

PERCEPTION OF COTTON FARMERS ON THE EFFECTS OF PESTICIDE USE

ABSTRACT

Pesticide use is said to have contributed significantly to the food security though, with the decline in crop production and post-harvest losses, there is a growing concern over the ill effect of pesticides on human and animal health, environment, natural resources and sustainability of agriculture production. Likert scaling technique was used to study the perception of cotton farmers on pesticide use, almost 90.83 per cent respondents felt that the pesticide use effects human health. Approximately, 52.50 per cent accepted the fact that pesticide kills other organisms and only 10 per cent of the respondents neglected it. When asked further about loss of bio diversity, soil, air and water contamination, pesticide drift and pest resurgence, majority of the respondents didn't know anything about it i.e. 48.33 per cent, 52.50 per cent, 60 per cent and 55 per cent respectively. Chi-square test was done to study the relationship between levels of perception and independent variables.

Keywords- **environment, health, perception, pesticide use,relationship**

INTRODUCTION

Cotton accounts for about 16 per cent of global insecticide usage. Almost one kilogram of hazardous pesticides is applied for every hectare under cotton. A total of one to three per cent of agricultural workers worldwide suffer from acute pesticide poisoning with at least one million requiring hospitalization each year. Characterized by a near total lack of safety measures, low quality equipment and unavailability of protective clothing and prohibitively expensive, Indian cotton production represents a highly unsafe environment within which to work. Observational

23 studies reveal a heavy toll exerted on the health of those who work with cotton pesticides and
24 chemical analysis has revealed traces of pesticide residues in blood samples taken from Indian
25 cotton labourers. Cotton undoubtedly represents one of India's most important economic,
26 nutritive and cultural commodities, but its conventional cultivation has become deeply
27 problematic, because of the external costs of its impact on health and environment (EJF, 2007,
28 ejfoundation.org/report/deadly-chemicals-cotton).

29 Over the past decade, the perplexities in pest management intensified with more and
30 more insect species developing resistance to insecticides. Cotton pest management was
31 particularly affected due to insecticide resistance, which was a consequence of excessive use of
32 insecticides on the crop. Insecticide resistance rendered insecticides ineffective, thus increasing
33 the need for repeated applications, wastage of resources and consequent environmental pollution.

34 Pesticides have potential negative effects on human health, as well as adverse effects on
35 the environment. In particular, inappropriate use of pesticides has been linked with: (1) adverse
36 effects on non-target organisms (e.g., reduction of beneficial species populations), (2) water
37 contamination from mobile pesticides or from pesticide drift, (3) air pollution from volatile
38 pesticides, (4) injury on non-target plants from herbicide drift, (5) injury to rotational crops from
39 herbicide residues remained in the field, (6) crop injury due to high application rates, wrong
40 application timing or unfavorable environmental conditions at and after pesticide application
41 (Damalas and Eleftherohorinos 2011, Eleftherohorinos, 2008). About 19.4 per cent of the
42 respondents had experienced negative side effects on health after handling pesticides. The
43 symptoms include headache, weakness, dizziness, fever, blurred vision, and nausea/vomiting.
44 Most of the respondents are aware of pesticide-related symptoms and possible routes of
45 absorption during application of pesticides. Farmers make only short-term assessments of

Comment [CK1]: There is not exist in reference list

46 pesticides and spray these chemicals without taking proper protective clothing (Shetty *et al.*,
47 2011).

48 METHOD

49 In Karnataka, cotton is grown in 8.75 lakh hectare with 23.12 lakh bales of production and 1793
50 metric tonne of pesticide consumption during 2014-15. Dharwad district of Karnataka occupying
51 an area of 90,497 ha under cotton was purposively selected for the present study. Three taluks i.e
52 Navalgund, Kundagol and Hubli were selected based on maximum area under cotton cultivation.
53 Two villages from each taluk were selected based on the highest number of cotton farmers and
54 maximum area under cotton. Twenty cotton farmers from each village were post stratified into
55 small, medium and large farmers proportionately making a total sample of 120. Primary data on
56 various aspects of sample farmers for 2016-17 agricultural year was collected through field
57 survey by the interview and recall memory method with the help of a pre-tested and well-
58 structured schedule in the month of November and December 2016. Simple averages and
59 percentages were calculated for tabulation of the collected data. Likert scaling, which is a
60 psychometric scale is the most widely used approach to scaling responses in surveys. This
61 technique was used to assess the perception of farmers on the effects of pesticide use in cotton.
62 The response to each perception aspect was recorded as strongly agree (5), agree (4), neutral (3),
63 disagree (2) and strongly disagree (1). To get an overall perception, total scores of all five
64 responses was summed up into three major levels high (45-60), medium (29-44) and low (12-28)
65 perceptions. The relationship between the levels of perception and independent variables was
66 tested using Chi-square test in SPSS version 16.0.

Comment [CK2]: Convert to the hectare and bales

Comment [CK3]: What is unit % etc.

69 **Table 1 Levels of perception**

Perception	High	Medium	Low
Scores	45-60	29-44	12-28

70

71

RESULTS

72 Farmers perception towards pesticide externalities and health effects was measured in relation to
 73 cultural, mechanical and chemical plant protection aspects by Likert scaling. Likert scaling,
 74 which is the most widely used psychometric scale in survey research, was applied in this study.
 75 Answer categories for these statements was based on a five-category Likert scale, going from 1
 76 (strongly disagree) to 5 (strongly agree). The survey results are presented in Table 2.

77 Almost all respondents interviewed believed that it is important to use pesticides wisely
 78 because of its harmful effects on human and environment. This is a welcome finding from the
 79 perspective of reducing the hazards of pesticides. About 9.16 per cent strongly agreed and 81.16
 80 per cent agreed that the pesticide use cause effects on human health. The respondents were well
 81 aware that pesticides are harmful to the environment and human health. Approximately, 4.16 per
 82 cent strongly agreed and 48.33 per cent agreed the fact that pesticide kills other organisms (e.g.
 83 beneficial insects, birds, earthworms and fish), only 8.33 per cent and 5.83 per cent of
 84 respondents neglected the fact. When asked further about loss of bio diversity, soil, air and water
 85 contamination, pesticide drift and pest resurgence, majority of respondents didn't know anything
 86 about it i.e. 48.33 per cent, 52.50 per cent, 60.00 per cent and 55.00 per cent respectively. Most
 87 of the respondents agreed that pesticide contamination is due to misuse of pesticides i.e. 25.00

88 per cent strongly agreed and 37.50 per cent agreed. Regarding the fact that also pesticide is the
89 solution for pest problem i.e. 27.50 per cent and 41.66 per cent strongly agreed and agreed
90 respectively. 8.33 and 37.50 per cent strongly agreed and agreed to the fact that use of pesticides
91 increase levels of crop yield. Most of the farmers were of the opinion that pesticides were less
92 effective and this persuades them to overuse pesticides. Many respondents were in the habit of
93 eating, drinking and smoking during spraying, 45.00 percent of farmers didn't know about
94 pesticide toxicity. Most of the respondents were unaware of the long term effects of pesticide use
95 and disagreed and strongly disagreed to it were 40.00 and 24.16 per cent, 37.50 and 25.00 per
96 cent experienced short term illness. Farmers were unaware of long term effects of pesticides on
97 health, beneficial insects, predators, crop and livestock, but they were aware of short term
98 illnesses due to pesticide exposure.

99 To get an overall perception, total scores of all five responses was summed up into three
100 major levels i.e. high (45-60), medium (29-44) and low (12-28) perceptions. The relationship
101 between the levels of perception and the types of farmer was found that there is a positive
102 relationship between the levels of perception and all independent variables with Pearson Chi-
103 Square value of 10.91. Factors that had positive relationship were type of farmer, age, education,
104 family size, family type and income. Factors significant at one per cent were age and income.

105
106
107
108
109
110

S.No	Farmers Percep. perception	Strongly a Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Str. ongly d Disagree (1)
1	Pesticides can cause damage to human health	11 (9.16)	98 (81.16)	7 (2.5)	3 (2.5)	1 (0.83)
2	Pesticides will not only reach the target organisms but will also kill other organisms (e.g. beneficial insects, birds, earthworms, fish) in and around the crop fields	5 (4.16)	58 (48.33)	45 (37.50)	10 (8.33)	2 (1.66)
3	Pesticides cause loss of biodiversity, deaths of wild life, and death of farm animals.	3 (2.50)	30 (25.00)	58 (48.33)	22 (18.33)	7 (5.83)
4	Soil, air and water bodies can easily be contaminated with these poisonous chemicals	8 (6.66)	42 (35.00)	63 (52.50)	5 (4.16)	2 (1.16)
5	Spraying of pesticides during the hottest part of the day when volatilization or drift can damage other garden plants, including our neighbor's.	1 (0.83)	16 (13.33)	72 (60.00)	29 (24.166)	2 (1.66)
6	Pesticides usage causes resurgence of pest population after removing natural enemies.	3 (2.50)	24 (20.00)	66 (55.00)	24 (20.00)	3 (2.50)

Formatted: Left

Formatted: Left

Formatted Table

Formatted: Font: 10 pt

Formatted: Line spacing: Multiple 1.15 li

Formatted: Font: 10 pt

Formatted: Line spacing: Multiple 1.15 li

Formatted: Font: 10 pt

Formatted: Line spacing: Multiple 1.15 li

Formatted: Font: 10 pt

Formatted: Line spacing: Multiple 1.15 li

Formatted: Font: 10 pt

Formatted: Line spacing: Multiple 1.15 li

Formatted: Font: 10 pt

Formatted: Line spacing: Multiple 1.15 li

Formatted: Font: 10 pt

7	A major factor of pesticide contamination is the misuse of pesticides	30 (25.00)	45 (37.50)	36 (30.00)	5 (4.17)	4 (3.33)
8	Pesticide use only solves pest problem	33 (27.50)	50 (41.66)	30 (25.00)	7 (0.58)	1 (0.83)
9	Use of pesticides increase levels of crop yield	10 (8.33)	45 (37.50)	40 (33.33)	23 (19.16)	2 (1.16)
10	Eating, drinking and smoking in the field causes increased pesticide toxicity	1 (0.833)	20 (16.66)	54 (45.00)	30 (25.00)	15 (12.50)
11	Long term negative effects of pesticides	5 (4.16)	10 (8.33)	28 (23.33)	48 (40.00)	29 (24.16)
12	Symptoms of acute poisoning with pesticides	30 (25.00)	45 (37.50)	34 (28.33)	7 (5.83)	4 (3.33)

Note: Figures in parentheses indicate percentage to the total

In this study, old farmers had high level of perception as they cared more about their health from Table 3. Higher the income level, higher was the level of perception and hence these farmers had taken proper precautions and used protective clothing. Factors significant at five per cent were different size group farmers and education, where small farmers had low perception than large farmers. Education is the most important factor to determine the level of perception and so higher the education of farmers, higher was their level of perception.

Similar results were also found in Adeola (2012) where the Chi-square results showed that age, education, farming experience and extension contact variable were the significant factors associated with farmers' perception. However, household size had no significant relationship with farmers' perception.

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt, English (United States)

Formatted: Indent: Left: 0", Add space between paragraphs of the same style, Line spacing: Multiple 1.15 li

Formatted: Font: 10 pt, English (United States)

Formatted: Font: 10 pt

Formatted: Font: 10 pt, English (United States)

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt, English (United States)

Formatted: Font: 10 pt, English (United States)

Formatted: Font: 10 pt

Formatted: Font: 10 pt

Formatted: Font: 10 pt, English (United States)

Formatted: Font: 10 pt

Formatted: Font: 10 pt, English (United States)

Formatted: Font: 10 pt

Formatted: Font: 10 pt, English (United States)

Formatted: Font: 10 pt

Formatted: Font: 10 pt, English (United States)

Formatted: Font: 10 pt

Formatted: Font: 10 pt, English (United States)

Formatted: Font: 10 pt

Formatted ... [2]

Formatted ... [1]

Formatted: Font: 10 pt

Formatted: Line spacing: Multiple 1.15 li

Formatted: Font: 10 pt

Formatted: Line spacing: Multiple 1.15 li

Formatted: Font: 10 pt

Formatted: Line spacing: Multiple 1.15 li

Formatted: Font: 10 pt

Formatted: Line spacing: Multiple 1.15 li

Formatted: Font: 10 pt

Formatted: Line spacing: Multiple 1.15 li

Similar results were found with Selvarajah and Thiruchelvam (2007) in their study where most of the farmers were unaware of the ill effects of pesticides on human health and their opinion was that pesticides are less effective and this makes them to overuse pesticides. Farmers awareness about long term effects was very low, with about 11 per cent of the sample population having an understanding of short term as well as long term effects of pesticides while 36 per cent

Table 3 Relationship between levels of perception and independent variables

S.No.	Independent variables	Pearson Chi-Square	Degrees of freedom	p values
1	Different size group farmers	10.91*	4	0.02
2	Age	12.88**	4	0.01
3	Education	15.93*	8	0.04
4	Family size	5.54	4	0.23
5	Family type	0.63	2	0.73
6	Income	19.46**	4	0.01

*- Significant at the 5per cent level. **- Significant at the 1per cent level

and 53 per cent are in low and medium level of perception. Positive relationship was seen in case of age of crop, income and farming type and negative relationship in case of education, experience, labour, land extent and price of pesticide with farmers level of perception.

134

DISCUSSION

135 From the above Likert scaling technique, farmers were aware of the ill effects of pesticides but
136 were of the opinion that pesticides are inevitable and were unaware of long term effects and pest
137 resurgence. Farmers were found to have medium perception level. Factors influencing levels of
138 perception were different size group or type of farmer, age, education and income.

139

140

CONCLUSIONS

141 Almost, all respondents interviewed believed that it is important to use pesticides wisely because
142 of the harmful effects on human and environment, and most of them also accepted the fact that
143 pesticide kills other organisms. Majority of the respondents didn't know anything about loss of bio
144 diversity, soil, air and water contamination, pesticide drift and pest resurgence. There is a need to
145 disseminate pest management information including technologies to increase the awareness
146 among farmers and consumers about the ill effects of pesticide use. The farmers may be
147 encouraged to use eco friendly pesticides which not only helps farmers to increase their income
148 but also reduces the health and environmental effects caused by pesticides use.

149

150

LITERATURE CITED

151 Adeola RG. Perceptions of environmental effects of pesticides use in vegetable production by
152 farmers in Ogbomoso, Nigeria. Global Journal of Science Frontier Research Agriculture
153 & Biology. 2012. 12(4).

154 **Damalas** CA and Eleftherohorinos IG. Pesticide exposure, safety issues and risk assessment
155 indicators. International Journal of Environmental Research and Public Health. 2011.
156 8:1402-1419.

157 **EJF**. The deadly chemicals in cotton. A report by Environmental Justice Foundation (EJF).
158 (2007). ejfoundation.org/report/deadly-chemicals-cotton.

159 **Selvarajah** A and Thiruchelvam S. Factors affecting pesticide use by farmers in Vavuniya
160 district, Tropical Agricultural Research. 2007. 19:ss380-388.

161 **Shetty** PK, Hiremath MB, Murugan M and Nerli RB. Farmer's health externalities in pesticide
162 use predominant regions in India. World Journal of Science and Technology. 2011.
163 1(4): 01-11.

Font: 10 pt, English (United States)

Font: 10 pt, English (United States)