of Layyah	Dr. Muhammad Kashif, Assistant Professor	District Layyah	03338442583	rana13tda@yahoo.com	Deputy Director, Layyah **Sheikh Ashiq Hussain** 03074836155	Director PWQCP Cotton zone Multan **Dr. Ghulam Abbas** 03346197889
7-	Ghazi University DG Khan	Dr Muhammad Shahid Nisar, Associate Professor	District DG Khan, Muzaffargarh, Rajanpur	0333-6589397	mnisar@gudgk.edu.pk	Director Ext. D.G. Khan **Mahar Abid Hussain** 0333-9451100	Director PWQCP Cotton zone Multan **Dr. Ghulam Abbas** 03346197889

کاٹن آئی سی ایم کیلنڈر 2023-24

تیار کردہ

ڈاکٹر حیدر کرار
ڈپٹی سیکرٹری ایگریکلچر (ٹیکنیکل) ساؤتھ پنجاب ملتان

رانا عظیم احمد
سیکشن آفیسر ایگریکلچر (پلاننگ) ساؤتھ پنجاب ملتان

زیرنگرانی

ثاقب علی عطیل
سیکرٹری ایگریکلچر ڈیپارٹمنٹ ساؤتھ پنجاب ملتان

امتیاز احمد
ایڈیشنل سیکرٹری (ٹاسک فورس) ایگریکلچر ڈیپارٹمنٹ ساؤتھ پنجاب ملتان

منجانب : محکمہ زراعت جنوبی پنجاب ملتان
https:// www.facebook.com/ groups/ agrisouthpunjab
https://twitter.com/AgricultureSou1/

مزید رہنمائی کیلئے محکمہ زراعت کے ماہرین سے رابطہ کریں۔

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0333-6102642, 0306-8849646

دورانیہ	1	2	3	4	5	6	7	8	9	10	11	12	13
یکم اپریل تا 30 اپریل	کپاس کے بیج کی بُرگنڈھک کے تیزاب کے ساتھ اتاریں فی ایکڑ 10 کلو کپاس کے بیج کا بُرا اتارنے کیلئے 1 لیٹر گنڈھک کا تیزاب استعمال کریں۔ یہ بُر 20 منٹ میں جل جائے گا۔	تیزاب سے بُر اتارنے کے بعد بیج کو صاف پانی سے اچھی طرح دھوئیں	دھونے کے بعد بیج کو 2 سے 3 دن کے لئے دھوپ میں خشک کریں۔	کپاس کے بیج کو زہر لگا کیں بیج کو زہر آلود کرنے کیلئے ایکڑ سے مارزہر + پھپوند کش زہر یا کسی مناسب زہر سے آلودہ کریں + مورنگا کا رس 100 ملی لیٹر پانی استعمال کریں اس سے بعد بیج کو آدھے گھنٹے کیلئے سایہ دار جگہ پر خشک کرکے بجائی کریں۔	بار بار لریکٹر چلانے سے زمین کی سطح کے 5-6 انچ نیچے سخت تہہ بن (Hard Pan) رکاوٹ بنتی ہے۔ لہٰذا ہر تین سال بعد سب سائلر چلا کر سخت تہہ کو توڑیں تاکہ پانی اور کھادوں کے استعمال میں کمی ہو اور جڑوں کی اندر تک آسانی سے ہو سکے جس سے پودا بھرپور فروٹنگ کے ساتھ ترقی کرتے ہوئے محفوظ رہے۔	زمین کی تیاری کیلئے 2 تا 3 بار ہل چلا کر زمین کو لیزر لیولنگ کی مدد سے ہموار کریں اس کے بعد کھیلیاں بنا کر یا لائنوں میں کپاس کاشت کریں۔	بجائی کے وقت 4 بوری سنگل سپر فاسفیٹ یا ڈیڑھ بوری ڈی اے پی اور ایک بوری پوٹاش فی ایکڑ ڈالیں۔	بجائی کیلئے اڑھائی فٹ کے فاصلے پر شلغا (تھوہ) کھیلیاں بنائیں۔ بجائی کے 60 دن تک کسی بھی قسم کا کیمیائی زہر کا سپرے نہ کریں اور اگر ضرورت محسوس ہو تو حتی الامکان Bioextract کا سپرے کریں یا تجربہ کار زراعت کے ماہر کا مشورہ کریں۔	کیمیلیں یا ڈرل پر کاشت کپاس کا درمیانی فاصلہ اتھاری فٹ ہونا چاہیے۔ بجائی کے 60 دن تک کسی بھی قسم کا کیمیائی زہر کا سپرے نہ کریں اور اگر ضرورت محسوس ہو تو حتی الامکان Bioextract کا سپرے کریں یا تجربہ کار زراعت کے ماہر کا مشورہ کریں۔ درمیانی فاصلہ 9 تا 12 انچ رکھیں۔	بجائی کے 24 گھنٹے کے اندر اندر تر جڑ میں قبل از اُگاؤ جڑی بوٹی مار دوائی کا اسپرے کریں۔ ٹریلین یعنی اقتصادی صورت میں کپاس کے اُگاؤ کے 25 دن کے اندر اندر گلیفوسیٹ کا سپرے کریں۔	بجائی کے 7 دن کے اندر اور بجائی کے 20 تا 25 دن کے اندر سہ رنگی مکس کریں۔	بارش کا پانی زیادہ دیر کھیتوں میں کھڑا نہ ہونے دیں اور 24 گھنٹے کے اندر اندر مناسب نکاسی کا انتظام کریں۔	بڑی ہونے والے کیڑوں مثلاً سفید مکھی، ہنیڈیو، تھرپس کے خلاف صبح سویرے بذریعہ سنڈیوں مثلاً گلابی سنڈی، چتکبری سنڈی اور سپوڈوپٹیرا سنڈی کے خلاف شام کے وقت سپرے کریں۔
یکم مئی تا 31 مئی	کپاس پر ایکڑ ماہ کے بعد نباتاتی محلول (بنانے کا طریقہ نیچے دیا ہے) بحساب 600 ملی لیٹر فی 100 لیٹر پانی میں ملا کر سپرے کریں اور ہر ہفتے دہرائیں۔	کسان دوست کیڑوں کے انڈوں والے 20 کارڈ فی ایکڑ ہر پندرہ دن بعد لگائیں۔	سفید مکھی نے تدارک کیلئے پیلے چپکنے والے 8 کارڈ فی ایکڑ لگائیں ہر 15 دن بعد تبدیل کریں۔ حریف سفید مکھی کے متبادل کھیتوں کا دورہ کریں۔	گلابی سنڈی کیلئے فیرومن پھندے 8 فی ایکڑ لگائیں ہر 15 دن بعد تبدیل کریں۔ پی پی، ڈبلیو 120 فی ایکڑ کے حساب سے لگائیں اگر حملہ معاشی نقصان دہ حد سے اوپر ہو تو مناسب کیمیائی زہروں کا ہفتے کے فرق سے 2 کا سپرے کریں	سفید مکھی نے تدارک کیلئے پیلے چپکنے والے 8 کارڈ فی ایکڑ لگائیں ہر 15 دن بعد تبدیل کریں۔ حریف سفید مکھی کے متبادل میزبان پودوں مثلاً ٹریس، رائی، بتھیل، وغیرہ کی کاشت چھانٹ کریں اور ہو سکے تو این Bioextract کا سپرے کریں۔	گلابی سنڈی کیلئے فیرومن پھندے 8 فی ایکڑ لگائیں ہر 15 دن بعد تبدیل کریں۔ پی پی، ڈبلیو 120 فی ایکڑ کے حساب سے لگائیں اگر حملہ معاشی نقصان دہ حد سے اوپر ہو تو مناسب کیمیائی زہروں کا ہفتے کے فرق سے 2 کا سپرے کریں	سفید مکھی نے تدارک کیلئے پیلے چپکنے والے 8 کارڈ فی ایکڑ لگائیں ہر 15 دن بعد تبدیل کریں۔ حریف سفید مکھی کے متبادل میزبان پودوں مثلاً ٹریس، رائی، بتھیل، وغیرہ کی کاشت چھانٹ کریں اور ہو سکے تو این Bioextract کا سپرے کریں۔	گلابی سنڈی کیلئے فیرومن پھندے 8 فی ایکڑ لگائیں ہر 15 دن بعد تبدیل کریں۔ پی پی، ڈبلیو 120 فی ایکڑ کے حساب سے لگائیں اگر حملہ معاشی نقصان دہ حد سے اوپر ہو تو مناسب کیمیائی زہروں کا ہفتے کے فرق سے 2 کا سپرے کریں	مدھانی نما پھولوں کو پودوں سے توڑ کر زمین میں دبا دیں	پنڑیوں کو جڑی مدد کے کیمیلوں میں تبدیل کردیں	کپاس کو بانات اور سبزیوں کے نزدیک کاشت نہ کریں	اچھی طرح گلا ہوا خمیر شدہ ٹرائیکوڈرما بحساب 5 کلو گرام فی ایکڑ مہینے میں ایک مرتبہ پانی کے ساتھ استعمال کریں
یکم جون تا 30 جون	جباتاتی محلول کے سپرے کو ہر ہفتے دہرائیں۔	سبز تیلہ اور تھرپس کے حملہ کی صورت میں فلونیکامڈ بحساب 60 گرام فی ایکڑ سپرے کریں۔	کسان دوست کیڑوں کے انڈوں والے 20 کارڈ فی ایکڑ ہر 15 دن بعد لگائیں۔	سفید مکھی نے تدارک کیلئے پیلے چپکنے والے 8 کارڈ فی ایکڑ لگائیں ہر 15 دن بعد تبدیل کریں۔ حریف سفید مکھی کے متبادل میزبان پودوں مثلاً ٹریس، رائی، بتھیل، وغیرہ کی کاشت چھانٹ کریں اور ہو سکے تو این Bioextract کا سپرے کریں۔	گلابی سنڈی کیلئے فیرومن پھندے 8 فی ایکڑ لگائیں ہر 15 دن بعد تبدیل کریں۔ پی پی، ڈبلیو 120 فی ایکڑ کے حساب سے لگائیں اگر حملہ معاشی نقصان دہ حد سے اوپر ہو تو مناسب کیمیائی زہروں کا ہفتے کے فرق سے 2 کا سپرے کریں	مدھانی نما پھولوں کو پودوں سے توڑ کر زمین میں دبا دیں۔	اچھی طرح گلا ہوا خمیر شدہ ٹرائیکوڈرما بحساب 5 کلو گرام فی ایکڑ مہینے میں ایک مرتبہ پانی کے ساتھ استعمال کریں
یکم جولائی تا 31 جولائی	جباتاتی محلول کے سپرے کو ہر ہفتے دہرائیں۔	کسان دوست کیڑوں کے انڈوں والے 20 کارڈ فی ایکڑ ہر 15 دن بعد لگائیں۔	اگر گلابی سنڈی کا حملہ معاشی نقصان دہ حد سے اوپر ہو تو گیما سائلی میلوتھرین بحساب 100 ملی لیٹر یا مناسب کیمیائی زہروں کا ہفتے کے فرق سے 2 کا سپرے کریں۔	سفید مکھی کے تدارک کیلئے پیلے چپکنے والے 8 کارڈ فی ایکڑ لگائیں ہر 15 دن بعد تبدیل کریں۔ حریف سفید مکھی کے متبادل میزبان پودوں مثلاً ٹریس، رائی، بتھیل، وغیرہ کی کاشت چھانٹ کریں اور ہو سکے تو این Bioextract کا سپرے کریں۔	گلابی سنڈی کیلئے فیرومن پھندے 8 فی ایکڑ لگائیں ہر 15 دن بعد تبدیل کریں۔ پی پی، ڈبلیو 120 فی ایکڑ کے حساب سے لگائیں اگر حملہ معاشی نقصان دہ حد سے اوپر ہو تو مناسب کیمیائی زہروں کا ہفتے کے فرق سے 2 کا سپرے کریں	ایک بوری یوریا کھاد ڈرم میں گھول کر فی ایکڑ ڈالیں	اچھی طرح گلا ہوا خمیر شدہ ٹرائیکوڈرما بحساب 5 کلو گرام فی ایکڑ مہینے میں ایک مرتبہ پانی کے ساتھ استعمال کریں
یکم اگست تا 31 اگست	اگر گلابی سنڈی کا حملہ معاشی نقصان دہ حد سے اوپر ہو تو گیما سائلی میلوتھرین بحساب 100 ملی لیٹر یا مناسب کیمیائی زہروں کا ہفتے کے فرق سے 2 کا سپرے کریں۔	سفید مکھی کے تدارک کیلئے پیلے چپکنے والے 8 کارڈ فی ایکڑ لگائیں ہر 15 دن بعد تبدیل کریں۔ حریف سفید مکھی کے متبادل میزبان پودوں مثلاً ٹریس، رائی، بتھیل، وغیرہ کی کاشت چھانٹ کریں اور ہو سکے تو این Bioextract کا سپرے کریں۔	سفید مکھی کے تدارک کے لئے پیلے چپکنے والے 8 کارڈ فی ایکڑ لگائیں اور ہر 15 دن بعد تبدیل کریں	گلابی سنڈی کیلئے فیرومن پھندے 8 فی ایکڑ لگائیں ہر 15 دن بعد تبدیل کریں۔ پی پی، ڈبلیو 120 فی ایکڑ کے حساب سے لگائیں اگر حملہ معاشی نقصان دہ حد سے اوپر ہو تو مناسب کیمیائی زہروں کا ہفتے کے فرق سے 2 کا سپرے کریں	ہر پانی کے ساتھ آدھی بوری یوریا ڈرم میں گھول کر لگائیں۔	اچھی طرح گلا ہوا خمیر شدہ ٹرائیکوڈرما بحساب 5 کلو گرام فی ایکڑ مہینے میں ایک مرتبہ پانی کے ساتھ استعمال کریں
یکم ستمبر تا 30 ستمبر	سفید مکھی نے تدارک کیلئے پیلے چپکنے والے 8 کارڈ فی ایکڑ لگائیں اور ہر 15 دن بعد تبدیل کریں۔ حریف سفید مکھی کے متبادل میزبان پودوں مثلاً ٹریس، رائی، بتھیل، وغیرہ کی کاشت چھانٹ کریں اور ہو سکے تو این Bioextract کا سپرے کریں۔	گلابی سنڈی کیلئے فیرومن پھندے 8 فی ایکڑ لگائیں ہر 15 دن بعد تبدیل کریں۔ پی پی، ڈبلیو 120 فی ایکڑ کے حساب سے لگائیں اگر حملہ معاشی نقصان دہ حد سے اوپر ہو تو مناسب کیمیائی زہروں کا ہفتے کے فرق سے 2 کا سپرے کریں	چنائی شبنم کے خشک ہونے پر یعنی صبح 10 بجے شروع کی جائے	کپاس کی چھڑیوں کو روٹاویٹ کریں	کپاس کے کھیت میں بھیڑ بکریوں کو چرائیں تاکہ نیندوں میں موجود گلابی سنڈی کا تدارک ہو سکے یا پھر سفید مکھی کی مدد سے سبز نیندوں کو چھڑیوں سے بھگو کر رکھیں اور بھرجانے کیلئے جمع کریں۔	چنائی شبنم کے خشک ہونے پر یعنی صبح 10 بجے شروع کی جائے	کپاس کی چھڑیوں کو روٹاویٹ کریں	کپاس کے کھیت میں بھیڑ بکریوں کو چرائیں تاکہ نیندوں میں موجود گلابی سنڈی کا تدارک ہو سکے یا پھر سفید مکھی کی مدد سے سبز نیندوں کو چھڑیوں سے بھگو کر رکھیں اور بھرجانے کیلئے جمع کریں۔	کیڑے مار زہروں کے سپرے کیلئے ہالو کون نوزل استعمال کریں، جبکہ جڑی بوٹی مار زہروں کیلئے فی۔ جیٹ یا فلیٹ فین نوزل استعمال کریں۔
یکم اکتوبر تا 31 اکتوبر	چنائی 10 نومبر تک ہر صورت میں مکمل کرلیں۔	کپاس کی چھڑیوں کو روٹاویٹ کریں	چھڑیاں کاٹنے سے قبل بچے کچے سبز نیندوں کو توڑ کر جانوروں کو کھلائیں یا پھر ضائع کردیں۔	گندم کی بیجائی									

جباتاتی محلول بنانے کا طریقہ:

کوڑتمہ، اک، نیم، مورنگا بحساب 600 گرام (باریک کاٹ لیں) اور ہنگ 5 گرام 5 تا 6 دن تک پانی میں بھگو کر رکھیں یا پھر رات کو پانی میں بھگو کر رکھ دیں اور صبح ہلکی آنچ پر ایک گھنٹہ کیلئے گرم کریں۔ اسکے بعد ہاتھوں سے مسل کر ململ کے کپڑے سے چھان لیں۔ 100 لیٹر پانی میں حل کر کے فی ایکڑ سپرے کریں۔

نوٹ: اجزائے صفحہ کو کپاس کی ضرورت کے مطابق سپرے کریں اور پانی کپاس کی ضرورت کے مطابق لگائیں۔

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2-Biological Control Laboratory Vehari o/o Deputy Director Agriculture Extension Vehari near Government seed farm baghwanpura road Vehari
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Email-aoextgarhamore.sb@gmail.com

3- Biological Control Laboratory Muzaffargarh o/o Deputy Director Agriculture Extension near social security hospital Jhang Mor Muzaffar Garh.
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Imtiaz Ahmad, Additional Secretary (Task Force) South Punjab Multan

Prepared By:
Dr. Haider Karar, Deputy Secretary (Technical) South Punjab Multan

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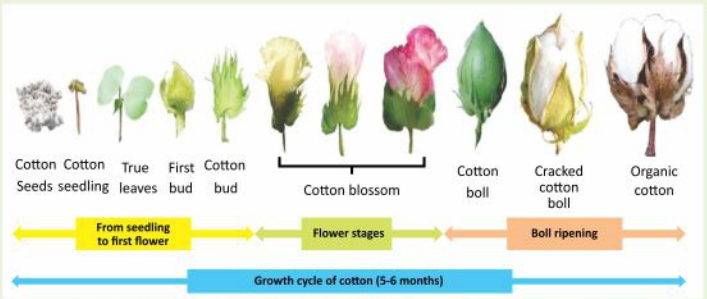

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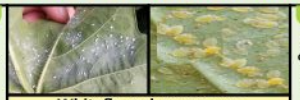
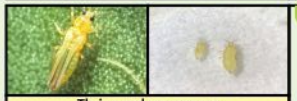
Major harmful insect pests for cotton and their ETL

	ETL		ETL
 Jassid and youngones	1 adult or nymph per leaf	 Whitefly and youngones	5 adults or nymph per leaf or both
 Thrips and youngones	10 adults or nymph per leaf or both	 Cotton Mealybug female and male	On damage apperarence
 Pink bollworm larva and adult	5 larvae per 100 bolls	 Spotted bollworm larva and adult	3 larvae per 25 plants
 American bollworm larva and Adult	5 brown eggs or 3 small larvae or both 5 per 25 plants	 Armyworm Adult and larva	On appearance
 Armyworm Adult and larva	On appearance		

Minor insect pests of cotton

	ETL		ETL
 Cutworm larvae and adult	On appearance	 Dusky Cotton Bug / Termites	On appearance
 Aphid adult and youngones	On appearance	 Grey weevil / Leafminer	On appearance
 Looper / Two spotted mites	10-15 mites per leaf	 Red Cotton Bug adult and youngones	On appearance

Beneficial insects (Predators of harmful insects)

 Chrysoperla adult and youngones	 Lady bird beetles adult and youngones			
 Syrphid fly and youngones	 Orius adult and larva			
 Cotton mealybug predator and youngones	 Assassin bug	 Spider		
 Trichogramma wasp eggs cards (Parasite)	 Apanteles wasp larval (Parasite)	 Whitefly youngones (Parasitoid)	 Wasps	 Rove beetle
 Big eyed bug	 Campylomma	 Ants	 Dragonfly	 Damselfly
 Mantid	 Birds		 Earwig	

جنوبی پنجاب میں موجود حیاتیاتی کنٹرول لیبارٹریز کے رابطہ نمبر زاور ایڈریس

حیاتیاتی کنٹرول لیبارٹری (لیّہ)

دفتر ڈپٹی ڈائریکٹر زراعت توسیع نزد ڈسٹرکٹ کمپلیکس لیّہ

آفس: 0606920300-301 موبائل: 0302-6972232

ای میل: doaextlayyah@gmail.com, mbhatti2634@gmail.com

حیاتیاتی کنٹرول لیبارٹری (وہاڑی)

دفتر ڈپٹی ڈائریکٹر زراعت توسیع نزد گورنمنٹ سیڈ فارم بھگوان پورہ روڈ، وہاڑی

موبائل: 03084474106 ای میل: aoextgarhamore.sb@gmail.com

حیاتیاتی کنٹرول لیبارٹری (مظفر گڑھ)

دفتر ڈپٹی ڈائریکٹر زراعت توسیع نزد سوشل سکیورٹی ہسپتال جھنگ موڑ، مظفر گڑھ

آفس: 42 -0669200041 موبائل: 0315-3337418 ای میل: ddaagriextmzg@gmail.com

زیرنگرانی

ثاقب علی عطیل
سیکرٹری ایگریکلچر ڈیپارٹمنٹ ساؤتھ پنجاب ملتان

امتیاز احمد
ایڈیشنل سیکرٹری (ٹاسک فورس) ساؤتھ پنجاب

تیارکردہ

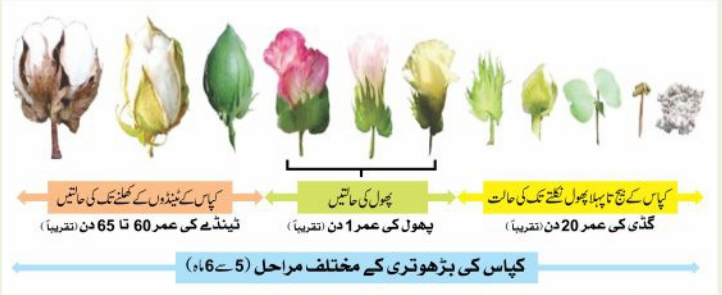
ڈاکٹر حیدر کرار
ڈپٹی سیکرٹری ایگریکلچر (ٹیکنیکل) ساؤتھ پنجاب

محکمہ زراعت جنوبی پنجاب، ملتان

https: // www.facebook.com/ groups/ agrisouthpunjab https://twitter.com/AgricultureSou1

کپاس کے نقصان دہ، فائدہ مند کیڑوں کی پہچان اور اُنکی معاشی نقصان دہ حد





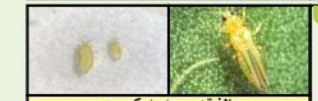
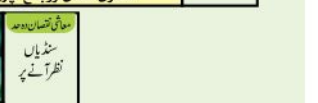





محکمہ زراعت جنوبی پنجاب، ملتان

https: // www.facebook.com/ groups/ agrisouthpunjab https://twitter.com/AgricultureSou1

کپاس کی فصل کو زیادہ نقصان پہنچانے والے کیڑے اور اُن کی معاشی نقصان دہ حد

معاشی نقصان دہ حد		
پانچ بالغ یا بچے یا دونوں فی پتہ		بالغ سفید مکھی اور اسکے بچے
		
ایک بالغ یا بچہ فی پتہ		بالغ سبز تیلا اور اسکے بچے
معاشی نقصان دہ حد		
گدھیری یا اُسکا نقصان نظر آنے پر		کپاس کی گدھیڑی اور اسکے نر
		
دس بالغ یا بچے یا دونوں فی پتہ		بالغ تھرپس اور اسکے بچے
معاشی نقصان دہ حد		
تین سنڈیاں فی پچیس ٹینڈے		کپاس کی چتکبری سنڈی اور بالغ (پروانہ)
		
پانچ سنڈیاں فی سو ٹینڈے		کپاس کی گلابی سنڈی اور بالغ (پروانہ)
معاشی نقصان دہ حد		
سنڈیاں نظر آنے پر		لشکری سنڈی اور بالغ (پروانہ) انڈے
		
پانچ گچھوے انڈے یا تین چھوٹی سنڈیاں یا دونوں فی پچیس پودے		امریکن سنڈی اور بالغ (پروانہ)
معاشی نقصان دہ حد		
سنڈیاں نظر آنے پر		چقندر کی لشکری سنڈی اور بالغ (پروانہ) انڈے
		

کپاس کی فصل کو کم نقصان پہنچانے والے کیڑے

معاشی نقصان دہ حد		
سنڈیاں نظر آنے پر		دیمک
		ڈسکی کاٹن بگ کے بالغ
سنڈیاں نظر آنے پر		سرنگ بنانے والی سنڈی
		گرے ویول
سنڈیاں نظر آنے پر		ریڈ کاٹن بگ بالغ اور بچے
		
دس تا پندرہ جوں فی پتہ		جُوں (مائٹس)
		لوپر سنڈی
معاشی نقصان دہ حد		
سنڈیاں نظر آنے پر		کٹ ورم بالغ (پروانہ) اور سنڈی
معاشی نقصان دہ حد		
سنڈیاں نظر آنے پر		ایفڈ یا کالا تیلہ کے بالغ اور بچے

کسان دوست شکاری کیڑے (جو کہ نقصان دہ کیڑوں کو کھاتے ہیں)

	
گرین/براؤن لیس ونگ بالغ ، بچہ اور انڈے	لیڈی برڈ بیٹل کی مختلف اقسام اور بچہ
	
سرفڈ فلائی بالغ اور بچہ	اوریئس بَگ کا بالغ اور بچہ
	
کریپٹو لیمس کے بالغ اور بچہ	بالغ قاتل بَگ
	
ٹرائیکو گراما بالغ بھڑ	اپینٹلیز بھڑ
	
بِگ آئیڈ بَگ	کیمپائی لوما
شکاری کیڑا (مینٹڈ)	پرندے

مکڑی	بالغ قاتل بَگ	کریپٹو لیمس کے بالغ اور بچہ	سرفڈ فلائی بالغ اور بچہ	گرین/براؤن لیس ونگ بالغ ، بچہ اور انڈے
روو بیٹل	بھڑ کی مختلف اقسام	سفید مکھی کے بچوں پر پلنے والا کیڑا (انکارشیہ)	اپینٹلیز بھڑ	ٹرائیکو گراما بالغ بھڑ
ڈیمسل فلائی	ڈریگن فلائی	چونٹیاں	کیمپائی لوما	بِگ آئیڈ بَگ
اینٹ وِگ	پرندے	شکاری کیڑا (مینٹڈ)		

12. Third Party Validation/Survey of cotton IPM

Ph: 061-9330975

No. DS (T)/SA/SP/3-3/2021
GOVERNMENT OF THE PUNJAB
AGRICULTURE DEPARTMENT
SOUTH PUNJAB
Dated: 18/08/2023

1- **The Vice Chancellor**, University of Agriculture, Faisalabad
2- **The Vice Chancellor**, MNS-University of Agriculture, Multan
3- **The Vice Chancellor**, Islamia University Bahawalpur, Bahawalpur
4- **The Vice Chancellor**, Ghazi University, DG Khan
5- **The Vice Chancellor**, University of Sargodha, Sargodha
6- **The Vice Chancellor**, University of Layyah, Layyah
7- **The Vice Chancellor**, Khawaja Fareed UEIT, Rahim Yar Khan

Subject: - **THIRD PARTY VALIDATION/SURVEY OF THE COTTON IPM BLOCKS ESTABLISHED BY AGRICULTURE DEPARTMENT FY-2023-24.**

Apropos to the subject cited above.

Integrated Pest Management (IPM) is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as cultural, physical, mechanical, biological and chemical controls. Keeping in view the importance of IPM, the Agriculture Department has established **284 Cotton IPM D-plots** (2243.50 Acres) in Punjab during 2023-24. Out of which 199 IPM plots (1718.5 acres) have been established in Multan, Bahawalpur and DG Khan Divisions. Whereas 51 IPM plots (525 acres) have been established in Sahiwal, Faisalabad and Sargodha Divisions.

3. As the Cotton crop is at its maturity stage and maximum possible IPM techniques have been adopted. To assess the results of the IPM practices independent third-party surveys are required. It has been decided by the Competent Authority that TPV of IPM plots survey may be started from the **2nd week of September, 2023.**

4. Forgoing in view, following universities are requested to conduct survey of the Cotton IPM-plots of Extension & Pest Warning wings of Agriculture Department according to the scheduled mentioned below:

#	Name of University	Assigned Divisions / Districts for Survey
1.	University of Agriculture, Faisalabad	Faisalabad & Sahiwal Divisions
2.	University of Sargodha	Sargodha Division
3.	MNS-University of Agriculture, Multan	Multan Division
4.	Islamia University of Bahawalpur	Bahawalpur Division (Except RYKhan District)
5.	Khawaj Fareed UEIT, RY Khan	Rahim Yar Khan District
6.	Ghazi University Dera Ghazi Khan	DG Khan Division (Except Layyah District)
7.	University of Layyah	Layyah District

5. Therefore, I am directed to request you to please assign the said task to the University staff / students to conduct the comprehensive survey of all these IPM plots along-with adjoining 10 other farmers who don't own IPM demo cotton plots on the prescribed questionnaire developed by this office and submit the consolidated analytical report (hard & soft form) till **30th of September, 2023** to the undersigned for onward submission to Secretary Agriculture South Punjab. The list of IPM plots along-with prescribed one-page questionnaire is attached herewith for kind information and further necessary action.

6. Vice Chancellors of the Universities are requested to nominate focal persons for coordination with Agri. (Ext.) Department as well as Agriculture Department South Punjab for surveys of IPM cotton plots for 2023-24 till **25th of August, 2023**. The details of IPM plots and logistics will be provided by Extension and PWQCP wings of Agriculture Department, Punjab.

7. It is further requested that after completion of survey a report may be compiled and submitted to the undersigned till **1st October, 2023**.

18/08/23

DEPUTY SECRETARY (Tech.)
AGRICULTURE DEPARTMENT,
SOUTH PUNJAB

CC:

1- Director General of Agriculture (Ext. & AR), Punjab. Lahore.
2- Director General of Agriculture (PW & QCP), Punjab Lahore.
3- PSO to Additional Chief Secretary, South Punjab, Multan.
4- PS to Secretary Agriculture, Punjab Lahore.
5- PS to Secretary Agriculture, South Punjab, Multan.

میرا نام محمد زبیر ولد عبدالحمید بستی میں تحصیل و ضلع بہاولپور کا رہنے والا ہوں میں نے محکمہ زراعت کے
آفیسران کے کہنے پر چک نمبر (۴) ایکڑ پر کپاس کا IPM پلاٹ کاشت کیا محکمہ کی دی گئی سفارشات
کے مطابق سفید مکھی کو کنٹرول کرنے کے لیے پیلے چپکنے والے کارڈ آٹھ فی ایکڑ لگائے اور محکمہ کی طرف
سے مہیا کیے جانے والے دوست کیڑوں کے کارڈ مثلاً کرائی سوپا اور ٹرائیکوگراما کے انڈوں
والے کارڈ لگائے آفیسران کے تجربہ کو استعمال کیا اور نیم اک تمباکو کے علیحدہ علیحدہ
اور ملا کر اسپرے کیے جس کی وجہ سے میری کپاس کی فصل سفید مکھی کے حملہ/نقصان
سے محفوظ رہی اس سال میری کپاس کی فصل بہت اچھی رہی اور دوست کیڑوں کی
تعداد میں اضافہ ہوا میں زہروں کے بہت کم اسپرے کیے میری اوسط پیداوار 54 من
فی ایکڑ رہی اور خرچ بھی کم ہوا۔

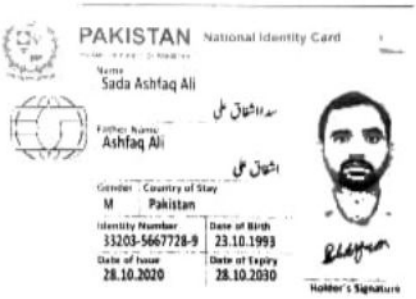
M: Zubair زبیر

محمد زبیر ولد عبدالحمید موضع نورپور نورنگا مرکز نورپور نورنگا تحصیل و ضلع بہاولپور
03008691401
31202-47970819

میرا نام صدا اشفاق علی ولد اشفاق علی ہے
میں ضلع جھنگ تحصیل شورکوٹ موضع قائم بلوانہ کا مستقل رہائشی ہوں
میں نے محکمہ زراعت کے آفیسران کے کہنے پر دو ایکڑ رقبہ پر پاس کا آئی وی ایم 11-PM
پلاٹ کاشت کیا محکمہ کی دی گئی سفارشات کے مطابق سنڈی کی کنٹرول کرنے کے لیے
پیلے چپکنے والے 4 کارڈ فی ایکڑ لگائے اور محکمہ کی طرف سے مہیا کیے جانے والے
دوسرے پیڑوں کے کارڈ فیرومون ٹریپ سوہرلا۔ ٹرائیکوگراما کے انڈوں والے کارڈ لگائے
آفیسران کے تجربے کو استعمال کیا اور نیم۔آب اور تمباکو کے علیحدہ علیحدہ اور ملا کر اسپرے
کیے جسکی وجہ سے میری پاس کی فصل سنڈی مکھی کے حملے کے نقصان سے محفوظ رہی
اس سال میری پاس کی فصل بہت اچھی رہی اور دوسرے پیڑوں کی نسبت میں اضافہ ہوا
میں نے زمین بہت کم سپرے کیں میری اوسط پیداوار 53 من فی ایکڑ رہی اور خرچہ بھی کم ہوا

Sada Ishfaq

صدا اشفاق علی ولد اشفاق علی
33203-5667728-9
0345-4653738


PAKISTAN National Identity Card
Name
Sada Ashfaq Ali
سدا اشفاق علی
Father Name
Ashfaq Ali
اشفاق علی
Gender | Country of Stay
M | Pakistan
Identity Number | Date of Birth
33203-5667728-9 | 23.10.1993
Date of Issue | Date of Expiry
28.10.2020 | 28.10.2030
Holder's Signature

میرا نام قمبر عباس ولد عاشق حسین قوم اڑول ہے۔ میں ضلع ڈیرہ غازیخان اور تحصیل کوٹ چھیہ کا رہنے والا ہوں۔ میں نے محکمہ زراعت توسیع کے آفیسران کے کہنے پر مین ایکڑ ③ کپاس کا آئی پی ایم (IPM) پلاٹ کاشت کیا۔ محکمانہ سفارشات کیمطابق سفید مکھی کے تدارک کیلئے پیلے چپکنے والے ⑧ آکٹھ کارڈز فی ایکڑ لگائے اور محکمہ کیطرف سے دیئے گئے دوست کیڑوں کے کارڈز مثلاً کرائی سوپا اور ٹرائی کوگراما کے انڈوں والے کارڈز لگائے۔ اس کے علاوہ زراعت آفیسران کی ہدایات پر عمل کرتے ہوئے، پودوں کا جوس (اَرس)، جیسے نیم، اک تمباکو، سیوہ پتہ، اور تمباکو کے علیحدہ علیحدہ پانی میں (ارک کرکے ان کے مکسچر کے دو سپرے کپاس (IPM) پلاٹ پر سپرے کیے جسکی وجہ سے میری کپاس کی فصل سفید مکھی کے نقصان سے کافی حد تک محفوظ رہی اور اسی سال میری کپاس کی فصل اچھی رہی اور دوست کیڑوں کی تعداد میں بھی اضافہ ہوا۔ جسکی وجہ سے میں نے زہروں کا بہت ہی کم سپرے کیا۔

میری اوسط پیداوار، (53) من فی ایکڑ رہی اور میرا خرچہ الائنٹ بھی کم ہوا۔

قمبر عباس ولد عاشق حسین اڑول
سکنہ موضع بستی حلانہ
تحصیل کوٹ چھیہ ڈیرہ غازیخان
0335-6141500
32102-7152033-1

میرا نام محمد اکبر ولد غلام رسول ہے میں چک نمبر 125 ٹی ڈی 9
تحصیل وضلع لیہ کا رہائشی ہوں میں نے محکمہ زراعت کے آفسران کے
کہنے پر چار ایکڑ پر کپاس کا IPM. طریقہ کاشت کیا محکمہ کی دی
گئی سفارشات کے مطابق سفید مکھی کو کنٹرول کرنے کیلئے پیلے چپکنے والے
آٹھ کارڈ فی ایکڑ لگانے کے بعد محکمہ کی طرف سے مہیا کیے جانے والے دوست کیڑوں
کے کارڈ مثلاً کرائسوپرلا اور ٹرائیکوگراما کے انڈوں والے کارڈ لگانے
آفسران کے تجربے کو استعمال کیا بعد نیم ایک کلو لیٹر اور عقاب کو
کے علیحدہ علیحدہ بعد ملا کر سپرے کیئے جس کی وجہ سے میری
کپاس کی فصل سفید مکھی کے حملے/نقصان سے محفوظ رہی
اس سال میری کپاس کی فصل بہت اچھی رہی۔ بعد دوست
کیڑوں کی تعداد میں اضافہ ہوا۔ میں نے زہروں
کے سپرے بہت کم کیے میری اوسط پیداوار 40 من
فی ایکڑ رہی اور خرچ بھی بہت کم ہوا

محمد اکبر ولد غلام رسول چک 125 ٹی ڈی
32203-5909131-3
0310 850 2245

(1)

جناب آفیسر صاحب محکمہ زراعت کبیر والا

عنوان :- IPM اور کپاس کی کاشت

جناب والا عنوان کو مدِ نظر رکھتے ہوئے IPM کے Features & Benifits بتانے سے پہلے چند ایک باتیں ضروری ہیں جو کہ آپ تک اور عام کاشتکاروں تک پہنچنا ضروری ہیں۔ میں وکالت کے پیشے سے وابستہ ہوں اور اسلام آباد رہائش پذیر ہوں۔ میرا وراثتی زرعی رقبہ حوضع 5 کسی تحصیل کبیر والا میں ہے۔ پہلے رقبہ ٹھیکہ پر دے رکھا تھا مگر سال 2022-23 میں محکمہ زراعت کی کپاس پر تحقیق اور IPM سے آگاہی مذاکرہ میں شرکت اور راعت جنوبی پنجاب سے حاصل ہوئی اور ملکی ضرورت کو دیکھتے ہوئے اور کپاس کے Revival کی اہمیت کو سمجھتے ہوئے کپاس خود کاشت کرنے کا فیصلہ کیا اور 12 ایکڑ کپاس کی کاشت کی۔ چونکہ اُس سال شدید بارشوں اور نامناسب موسمی حالات کی وجہ سے نقصان ہو گیا اور عملی طور پر IPM پر اس طرح سے عمل درآمد نہ ہو سکا۔ اس سال 2023 میں دوبارہ 13 فروری کو 6 ایکڑ کپاس کی کاشت کی۔ Luckily بیج بھی اچھا ملا اور ہم نے کپاس کی کاشت بمطابق IPM شروع کی۔ IPM کے فوائد بتانے کے لیئے کافی وقت درکار ہوگا مگر چند ایک چیزیں کاشتکار تک مزید مشاہدے اور Practically کے طور پر پہنچنی چاہیں۔ IPM کو Follow کرنے کا فائدہ نہ صرف مالی طور پر ہوا بلکہ ماحولیاتی آلودگی کو کم کرنے کے لیئے ہم نے اپنے طور پر کردار ادا کیا۔ صرف 2 عدد Pesticide Spray کا استعمال کیا گیا جو کہ Thrips کے کنٹرول کے لیئے تھا۔ اس کے علاوہ کپاس کی فصل پر کسی قسم کا Pesticide Spray کا استعمال نہ ہوا ہے۔ سفید مکھی نے سال 2023 میں کپاس کی فصل کو شدید متاثر کیا اور کسانوں نے تدارک کے لیئے مارکیٹ میں موجود بے اثر زہروں کا بھرپور استعمال کیا جس سے کپاس کی فصل جل گئی اور سفید مکھی پر بھی کنٹرول نہ ہو سکی اور کسانوں کا نہ صرف مالی اخراجات میں اضافہ ہوا بلکہ فصل کا نقصان بھی برداشت کرنا پڑا۔

میں نے جو فیلڈ IPM کو Follow کرنے لیئے بغور مطالعہ اور مشاہدہ کیا کہ ہم نے سفید مکھی کو کنٹرول کرنے کے لیئے اپنا تیار کردہ نباتاتی محلول جو کہ IPM کا سب سے بڑا اور فائدہ مند جزو ہے کو شروع دن سے اپنی تقریباً دو ماہ کے بعد پہلا سپرے کیا۔ (کوڑتماہ + اک + نیم کے پتے + تمباکو + ہنگ + سوہانجنا) نباتاتی محلول کو ماہ اکتوبر تک استعمال کیا۔ یہ محلول کی سب سے بڑی خوبی ہے کہ پودے کے اندر حیران کن طور پر قوت مدافعت پیدا کرتا ہے کہ وہ سفید مکھی کے شدید حملے کو بھی برداشت کرنے کی Position میں آ جاتا ہے۔ چونکہ یہ تمام قدرتی اجزاء کڑوے ہوتے ہیں اور یہ محلول پتوں میں جذب ہو کر سفید مکھی کے لیئے پتوں میں کڑواہٹ برقرار رکھتا ہے جس کی وجہ سے بالغ و نابالغ سفید مکھی فصل پر اثرات نہیں چھوڑتی اور فصل محفوظ رہتی ہے۔ IPM کے پلان کے مطابق نباتاتی محلول دیکھ تو بہت کم اخراجات سے تیار ہو جاتا ہے اور دوسرا بڑا فائدہ Environment Free Cotton کے حصول کے لیئے بہترین ذریعہ ہے IPM کا ایک اور انتہائی اہم فائدہ یہ ہے کہ یہ کسان کو اپنی فصل پر دوست کیڑوں کا ماحول سازگار بناتا ہے اور دوست کیڑے جب دشمن کیڑوں کو کھاتے ہیں تو پھر فصل پر کسی Pesticide کا سپرے کرنے کی ضرورت نہ پڑے گی۔

ہم نے اپنی فصل پر Yellow Sticky Traps کا استعمال بھی کیا تاکہ سفید مکھی کے نقصان کے لیئے مگر اس طریقہ سے سفید مکھی کے شدید حملے کو مکمل طور پر ختم نہیں کیا جا سکتا۔ میرا ذاتی مشاہدہ اور Practical ہے کہ اگر نباتاتی محلول کا استعمال کیا جائے تو پودے کے اندر فطری طور پر سفید مکھی سے مقابلہ کرنے کے لیئے قوت مدافعت موجود ہوگی اور فصل نقصان سے بچ جائے گی۔

کسان کو یہ بات سمجھنے اور سمجھانے کی اشد ضرورت ہے کہ اللہ تعالیٰ نے پودے کے اندر جان ڈالی ہے اور فصل جاندار ہوتی ہے اگر

کیسی بھی جاندار چیز کے اُوپر خواہ وہ انسان ہو یا پودا، اگر زہر
کا استعمال کریں گے اس کے اُوپر تو کیا وہ زہر (Pesticide)
اُس جاندار کا فائدہ کرے گی یا نقصان دہ ہوگی؟ صرف اس
نقطے کو سمجھنا ضروری ہے۔ IPM کو Follow کرنے سے نہ صرف
اخراجات کنٹرول ہوں گے بلکہ Environment Friendly Cotton کو فروغ حاصل ہوگا
جس سے ملک کو فائدہ ہوگا کسان خوشحال ہوگا۔

میں نے ذاتی طور پر IPM کو Follow کیا ہے اور الحمدللہ 65 من
فی ایکڑ کی پیداوار حاصل کی ہے۔ میں نے مختلف stages پر اپنی فصل
کی تصاویر اور ویڈیوز محکمہ کو ارسال / مہیا کی ہیں تاکہ میری
success story عام کاشتکار تک پہنچے اور IPM کے فروغ کے لئے
بہتر کسان اپنا کردار ادا کر سکوں۔

فاروق صفدر، ایڈووکیٹ
61101-4987514-7

15-01-2024

INTEGRATED PEST MANAGEMENT FOR COTTON CROP

IPM 2021

- 120 IPM Plots
- 496 Acres
- 57% less pesticides (saving of Est. Rs.40 billion to farmers)
- Substitution with botanical extracts
- Avg Yield: 34.22 mds/ acre against 19.68 average for yera 2021-22

IPM 2022

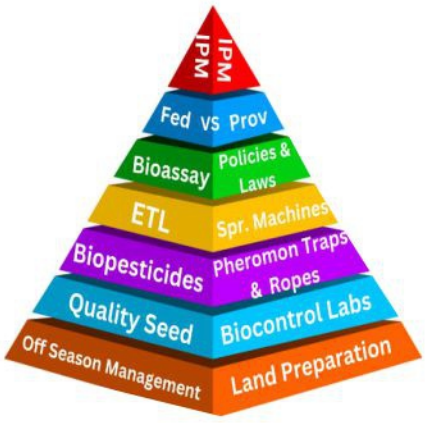
- 199 IPM Plots
- 1614.5 Acres
- Substitution with botanical extracts
- IPM plots Avg. Yield: 27mds/ acre against 9.92 mds/acre (2nd estimates CRS for year 2022-23

IPM 2023

- 292 IPM Plots
- 1306 Acres
- Substitution with botanical extracts
- IPM plots Avg. Yield: 38.89 mds /acre against 17.42 mds/acre (2nd estimates CRS for year 2023-24

ROI:

- Conventional= Rs.1.69/1 Rupee
- IPM Demos= Rs.3.63/1 Rupee



Lower Input Costs → Optimum Yield → Better ROI

15. Comments of Directors Extension Punjab & PW&QCP about IPM

Message of the Chief Agriculture Officer/DA (Extension) Multan, Division Multan regarding IPM

IPM is considered as key in Successful Agriculture. It provides good effect on climate and improves crop yield. It involves less use of chemical and ultimately delaying in first spray as possible and use of bio-pesticides. Release of *Chrysoperla* and Trichogramma card favoring the biological control rather than chemical controlled IPM techniques does not meant complete eradication of insect pests, it's aim is to maintain insect and pest level to below ETL. IPM starts with breaking of hardpan with deep ploughing and continues till harvesting involving weeds eradication and mulching.

Message of Chief Agriculture Officer/DA (Extension) D.G Khan, Division D.G Khan regarding IPM

I observed while implementing the Integrated Pest Management Techniques on cotton crop that it promotes sound structures and healthy plants. It promotes sustainable bio-based pest management alternatives. It reduces environmental risk associated with pest management by encouraging the adoption of more ecologically benign control tactics. It is helpful to reduce the potential for air and ground water contamination.

Message of Chief Agriculture Officer/DA (Ext.) Bahawalpur, Division Bahawalpur regarding IPM

IPM plays a pivotal role in Sustainable Agriculture. It is environment friendly, economically feasible and socially acceptable technique. It maintains the plant health and gives good average yield per acres. In Bahawalpur division, 46 Demonstration IPM plots of Cotton are established every year. IPM techniques used including sowing of healthy and approved varieties, delay of first chemical more than 60 days after sowing, installation of yellow sticky cards, bio cards of *Chrysoperla* and *Trichogramma,* weeds removal and use of soft pesticides at last resorts. The results of the demonstration plots shown good average yield per acre with reduced cost of inputs. Thus, IPM is need of hour and most efficient technique of the pest management.

Message of Chief Agriculture Officer/DA (Ext.) Sahiwal, Division Sahiwal regarding IPM

Integrated Pest Management (IPM) techniques offer numerous benefits. Firstly, they reduce reliance on chemical pesticides, minimizing environmental impact and promoting ecological balance. IPM helps to maintain beneficial insect populations that can naturally control pests, reducing the need for costly chemical inputs. Additionally, IPM strategies are often more cost-effective in the long run, as they focus on preventing pest damage which leads to higher yields and better crop quality, improving overall profitability. IPM Techniques lead to more sustainable and environmentally friendly agricultural practices.

Message of Chief Agriculture Officer/DA (Ext.) Sargodha, Division Sargodha regarding IPM

Cotton is cash crop and to get maximum yield its protection from harmful insets is the major hindrance. Last year IPM plots were laid down in farmer's field where IPM practices were performed to minimize the insets attack. Installation of bio cards and yellow sticky card gave better result to lower down the intensity of white fly. IPM technology is basic tool of farmer awareness regarding alternative IPM practices other than chemical control and enhances the crop production through adoption of optimal inputs of fertilizer & Pesticides. By adopting these practices no. of chemical sprays on cotton against white fly, Jassid, Thrips reduced ultimately economically supported farmers. Mr. Muhammad Suleman s/o Muhammad Ramazan Tehsil Kallurkot. (IPM plot) got first Position (62.96) in cotton yield competition 2023 in Sargodha Division. Therefore it is recommended to adopt IPM practices in cotton to increase the yield of cotton.

Message of Chief Agriculture Officer/DA (Ext.) Faisalabad, Division Faisalabad regarding IPM

- It delays 1st spray on cotton crop.
- Beneficial insect's population increase due to IPM techniques.
- It promotes wise use of pesticides.
- It decreases number of pesticides sprays per acre due to increased population of beneficial insects.
- It may decrease the negative impact of pesticide on environment.
- Awareness of beneficial insects and Bio cards among farmers.
- It decreases the per acre cost spray by using pesticides spray.
- Ultimately less pesticide residual in cotton seed and products made.
- Farmers cost benefit ratio increase due to low input cost.

Message of Director General Agriculture, Pest Warning & Quality Control of Pesticide Punjab-Lahore.

IPM means a mindset in which all possible strategies of pest management are wisely blended to get a successful and sustainable level of pests in the field at which damage inflicted by pests is within tolerable limits.

Message of the Chief Agriculture Officer/DA (Extension)/Director IPM Punjab

IPM is a common-sense approach to manage pests while reducing the loads of harmful pesticide sprays on our valuable commodities. The chemical pesticides have detrimental effects on food safety, pollute the environment, destabilize agro-ecosystems and are potential threats to natural biodiversity. The development of insecticide resistance in pest insects and the negative impacts of chemical pesticides on the ecosystem could only be slow down by IPM technologies. Actually, IPM uses a combination of least harmful practices rationally. It works excellently because combined (integrated) approaches for pest management are more effective than relying upon a single tactic. The results of IPM practices could be prominent if adopted on large scale. A small IPM based field among the pesticides sprayed filed is just like an island in a big ocean. Therefore, in order to make IPM a result oriented technology a community based and holistic approach is required including all stakes holders involved in production system.

Message of Chief Scientist Cotton Research Institute (CRI) Multan

آئی پی ایم: Integrated Pest Management کے نام سے منسوب ہے۔اسے عام زبان میں کیڑوں کا مربوط طریقہ انسداد کہتے ہیں جس میں ضرر رساں کیڑوں کے نقصان سے بچنے کے لئے تمام موزوں تراکیب کو یکجا استعمال کیا جاتا ہے۔کسی بھی فصل کی صحتمند، منافع بخش پیداوار کے حصول کے لئے آئی پی ایم کلیدی اہمیت رکھتا ہے۔

☆ پیداواری لاگت میں کمی۔☆فصل زہریلے سپرے کے اثرات سے محفوظ رہتی ہے۔☆ کیڑوں میں زہروں کے خلاف قوت مدافعت پیدا نہیں ہو پاتی۔☆ دوست کیڑے اور ماحول زہریلے سپرے کے اثرات سے محفوظ رہتے ہیں۔

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