Cotton Growers Perception Level Regarding Pesticides Practices and Toxic Effects of Pesticides on Cotton Plants as Well as the Environment in Sindh

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| History | ABSTRACT |
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| Revised format: May 2022 | Purpose: Pesticides are used to stop or control insects, for instance, weeds, dreadful little creatures, and plant pathogens. The perception among cotton growers of beneficial and harmful effects of pesticides on cotton plant and environment, factors concerning with pesticides applications have a very essential role to get maximum yield. |
| Available Online: Jun 2022 | Design/Methodology/Approach: The 300 samples were collected for this study and the reliability of the questionnaire is checked by Cronbach's Alpha test its worth was 0.92 and items were perfectly correlated to one another. The majority of respondents' age was 31-40 years with education level matriculation. Unfortunately, the low literacy rate and education level of the respondents is discouraging. It is also noticed that a large number of respondents had 31- above acres size of land from which 16-20 acres were used for cotton cultivation. The test statistic provided all probability values are highly significant |

Keywords

Perception, Pesticides, Environment, Cotton growers

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Introduction

Agriculture is the guideline channel of giving crude materials to industry similar to the business community for present-day items. Cotton is the certified fiber yield and lifesaver of Pakistan's economy. A tremendous green thing gives the work to cultivators in Pakistan and unrefined material to the business. Cotton is a significant fiber yield and helps Pakistan’s economy. A significant agrarian ware gives business to ranchers in Pakistan and natural substance to the material business. Cotton contributes 7% worth of Increased to farming and 1.5% to the GDP of Pakistan. Be that as it may, 2012-13 isn't a useful year for cotton cultivators of Pakistan. Whiteflies and thrips caused the greatest harm to the cotton in the cotton belts of Punjab and Sindh. (Shahid et al.2013) Cotton is a significant fiber crop planted in the dry climate of Pakistan on an area of 3.20 million hectares with an all-out creation of 2.15 million tons. (APTMA 2016).

Pesticides are substances that are utilized for controlling creepy crawly/insects which harm the harvest, manage the development of the plant, build the yield of harvest, and so forth. Two billion chemical pesticides each year, within which at least US$ 819 million are considered toxic enough to be classified as dangerous by the World Health Organization. The pesticide is used successfully in controlling several diseases, such as malaria and typhus World Health Organization. (Whitehouse et al.,2005). Pesticides are used to stop or control insects, for instance, weeds, dreadful little creatures, and plant pathogens, while diminishing the measure of work, fuel, and apparatus used for creepy crawly/bother control (Osteen and Szmedra, 1989; These points of interest convert into lower creation costs, higher collect yields just as quality, and improved advantages for cotton cultivators. The favorable circumstances for U.S. cotton cultivators are exhibited by their readiness to spend around $12 billion on pesticides in 2008 (USDA/ERS, 2010). Pesticides were used for the first time in 1950 in Pakistan to battle creepy crawly ambush. In 1954, imports of substance pesticides meant 254 tones and in 1980; the organization controlled the imports and maintained the dissemination of pesticides. As showed by the Prime Minister’s Task Force on Agriculture, generally 90% of the creepy crawly/bother splashes and pesticides are used on cotton crops. That infers most of the 6.62 million segments of land used for the improvement of cotton crops for instance the target of pesticide use (PAN International Website, basic social affair, PANAP p.2). It has been reported that consistent indiscriminative utilization of pesticides has made super durable harm to the climate and created opposition in bug species against these synthetic substances. The cultivating networks are less mindful of the suggested measurements and techniques for insecticidal application and as result, the regular fruitfulness of the dirt is diminished.(Shetty, Barik and Gautam 2014).

This study describes the hazards of pesticides/ Insecticides and herbicides but the benefits of pesticides/Insecticides and herbicides cannot be denied .few benefits of pesticides/ Insecticides and Herbicides are given below.

Benefits of Chemical Pesticides

The top advantage of pesticides is their adequacy against bugs that would somehow demolish crops huge and little. By controlling bugs and rodents, pesticides forestall the spread of infection and safeguard structures from termite perversions. Pesticides additionally keep the cost of dress and food somewhere around disposing of hunters that would annihilate crops, raising the expense of things like corn and cotton. Indeed, even careful instruments and working rooms are cleaned
with pesticides, as per the Environmental Protection Agency. The yield assurance advancements influence the expense of food, where without them, food creation would decline. Many products of the soil would be hard to find and the costs would rise. They are utilized to control termites, bugs, subterranean insects, rodents, and different vermin, they permit the purchasers to have excellent harvests that are liberated from bug imperfections and bug pollution.

**Negative Impacts of Pesticides**

Substance pesticides cause compound contamination for the dirt, the water, and the air, they cause serious well-being dangers like a malignant growth, sensory system sicknesses, and concepitive issues in individuals who are presented to the pesticides through home and nursery openness. They can harm the rural land by hurting the helpful bug species, the dirt microorganisms, and the worms which normally limit the irritation populaces and keep up with the dirt wellbeing. Pesticides are poisonous substances delivered into our current circumstances to kill living things. They kill weeds, bugs, the organism, rodents, and others. Short openings to certain pesticides might kill or nauseate the natural life. They are harmful to live creatures, They cause air contamination when they are suspended in the air as the particles are conveyed by the breeze to different regions, and They decrease the centralizations of plant supplements in the dirt like nitrogen and phosphorous, They debilitate the plant root foundations and the resistant frameworks. Numerous honey bees and butterflies are lost, they are the pollinators that do cross-fertilization normally, they assume a significant part in the plant cycles and development and the plants that are prepared to utilize pesticides become quicker.

**Objectives of The Study**

To examine the perception level of cotton growers regarding pesticides usage

To study the impacts of pesticides on cotton plant

To study the impacts of pesticides on the environment

**Hypotheses**

H₀: There is no perception of pesticide usage among cotton growers.

H₀: there is no negative impact of pesticide usage on the cotton plant.

H₀: there is no negative impact of pesticide usage on the environment.

**Material and Methods**

**Study area:** Sindh represents 18% of the nation's territory region, 16% of its absolute edited region, and contributes around 23% to the public horticulture esteem added. (Sindh Agriculture Policy (2018-2030). Matiari contributes significantly to the agribusiness area of Sindh because its environment is appropriate for the development of different harvests, including the Kharif yields of maize, rice, sugarcane, cotton, and bajra and Rabi harvests of wheat and grain. Also, organic product plantations are bountiful in this region. This locale is popular, all over Pakistan, for its Bananas and mangoes. The total population of the district is 655065 from which 196520 live in the urban area and 458 545 live in rural areas, The majority of the population of rural areas depends upon agriculture. The present study was carried out in the tehsil Matiari, tehsil Hala and tehsil Saeedabad of district Matias.
Sample Size and Sampling Procedures for Data Collection

The primary data were collected by an organized questionnaire consisting of four sections demographic information, pesticide impacts, cotton growers’ PERCEPTION, and farm expenditure. The questionnaire was designed in English language and translated into the Sindhi language for easiness for the respondents. The Likert five option scale was used 1. Unsatisfied, 2. Poor satisfied, 3. Neutral, 4. Satisfied and 5. More satisfied. The survey was started in June 2018. The data were collected from district Matiari and the whole district is consisting of three tehsils (Matiari, Hala, Saeedabad) and 30 union councils. The four U/Cs were randomly selected from each tehsil. Twelve U/Cs from the Whole district of Matiari and five villages were selected randomly from each U/C and five questionnaires were filled to respondents from each village, the total sample size of cotton growers was 300 samples for this study. The field survey was completed through simple random sampling for selecting union councils and villages from the whole district.

Statistical Analysis

Data were compiled in a spreadsheet for further processing and following analysis in the statistical software SPSS (23–versions). Descriptive techniques are exceptionally useful tools for presenting information, investigating the information, and describing the data. The reliability of the data is checked through the statistical test Cronbach's Alpha. The gathered information is presented in frequency distribution and percentage. The non-parametric statistical tool the Kuraskul-Walis H Test was applied to examine the toxic impacts of pesticides and the perception of pesticide utilization among the cotton growers.
Results and Discussion
The demographic profile of the respondents (figure 2) describes the characteristics of a particular rural society. It is quite evident from the fact that all respondents were mature and experienced. A huge number of respondents were landlords and farmers, they were oneself concerned with pesticide practices. The majority of respondents' age was 31-40 years with education level matriculation. Unfortunately, the low literacy rate and education level of the respondents is discouraging. It is also noticed that a large number of respondents had 31- above acres size of land from which 16-20 acres were used for cotton cultivation. The maximum interval of farming experience was 16-20 years among the cotton growers.

**Age**

| Age Interval | Respondents |
|--------------|-------------|
| 10 to 20     | 15          |
| 21 to 30     | 58          |
| 31 to 40     | 115         |
| 41 to 50     | 112         |

**Education**

| Education Level | Respondents |
|-----------------|-------------|
| Illiterate      | 55          |
| Any Other       | 15          |
| Graduate        | 57          |
| Intermediate    | 52          |
| Metric          | 81          |
| Primary         | 40          |

**Size of Land Holding**

| Land Size       | Respondents |
|-----------------|-------------|
| >10 acres       | 65          |
| 21-30 acres     | 74          |
| 11-20 acres     | 71          |
| 31-above acres  | 90          |

**Area Under Cotton Cultivation**

| Cultivation Size | Respondents |
|------------------|-------------|
| >10 acres        | 62          |
| 16-20 acres      | 113         |
| 10-15 acres      | 62          |
| <10 acres        | 62          |
Reliability statistics of the questionnaire

It is fundamental to test the reliability of the instrument and questionnaire. The reliability test quantifies the consistency of items and crosses the information. Reliability coefficient determines the sum to which results on a scale can be estimated as inside steady of solid. The reliability coefficient called Cronbach’s alpha is a proportion of between class connection and its range is from 0 to 1. The value of Cronbach’s Alpha for reliability obtained through SPSS is 0.944, which means that the data were excellent and the questionnaire was valid for the research.

Cotton grower’s perception level regarding pesticides practices

Before applying pesticides on crops it is very essential to get information about the toxic effects of pesticides on different things, crops, vegetables, fruits, animals, birds, and the perception of the pesticide applications among growers. (Bush 2016) Accomplished the cotton cultivators consciousness approach on the utilization of insect control systems, application supported insecticides against objective difficulties and came about that cotton cultivators don't depend upon any set heap of manufactured substances or materials and by and large, they depend upon the information given by the pesticide vendors to the utilization of insect showers in their cotton crop in South Asian countries.

| Perception level regarding pesticides practices | 1 | 2 | 3 | 4 | 5 | Mean | Std | Chi-square value |
|-------------------------------------------------|---|---|---|---|---|------|-----|-----------------|
| Harms of pesticides are known                    | 23| 37| 27| 184| 29| 3.60 | 1.085| 188.567         |
| Necessary precautions are known                  | 21| 36| 29| 199| 15| 3.50 | 1.007| 406.733         |
| The technical application of pesticides is known | 19| 46| 48| 176| 11| 3.38 | .999 | 297.967         |
| Proper pesticides product for disease can be chosen | 11| 54| 37| 140| 58| 2.14 | 1.181| 186.633         |
| A precautionary costume is used                  | 172| 38| 33| 54 | 3 | 3.85 | 1.113| 228.600         |
| Dosages information                              | 19 | 46 | 48 | 171 | 16 | 1.93 | 1.222| 284.033         |
| Disease knowledge                                | 31 | 23 | 32 | 176 | 38 | 3.62 | 1.273| 155.567         |
| Instruction is read and understood as mentioned on the bottle | 26 | 46 | 36 | 152 | 40 | 3.45 | 1.160| 179.867         |
| The expiry date is read                          | 6  | 39 | 30 | 174 | 51 | 3.75 | .954 | 288.900         |
| Face and hands are washed immediately            | 56 | 80 | 53 | 101 | 10 | 2.76 | 1.197| 77.433          |

Harms of pesticides were well known among the cotton growers because 188.567 at the degree of freedom 4 and P-value 0.000 is highly significant.Hussain et al. (2011) conducted a cross-sectional survey in the district Jhang of Punjab and invited 99 farmers to their perception of pesticide application (Hussain et al. 2011). Necessary precautions and technical applications were known among the cotton growers because statistical tool values 406.733 and 297.967 with p values 0.00 do not fall in the critical region indicating that cotton growers have good information about the precaution and technical applications, they had good knowledge to choose proper pesticides product information. But the majority of the respondent had not received training about pesticide applications, they were traditionally skilled mostly of them do not use precautionary costume. The researcher asked about diseases and dosages information they had...
good knowledge about the diseases and dosages as the values of test statistics 284.033 and 95.567 lie too away from the critical region and probability values are also less than the specified level of significance. Singh et al. (2013) analyzed the ranchers' view of the utilization of suggested pesticides for legitimate techniques and measurements and surveyed the effect of key financial and institutional variables on the reception of suggested pesticide application. Singh et al. (2013). it is also noticed that instruction and expiry date of the pesticides product was red carefully by them the results are mention table no 1, after applying pesticides mostly respondents used to wash their hands and face immediately as $\chi^2 = 55.55$ is highly greater than critical region value and probability value $0.000 < 0.05$. Most cotton growers are unconscious of the potential toxicities of pesticides. They have no data about the sorts of pesticides, their level of harm, hazards, and wellbeing measures to be taken before utilization of those pesticides. Because of this reason, dangerous and environment-constant synthetic concoctions are utilized to kill insects/pests which can likewise rapid deliberate, accidental, or word-related introduction. These mixes have long time impacts on the health of humans (Sharma et al. 2012). (Amera 2015) analyzed the impression of ranchers concerning the utilization of pesticides for controlling bug bothers in cotton involving undeveloped ranchers in cotton creation. One hundred 82 ranchers (half of the prepared and the rest undeveloped) were chosen by advantageous examining from 8 towns. (Amera 2015).

**Toxic Effects on Cotton Plant**

The positive effects of pesticides cannot be denied on different kinds of crops, vegetables, and foods, especially cotton crops. Insecticides are often the only practical way to control the insects that spread deadly diseases such as malaria, resulting in an estimated 5000 deaths each day (Ross. (2005).

Table 2: Toxic impacts on cotton plant

| Toxic impacts on cotton plant                  | 1  | 2  | 3  | 4  | 5  | Mean | Std  | Chi-square value |
|-----------------------------------------------|----|----|----|----|----|------|------|------------------|
| Stop the Growth of plant                      | 19 | 57 | 34 | 143| 47 | 3.47 | 1.152| 157.067          |
| Harm Branches of plant                        | 45 | 46 | 40 | 146| 23 | 3.19 | 1.232| 159.767          |
| Excessive use damages roots                   | 31 | 42 | 40 | 140| 47 | 3.43 | 1.210| 135.567          |
| Excessive use is the cause of infertility     | 86 | 67 | 29 | 95 | 23 | 2.67 | 1.376| 71.333           |
| Kills friendly Insects                        | 6  | 36 | 30 | 163| 65 | 3.82 | 0.973| 250.433          |

Furthermore, those pesticides have a toxic impact on the various parts of cotton plants as well. In this study toxic effects were found on the growth of the cotton plant and roots of plants due to excessive usage of pesticides; the test statistic chi-square provides results 157.067 and 159.667 do not fall in the critical region, and p values are less than the specified level of significance, showing that excessive usage of pesticides damages the plant growth as well as roots of plants. The majority of pesticides reduce the fertility of the land and kill the friendly insects which help in the enhancement of cotton production is also resulting through statistical analysis with the values of chi-square 71.333 and 250.333 are less than the critical value of 9.46 and probability values 0.000 are highly significant, those are main evidence that pesticides utilization is the major cause of infertility and kill the friendly insects of crops. (Schreck et al 2008) Earthworms worms accept a huge activity in the soil organic framework by going about as bioindicators of soil debasement and as models for soil hurtfulness testing. Worms also add to soil lavishness. Pesticides have not spared earthworms from their toxic effects and the latter is displayed to the past principally by methods for spoiled soil pore water.
Pesticides’ toxic impacts on the environment

Pesticides are known in the world for their toxic effects. Those pesticides are very beneficial for the protection of crops, fruits, and vegetables. Besides, those pesticides harm many atmospheric things also. (Sharma et al. 2013) Most cotton growers are unconscious of the potential toxicities of pesticides. They have no data about the sorts of pesticides, their level of harm, hazards, and wellbeing measures to be taken before utilization of those pesticides. in this research, a few objects were taken and found effects of pesticides on them.

### Table 3: Toxic impacts of pesticides on the environment

| Toxic impacts of pesticides on the environment | 1 | 2 | 3 | 4 | 5 | Mean | Std | Chi-square value |
|-----------------------------------------------|---|---|---|---|---|------|-----|-----------------|
| Cause of Underground water contamination      | 85| 58| 49| 96| 12| 2.64 | 1.297| 72.500          |
| Cause of environmental pollution              | 40| 62| 45| 119| 34| 3.15 | 1.254| 79.767          |
| Harms the biological life                      | 16| 46| 37| 178| 23| 3.49 | 1.016| 299.233         |
| Negatively affects human health during spray   | 18| 48| 26| 159| 49| 3.57 | 1.121| 207.700         |

During a survey in India, 58% of drinking water samples drawn from various hand pumps and wells around Bhopal were contaminated with Organo Chlorine pesticides above the Environmental Protection Agency (EPA) standards (US EPA, 2001). pesticides have a severe negative impact on underground water, during the survey it is observed water has been contaminated due to pesticides usage and respondents also informed that the water position is not the same after applying pesticides the man evidence is statistical measure provide result 72.500 with probability value 0.00 is highly significant it indicates water has contaminated due to pesticides usage. (Agrawal et al 2010) There are organochlorines, which are utilized as pesticides. These pesticides are the least biodegradable and their utilization is prohibited in numerous countries. Other than this reality, organochlorines are much utilized in numerous places in the world. This outcome has real health hazards. Water contamination is on the ascent because of these pesticides, even at low fixation, these pesticides have a danger to the environment Environmental pollution is the major problem of the world, there is the major influence of pesticides to make it polluted, in this research also observed that pesticides have polluted environment with chi-square value does not fall in the critical region and p-value is highly significant. Biological life and human health are also affected with test statistic values 299.233 and 207.700 lies so far to the region and probabilities values 0.000 < 0.05 those are indicating that biological life and human health are also disturbed by using of those pesticides on the various crops, foods.

**Conclusion**

This study was carried out to know the PERCEPTION of cotton growers regarding pesticide utilization on cotton crops and the toxic effects of pesticides on the cotton plant as well as the environment. The results of statistical analysis are indicating that cotton growers have adequate knowledge about the harms of pesticides and they apply the necessary precaution of pesticides while using the spray. They can choose proper pesticide products for disease and have good knowledge of crop diseases and dosages of pesticides. it is also observed that they were traditionally skilled they had not got training in pesticide application. Instructions about pesticide applications and expiry of the date of pesticide product were read and followed by them, after applying pesticides face and hands were washed by them immediately. Toxic effects of pesticides were found on the growth of a plant, branches of a plant, roots of a plant, fertility of the soil, and friendly insects which were damaged badly due to excessive usage of pesticides.
Besides, pesticides are a key factor to pollute the water and environment they have contaminated the water and environment because of that biological life and human health is also affected negatively.

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