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Demographic survey on pesticide applicators in chilli production in the Guntur district of Andhra Pradesh

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Abstract

In this study, the survey was conducted on pesticide applicators in Chebrolu Mandal of Guntur district to understand the mode, frequency and type of pesticide used, related health aspects and constraints in using protective garments.

Keywords: applicators, demographic profile, pesticides, chillies

1. Introduction

Chillies are generally grown in both Kharif and Rabi seasons. Crop season in study area indicated that 75 per cent of farmers cultivate it in Kharif while only one-fourth of them in Rabi season. Four varieties of chilli are produced in the fields of these 102 applicators. Byadgi, the most popular variety is grown by majority (70) of them. LCA-235, a high pungency variety and Endo-5—an Indo-American variety was grown by equal number of farmers (20) and only 10 farmers grew Sindhuri, a thick-skinned variety. As per the observation only men were involved without wearing protective garments and accessories in spraying activity. Most of the respondents used stick and hand while mixing of pesticides in the study area. None of them aware about precautionary measures while spraying pesticides. A total of 76 pesticide active ingredients were found to be in use during the survey period. The majority of the farmers acknowledged that pesticides were harmful to their health (71%) and the environment (65%). However, farmers' level of knowledge of pesticide safety is insufficient. Knowledge deficits included the poor use of PPE and other safety measures, and the improper storage and disposal of pesticides. Over 70% of the farmers did not read or follow pesticide label instructions, and 58% did not use any personal protective equipment (PPE) when handling pesticides and a significant number (82%) of the farmers reported at least one symptom of acute pesticide poisoning (Jallow *et al.*, 2017).

Due to irrespective of spraying, certain health problems were found in spray men *viz.*, dizziness (74.5%) and headache (58.8%) were the most common health problems found among the farmers. Skin irritation (19.6%), nausea (13.7%), paraesthesia (9.8%), restlessness (5.8%), eye irritation (5.8%) and vomiting (1.9%) were also reported by pesticides handlers (Lamichhane *et al.*, 2019). Even in washing practices, after spraying majority of them wash their hands and legs only and worn regular clothing while spraying. Most of them worn lungi and shirt, wrapped head with towel and no one worn even chappals for foot protection. Then high number of subjects suggested clothing was full covered garment which is given protection from pesticides exposure. Hence, the survey was conducted to know the pesticide applicators awareness about Pesticides Protective Practices, health aspects, washing practices respectively.

2. Material and methods

A field survey was conducted on 120 pesticide applicators in Narakoduru, Salapadu, Suddapalli and Vejudla, which are the predominant chilli growing villages of Chebrolu Mandal in Guntur District and these villages, were selected based on the preliminary data available with the Department of Agriculture, Guntur District of Andhra Pradesh. This survey was carried on face to face survey with pesticide applicators to understand the needs and problems specific to pesticide application in chilli pest management.

Questionnaire was developed for pesticide applicators which consists of six major aspects *i.e.* demographic profile, pesticide usage practices, clothing aspects including their preferences for

protective wear, health aspects of workers, washing practices followed for clothing and storage practices.

3. Results and discussion

Face to face personnel interviews was conducted with the help of specially designed schedules and totally 120 men involved in pesticide application its related problems were noticed. The survey results inferred that in case of male the age group of 40-50 years actively participated in the spraying operation. Majority of them studied primary education in the study area. 81.7 % farmers having the land holding capacity ranged from one to five acres with spraying experience of more than five years (70.8%). The age group of 40-50 years having the more experience in the spraying operation.

Further the knowledge about commonly used pesticides, formulations, symbols, spray fluid preparation and their usages in the chilli crop production were studied in the selected area. Perusal of the data indicated that nearly thirteen pesticides *viz.*, Phosphamidon, Monocrotophos, Dimethoate, Chlorpyrifos, Pyriproxyfen, Acephate, Carbendazim, Chlorantraniliprole, Carbaryl, Dicofol, Tracer and Carbathion were majorly used by the farmers in the study area and among the 13 pesticides, Acephate, Monocrotophos, Carbendazim + Mancozeb, Chlorantraniliprole and Dicofol were used by majority of the farm holdings. Of the 13 chemical pesticides mentioned, it was observed that one extremely toxic pesticide, three highly toxic, one moderately toxic and the rest less toxic in nature (as listed in WHO Hazard Class) were handled by the pesticide applicators during each chilli crop season.

Eighty per cent of them are aware of the symbols printed on the containers and only 20per cent do not know about them and that the 90per cent of the subjects do follow precautions as suggested by the manufacturer. A small percentage of farmers were found using both hand and stick and a meagre percentage of them do hand stirring. Sai *et al.* (2019) in his study found that 22 per cent of applicators were mixing pesticides with hand. All the subjects indicated that pesticide application is done by spraying method and used emulsifiable concentrates followed by granules and powder formulations and a combination of formulations.

3.1 Mode of Application, Frequency, Time, Duration and Exposure to Pesticides

From the applicators response it was found that majority of them use pesticide tins for mixing or diluting pesticides, while a few (12.5 per cent) of them use household utensils for this purpose. Almost 17 per cent of them revealed that they use

both used pesticide tins and household utensils while the least number use water storage cement tanks. Using household utensils is not only unsafe but increases the chance of higher exposure of the family members.

a. Mode and frequency of application

All the formulations were applied with Taiwan power sprayer. Spraying activity was done using power sprayers i.e., backpack sprayers with a tank capacity of 10-20 litres by all the subjects under study. The data pertaining to the pesticide application frequency for pest management in the study area indicated that 63.3 per cent farmers applied twice in week, 28.3 per cent farmers thrice in week and 8.3 per cent of farmers once in week (Table 1). Among 120 farmers, majority of them (44.2 per cent) would spray after 3 pm, while nearly 31 per cent of them after 8 am and roughly 17 per cent of them would spray after 6 am.

b. Duration of exposure

During the application of different pesticides formulations, applicators are directly or indirectly exposed to the spray fluids with exposure duration ranging from one hour to six hours per day in the study area. A high exposure of 5 hours was seen among 38.3 per cent of farmers followed by an equal number of farmers exposed for 6 hours and 4 hours respectively. Only 10 per cent of them were exposed for 2 hours and 8.3 per cent of them for 3 hours (Table 1). This indicated that spraying is always carried out for more than one-hour duration. The numbers of hours depend on the acreage. Generally, farmers take one hour to spray an acre of crop. Though all the applicators said that they follow wind direction during spraying, observations made during the spray operation showed that spraying was done sometime in opposite direction also.

c. Exposure in crop season

The crop period of chilli ranges from 120-150 days depending on the variety grown. Based on this it can be observed that nearly 22-26 week time is required for the crop from time of sowing to complete harvest. If pesticides are sprayed at the rate of a minimum of 2 hours a week, it would amount to an average of 48 hours for the entire crop period. This indicates the exposure of applicators to pesticides. The data reveals that some of them spray nearly 6 hours per day and calculating the total exposure leads to almost 120 to 122 hours for the entire crop period.

Table 1: Frequency of spraying and period of exposure of pesticide applicator in the study area

(n=120)

S. No.	Spraying frequency	No. of Persons involved	Duration of exposure per day	No. of persons involved
1	Once in fortnight	-	1 hour	8 (6.7)
2	Once in week	10 (8.3)	2 hours	12 (10)
3	Twice in week	76 (63.3)	3 hours	10 (8.3)
4	Thrice in week	34 (28.3)	4 hours	22 (18.3)
5	-	-	5 hours	46 (38.3)
6	-	-	6 hours	22 (18.3)

(Figures in parenthesis indicate percentages)

3.2 Awareness on Protective Clothing

a. Awareness

Questions on awareness of protective clothing indicated that of 120 subjects, 87 farmers were not aware of protective

clothing during pesticide application while only 33 of them are aware of protective clothing (Table 2). It was visible from the data that

Table 2: Awareness on protective clothing

(n=120)

S. No.	Awareness on protective clothing	No. of persons involved
1	Yes	33 (27)
2	No	87 (72.5)

(Figures in parenthesis indicate percentages)

Table 3: Source of pesticide information and Protective clothing suggested by subjects

(n=120)

S. No.	Pesticide information	No. of persons involved	Type of protective clothing suggested	No. of persons involved
1	Information available on the container/tins	-	Full body cover	120 (100)
2	From the leaf let enclosed with the product	-	Covering only back of the body	-
3	Local Land lord	4 (3.3)	Covering only head & chest	-
4	Scientists/Dept. officials	10 (8.3)	Covering face, head and chest	-
5	From the Shop-keeper	24 (20)	-	-
6	From neighbouring farmers	49 (40.8)	-	-

(Figures in parenthesis indicate percentages)

b. Knowledge and use of protective clothing

Hundred per cent of applicators suggested 'full body cover' when asked their suggestion for protective clothing while spraying (Table 4). But this practice is not seen in actual situations. This implies that they are aware of the effect of pesticide poisoning to their health.

Only 24.2 per cent of farmers said that protective clothing is supplied when they purchase pesticides while majority said that there was no such supply. A meagre percentage of them agreed that despite being provided by the manufacturer, they do not use it during spraying operation as it was uncomfortable for them (Table 4). All the farmers discouraged that no specific instructions were provided by the pesticide manufacturer regarding cleaning and washing of protective clothing.

Table 4: Supply of protective clothing by pesticide manufactures

(n=120)

S.No.	Manufacturer's supply	No. of persons involved
1	Yes	29(24.2)
2	No	91(75.8)

(Figures in parenthesis indicate percentages)

3.3 Clothing Aspects

In addition to the preliminary information regarding demographic, chilli crop management and plant protection clothing aspects of pesticide applicators in chilli crop were also collected and discussed in the following sub-heads

a. Opinion and practice about protective clothing

Opinion on wearing of protective clothing by pesticide applicators in chilli crop management indicated that 78.3 per cent farmers expressed positive opinion in wearing the protective clothing while spraying, while 26.8 per cent applicators had negative opinion. The later group of farmers have opinioned different reasons for not using them such as, not known (8.3 per cent), not available in market (6.7 per cent) and not comfortable (5.8 per cent) and only one farmer said that they are expensive to buy (Table 5). Discomfort in using PPE was the reason found by Jallow *et al.*, (2017) while studying the knowledge and safety practices of Kuwait farm workers.

Applicators received the information from neighbouring farmers (40.8 per cent) followed by shop keepers (20 per cent), and finally from department officials. They did not obtain information either from labels available on the containers or from leaflets enclosed with the product (Table 3).

Table 5: Reasons for not wearing protective clothing

(n=120)

S. No.	Reasons	No. of persons involved
1	Do not know	10 (8.3)
2	Expensive	1(0.8)
3	Not available	8 (6.7)
4	Not comfortable	7(5.8)

(Figures in parenthesis indicate percentages)

3.3 Clothing type used in regular spraying operation

a. Garment type used

To fulfil the one of the objectives i.e., designing of suitable protective clothing to applicators, data on type of clothing worn by them was collected, analysed and tabulated. The analysed data revealed that majority of them (40 per cent) wore dhoti, shirt and turban, 30.8per cent wore lungi and shirt and 22.5 per cent wore other type of clothing and a small percentage of them (6.7per cent) wore Shots and shirt also during spraying operation (Table 6). Similar findings of wearing shorts and shirt were observed by Phukan *et al.* (2016) when they studied sprayers working in tea garden in Jorhat district of Assam. Results indicated that the first group had protection of head but not scalp region which a very important area for absorption. The lower body portion was partly covered. The second and third groups were highly exposed, to pesticides during their 1 to 6 hours of spraying operation. Though 100 per cent of applicators suggested full body cover during spraying, they do not follow in practice and are exposed to harmful effects of pesticides.

Table 6: Clothing worn by applicators while spraying

(n=120)

S. No.	Type of clothing	No. of persons involved
1	Kurtha & pyjama	-
2	Shirt and turban	-
3	Dhoti & full hands shirt and turban	48 (40)
4	Shorts & shirt	8 (6.7)
5	Shorts, shirt, and turban	-
6	Dhoti alone	-
7	Lungi & shirt	37 (30.8)
8	Any other	27 (22.5)

(Figures in parenthesis indicate percentages)

b. Head protection

Out of 120 pesticide applicators interviewed, 106 applicators (88.3 per cent) said that they cover the head while spraying pesticides on chilli crop and that they use a towel to wrap around the head. As seen from table 6 it is evident that only 40 per cent use a turban while others do not use any headgear during the activity. It can be construed that though they are aware of head protection, they do not follow proper measures while spraying thereby exposing themselves to harmful chemicals.

3.4 Comfort and fit factors in regular clothing

a. Comfort

Collected and tabulated data on comfort factors of their

Table 7: Reasons for discomfort in regular clothing

(n=120)

S. No.	Reasons	No. of persons involved
1	Interferes with work	18 (15)
2	Not comfortable to work	16 (13.3)
3	Does not cover the whole body	49 (40.8)
4	Do not feel cool	18 (15)
5	Shirt- too long too short	19 (15.8)
6	Pant- too long too short	-
7	Any other reasons	-

(Figures in parenthesis indicate percentages)

b. Fit of clothes

As many farmers/applicators were wearing dhoti, shirt and turban, their clothing had loose fit. It was observed and was also expressed by them that 66.7 per cent of them had regular clothing with loose fit, 30.8 per cent had medium fitted clothes and the rest of them (2.5 per cent) had tight fit in their regular clothes.

3.6 Fabric type used in regular clothing and practices about clothing and accessories used in spraying

Since most of the farmers were not aware of the type of fabric

regular clothing during pesticide spraying indicated that highest number of applicators (82.5 per cent) expressed that they are not comfortable with regular clothing while almost 37.5 per cent said that they were satisfied. Those applicators who were uncomfortable with regular clothing have expressed different reasons. Most of them stated that regular clothing does not cover the whole body (40.8 per cent), 15 per cent said that it interferes with work and an equal number said that they do not feel cool in regular clothing, while 13.3 per cent expressed that it is not comfortable to carry out the operation with their present clothing style (Table 7).

used in their clothing, random visits during spraying operation and personal observations were made to assess this characteristic. It was observed that a large group of people, 58.8 per cent wore clothes made of cotton/polyester blend while 38.4 per cent wore both cotton and polyester clothes. It was seen that 100 per cent cotton and 100 per cent polyester was worn by 36 per cent and 10.8 per cent respectively (Table 8).

Table 8: Fabric type in regular clothing and Protective accessories used

(n=120)

S. No.	Fabric type	No. of persons involved	Protective accessories	No. of persons
1	Cotton	30 (36)	Undergarments	114(95)
2	Polyester	9 (10.8)	Masks for nose and mouth	-
3	Cotton/Polyester	49 (58.8)	Goggles	-
4	Both cotton and polyester	32 (38.4)	Turban/cap	6(5)
5	-	-	Foot wear	-
6	-	-	Gloves	-
7	-	-	Any other	-

(Figures in parenthesis indicate percentages)

3.7 Practices about clothing and accessories used in spraying

a. Clothing

Most of the applicators (80.8 per cent) revealed that they use separate clothes while spraying and use only them during every spraying operation while 19.2 per cent applicators said that they use regular clothing while spraying pesticides and that they do not keep clothing separate after spraying. Farmers who follow the norm of separate clothing exclusively for pesticide spraying indicated that they use old unused garment for this operation. This indicates that precautions are not being followed in using clothing which may lead to many health issues of the individuals and their family members in the long run.

b. Accessory use

Observations made during the study revealed that majority of the applicators were not using any particular protective accessory along with clothing. The data and results depicted in table 4.15 indicated that 95per cent applicators wore under garments and 5per cent subjects wore a turban while spraying. Except these two items, they do not use any protection to eyes, nose, hands, and foot. When asked about the type of foot protection they follow during spraying activity, it was found that they do the operation without wearing any foot wear. Similar findings were observed by Singh and Gupta (2009), among workers in Ahmednagar. It was observed that 35% were spraying barefooted, 93% of the respondents were not using goggles and 33% were not using gloves during

spraying.

This aspect is extremely dangerous as absorption rate of pesticides at the ball of human foot is 1.6, which is higher than the rate of absorption of palm and forearm.

3.7 Garment design preferences in protective clothing

Observations and inferences from the interview data revealed that pesticide applicators are exposed to the poison of pesticides through lack of proper clothing and accessories. Comfort factor plays a greater role in the successful usage of a garment. Hence intervention in this regard can be made from the opinion and preferences of subjects. Subjects were shown pictures and were explained about garment features like hoods, masks, closures, sleeve styles, pant styles and footwear for a better understanding so that the choice is done. Explanation of various parts of the garment along with their merits and protection offered was done. Discussion was held by the researcher so as to make the applicator understand the importance of body protection from harmful pesticides. Accordingly, data was collected and tabulated to help design a new garment with greater protection factor and with the preferences of subjects in garment detailing. Collected data is discussed below.

a. Garment type

From the findings in the table 4.16, it was found that 75.8 per cent applicators preferred two-piece garment and only 24.2 per cent preferred one-piece (shirt attached to bifurcated pant) garment. Among two-piece garment, shirt and pant were preferred by all 120 applicators.

b. Upper garment

All of them preferred an ordinary shirt to double breasted one. Full length shirt was preferred by 80 per cent of applicators

while nearly 12 per cent of them preferred shorter length and 8.3 per cent also preferred elastic at the waist of the shirt. Full sleeve length was preferred by majority of them to short length and 3/4th length. However, nearly 26 per cent of them recommended to have elastic at the wrist region of the sleeve. Nearly 67 per cent of applicators chose a regular sleeve, 32.5 per cent favored raglan sleeve and one subject preferred detachable sleeve. Many applicators suggested to design garment so that they do not feel suffocated but comfortable during their spraying operation.

c. Pockets-number, size and placement

Another important feature of the shirt was pocket. Its size, number and placement choice was made by the applicators. Results showed that 63.3 per cent applicators chose medium pocket size, 26.7 per cent a bigger one and other remaining 10 per cent subjects preferred small size pocket. Regarding placement of pockets at the side or front of shirt, 73.3 per cent applicators wanted pocket placed on front side of the shirt for keeping things conveniently. Majority i.e. 72.5 per cent applicators preferred two pockets and 27.5 per cent subjects chose to have only one pocket.

d. Closures

Closures details from survey showed that Velcro was preferred by 60 per cent of subjects, zipper closure was selected by 20.8 per cent applicators, 10.8 per cent chose pressing studs and only 8.3 per cent applicators asked for buttons to shirt closure.

e. Hood

Incase of head covering, all the subjects' preferred only attached hood to the shirt and none accepted detachable hood.

Table 9: Preference of garment features by subjects

(n=120)

S. No.	Garments features	No. of persons involved
1	Garment type	
	a. One piece (With bifurcated pant)	29 (24.2)
	b. Two piece	91 (75.8)
2	Shirt features	
	i. Shirt type	
	a. Double breasted	-
	b. Ordinary	120 (100)
	ii. Shirt length	
	a. Long	96 (80)
	b. Short	14 (11.6)
	c. Elastic at waist	10 (8.3)
	iii. Sleeve length	
	a. Full	107 (89.1)
	b. Short	2 (1.6)
	c. 3/4 th	11 (9.1)
	d. Elastic at wrist	31 (25.8)
	iv. Sleeve type	
	a. Regular	80 (66.6)
	b. Raglan	39 (32.5)
	c. Detachable	1 (0.83)
	v. Pocket-Size	
	a. Large	32 (26.7)
	b. Medium	76 (63.3)
	c. Small	12 (10)
	vi. No. of pockets	
a. One	33 (27.5)	
b. Two	87 (72.5)	
c. Three	-	

	vii. Placement of pockets	
	a. Side	32 (26.6)
	b. Front	88 (73.3)
	viii. Closures	
	a. Buttons	10 (8.3)
	b. Zip	25 (20.8)
	c. Velcro	72 (60)
	d. Press studs	13 (10.8)
	ix. Hood	
	a. Attached	120 (100)
	b. Detachable	-
	Pant features	
	i. Pant length	
	a. Full length	110 (91.6)
	b. Full length with elastic at ankle	10 (8.3)
	ii. Pant style	
	a. Regular fit	120 (100)
	b. Loose fit	-
	Shoes	
	a. Strap on shoes	90 (75)
	b. Gum boots	30 (25)
	Hand protection	
	a. Chemical resistant gloves	120 (100)
	b. Fabric	-
	c. Knitted	-
	Eye protection	
	a. Goggles	120 (100)
	Nose and mouth protection	
	a. Beak	120 (100)
	b. Pleated	-

(Figures in parenthesis indicate percentages)

f. Pant style

Among the two styles of pants, loose fit and regular the regular fit was chosen by all the subjects through their regular garments loose fit. This may be because of their difficulty in rendering the activity with loose fit.

g. Foot wear

Between two types of shoes, strap on shoe variety was greatly preferred over gum boots. Seventy five per cent of them chose strap-on variety while gum shoes were preferred by the rest of the subjects.

h. Hand protection

Fabric, knitted and chemical resistant gloves were given for the choice by the subjects for hand protection. Hundred per cent of them preferred only chemical resistant gloves over knitted and fabric variety.

i. Eye and nose protection

All of them chose goggles for eye protection and when two

types of masks (beak and pleated masks) were shown to subjects, beak mask was chosen by all 120 subjects (Table 9).

Health Aspects

Some of the general health condition and other conditions/symptoms relevant to pesticide poisoning were suggested in the questionnaire based on available secondary sources.

3.8 Health issues while mixing and loading pesticide and Incidence of health problems

a. Health issues while mixing and loading pesticide

When questioned if any discomfort feeling was encountered while mixing and loading of pesticide, it was found that 96 per cent of them expressed discomfort during this activity. The type of discomfort was indicated differently as headache, dizziness,

Table 10: Discomfort during mixing and loading of pesticide and incidence of health problems

(n=120)

S. No.	Type of discomfort	No. of persons involved	Years suffered	No. of persons involved
1	Dizziness	14 (11.7)	0-5	22 (18.3)
2	Excess salivation	23 (19.2)	5-10	78 (65)
3	Excess sweating	21 (17.5)	10-15	12 (10)
4	Itching	22 (18.3)	15-20	8 (6.6)
5	Burning sensation	10 (8.3)	-	-

(Figures in parenthesis indicate percentages)

Salivation, itching etc. It was evident from the data that 20.8 per cent applicators had experienced headache, 19.2 per cent had excess salivation, 17.5 per cent suffered excess sweating, 18.3 per cent applicators had itching, 11.7 per cent subjects

reported dizziness and burning sensation was experienced by the least number of people (8.3 per cent) (Table 10). b.

Incidence of health problems

Pesticides symptoms of poisoning may not be evident after 1st or 2nd spray. Incidence of health problem may occur after a year or two or even after a long period of time. To assess the applicators onset of health issues related data was collected. Collected data revealed that many were suffering with health issues for the past 5-10 yrs. while 18.3 per cent revealed that it was in the past 5 years, they were facing the problem. A meagre percentage of them have observed that pesticide spraying has affected their health in the past. 15-20 yr. Overall it was clear all the subjects had an issue of health due to pesticide spraying (Table 10).

3.9 Health issues during and after spraying

Poisoning with pesticides in humans range from minor health issues to sometimes fatality based on the type used and period of time used. Certain symptoms may be under diagnosed and applicators may not confer attention on it.

A list of common health problems/conditions were presented to the subjects before and after spraying operations. All the subjects expressed their health issues they found during and after spraying operation. Perusal of data indicated that burning sensation, excessive salivation, itching, headache, nausea, blurred vision, excessive sweating were the conditions revealed in descending order or importance by subjects. Burning sensation and excessive salivation were reported by more than 50 per cent of the applicators followed by itching sensation they felt while spraying pesticides on the crop. Symptoms of headache and nausea were faced by 38.3 and 36.6 per cent of the subjects. Excessive sweating and blurred vision were faced by nearly 23 per cent of the target group. Breathlessness was the next symptom that was scored by 8.3 per cent of the subjects. However, none of them faced symptoms of loss in appetite, high blood pressure and diarrhea.

Table 11: Health conditions of applicators during and after spraying pesticides

(n=120)

S. No.	Health problems	During spraying	After spraying
1	Headache	46 (38.3)	53 (44.1)
2	Nausea	44 (36.6)	32 (26.6)
3	Vomiting	8 (6.6)	24 (20)
4	Loss of appetite	-	51 (42.5)
5	Blurred vision	27 (22.5)	11 (9.1)
6	Skin allergy	5 (4.1)	46 (38.3)
7	Scorching	4 (3.3)	16 (13.3)
8	Excessive sweating	27 (22.5)	16 (13.3)
9	Rise in BP	-	4 (3.3)
10	Gastrointestinal problems	-	46 (38.3)
11	Diarrhoea	-	-
12	Hand tremors	2 (1.6)	-
13	Itching	48 (40)	67 (55.8)
14	Burning sensation	65 (54.1)	63 (52.5)
15	Breathlessness	10 (8.3)	3 (2.5)
16	Excessive salivation	62 (51.6)	30 (25)
17	Any other	-	-

(Figures in parenthesis indicate percentages)

Health issues were also revealed by subjects after completing the spraying operation. A higher percentage (55.8 per cent) had symptoms of itching after spraying. Next higher number of applicators scored to burning sensation and headache after itching. Before spraying there was no symptom of loss in appetite, and gastro-intestinal problems, but it was reported by 42.5 per cent and 38.3 per cent of the target group respectively after completion of spraying. Higher incidence of symptoms of vomiting, skin allergies and scorching or blistering were reported after spraying than before spraying of pesticides (Table 11).

Regarding medical support, only 10 members among 120 members informed that they would consult the doctor on the onset of symptoms. They also apprised that they do not generally treat the conditions on their own but consult a local

homeopathic doctor.

3.10 Opinion of farmers on pesticide usage and health and Cleanliness after spraying

a. Opinion of farmers on pesticide usage

A mixed response was observed regarding pesticide usage and health among subjects. It is a well-known fact that pesticides usage can also affect non pest organism i.e. humans and creates health problems. Review of the data indicated that 11.7 per cent applicators expressed that pesticide usage has no effect, 35.8 per cent expressed that there is an effect but cannot explain, 12.5 per cent expressed that effect can only be seen in the long run and 31.7 per cent expressed that they do not know if there is an effect or not (Table 12).

Table 12: Pesticides usage and health and Cleanliness after spraying

(n=120)

S.No.	Opinion on pesticides usage	No. of persons involved	Personal cleaning after spraying	No. of persons involved
1	Has no effect on health	14 (11.7)	Immediately take bath	22 (18.3)
2	Has effect but I cannot explain	43 (35.8)	Only hand wash	40 (33.3)
3	Health effects were seen in the long run	15 (12.5)	Only leg wash	5 (4.1)
4	I do not know	38 (31.7)	Both a & b	38 (31.6)
5	-	-	No special attention	15 (12.5)

(Figures in parenthesis indicate percentages)

Around 50 per cent of applicators are aware of health issues arising due to pesticide usage and require full protection to overcome this; they do not wear proper protective clothing. This shows that there is a wide gap between knowledge and practice.

b. Cleanliness after spraying

When asked about how they clean themselves after spraying, majority (33.3%) of the spray men agreed that they only hand wash after spraying. Thirty one per cent of the applicators expressed that after spraying they wash both hands and legs. Fifteen per cent of the applicators reported that no special attention is given to washing after spraying of pesticides (Table 12).

Table 13: Frequency of washing pesticide contaminated clothing and Mode of washing the clothes

(n=120)

S. No.	Frequency	No. of persons involved	washing	No. of persons involved
1	After every spray	90 (75)	Self	6 (5)
2	After alternative spray	30 (25)	House wife	108 (90)
3	Weekly	-	Dhobi	2 (1.7)
4	Fortnightly	-	Any other	4 (3.3)
5	Monthly	-	-	-
6	Discard clothes after each spray	-	-	-
7	Discard after season	-	-	-

(Figures in parenthesis indicate percentages)

b. Mode of washing

Applicators have informed that their wives wash the clothes (90%) while only 5% wash on their own and a small percentage is done by the dhobis as well (Table 14). It was surprising to note that nearly a little above 9% informed that pesticide contaminated clothing is washed using only water and no other detergent or chemical is used. While the other 90% wash them properly with detergent or soap.

Regarding the method employed in washing the clothes, soaking, washing and drying method was followed by 49.2% followed by beating, rinsing and drying method. A lower percentage of 16.7% followed kneading, squeezing, and drying method (Table 14).

Table 14: Method of washing the clothes used while spraying

(n=120)

S. No.	Method of washing	No. of persons involved
1	Kneading, squeezing, rinsing and drying	20 (16.7)
2	Beating, rinsing, and drying	41 (34.2)
3	Soaking, washing and drying	59 (49.2)
4	Any other	-

(Figures in parenthesis indicate percentages)

c. Pesticide effect on quality of fabric

When asked if any aftereffects of pesticides were observed on quality of clothing fabric, 85.8% agreed that various quality effects were observed. Many people (58.3%) agreed that there was colour loss, 55% said that they could smell off odours from clothing, 38.3% informed that there was a reduction in durability of fabric, 21.7% indicated that many holes and tears appeared very soon and finally 7.5% said that they could see a bleached effect on clothing (Table 15).

3.11 Washing Practices

a. Frequency of washing

Spraying pesticides on crop, mixing, loading and other pesticide related activities tend to soil clothing worn next to body. Poisonous chemicals if left on clothing can penetrate the wearer creating various health issues. Proper washing eliminates its removal from clothing.

Results regarding frequency of washing clothes used during pesticide spraying indicated that 75% of them washed after every spray and 25% after alternative spraying. It was also disclosed by them that all clothing after spraying are washed at home (Table 13).

Table 15: Effect on quality of fabric due to pesticides

(n=120)

S. No.	Kind of effects	No. of persons used
1	Colour loss	70 (58.3)
2	Bleached	9 (7.5)
3	Holes and tears	26 (21.7)
4	Off odours	66 (55)
5	Durability	46 (38.3)
6	Any other	-

(Figures in parenthesis indicate percentages)

4. Conclusions

Based on the information obtained and consolidated, it was understood that pesticide applicators needed clothing for protection from pesticide exposure. It was found that they prefer clothing or garment with features they favour besides the priority factor of comfort. It was suggested that it should be easy to put on and take off and should not obstruct or slowdown their spraying work. Other concern they showed was the cost of garment. They wanted a low cost, comfortable garment.

5. References

- Jallow MF, Dawood GA, Mohammed SA, Vimala YD, Binson MT. Pesticide Knowledge and Safety Practices among Farm Workers in Kuwait: Results of a Survey. International Journal of Environmental Research and Public Health 2017;14(4):340.
- Lamichhane R, Lama N, Subedi. Use of Pesticides and Health Risk among Farmers in Sunsari District, Nepal. Journal of Nepal Health Research Council 2019;14(42):66-70.

3. Phukan AR, Choudhury S, Gogoi M. Designing and construction of protective clothing for tea garden worker of Assam. *International Journal of Humanities and Social Sciences* 2016;5(6):1-8.
4. Sai MVS, Revati GD, Ramya R, Swaroop AM, Maheswari E, Kumar MM, *et al.* Knowledge and perception of farmers regarding pesticide usage in a rural farming village, Southern India. *Indian Association of occupational Health* 2019;23(1):32-36.