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# Hazards Association with the Spraying of Pesticides to Chilli and Brinjal in the Jaffna District

S. Gnanachandran and C. Sivayoganathan

Dept. of Agricultural Economics, Faculty of Agriculture,
University of Peradeniya.

*ABSTRACT. Intensified agriculture in the Jaffna district depends on high levels of pesticide use. In 1985, 85% of the total admissions and 21% of admissions to the emergency unit in the Jaffna hospital were due to acute poisoning by pesticides.*

*In a socio-economic survey conducted among randomly chosen 180 farmers growing both chilli and brinjal during Maha 1986/87 and Yala 1987, nearly one-third were victims of pesticide poisoning while the others were either neighbours or labourers. The main causes were inadequate protective clothing, neglecting wind direction, spraying for a long time in hot weather, consuming food and drink during spraying, improper methods of disposal of empty pesticide containers and carelessness in reading the label. Poverty and job completion in a day are social problems encountered.*

*Educational programs and registering of spraying operators may assist to a great extent, in overcoming the above problems.*

## INTRODUCTION

The Jaffna district comprises a major portion of the Jaffna peninsula and is located in the northern part of Sri Lanka. It covers an area of 1036.8 sq.kms. of which the land area comprises of 951 sq.kms. and the balance is lagoons (Balasundarampillai and Rupamoorthy, 1987). The land is flat and the highest altitude above sea level is 15 meters. This district has subterranean streams that help the development of agriculture and sustain a heavy concentration of people.

Agriculture is the major occupation of the people. Out of the total land area of 95,096 hectares, 26,200 hectares are under cultivation.

Today the farmers of this district are spending large sums of money on pesticides to control pests affecting their crops. Pesticides, being freely available, are used lavishly by these farmers who are obvious of the dangers of over-exposure both to themselves and to the environment. The increasing number of deaths by pesticide poisoning and the dangers posed to the environment by the indiscriminate use of pesticides are now a subject of concern among the medical and environmental sector. Wooten (1987) pointed out that the excessive and careless use of agro-chemicals in Sri Lanka has directly led to cancer, leukaemia, liver disease and kidney ailments. He further disclosed that pesticides are even responsible for miscarriages, child deformity and sterility among men and women in Sri Lanka. According to Senanayake and Karalliedde (1986) in Jaffna in 1985 the 446 patients affected by pesticide poisoning formed 0.88 percent of total admissions to the hospital for acute poisoning and 21% of admissions to the emergency unit. This does not take into account those cases who took treatment at private clinics and cases that do not seek medical treatment. They further stated that the peak incidence was in February with a lull in August being apparently related to the pattern of pesticide use in the district. Indiscriminate use and carelessness with respect to the precautions in the application of pesticides have led to health hazards among the farm family and hired sprayer operators. A study was, therefore, conducted to find out whether the farmers were aware of the hazards of pesticide poisoning and the extent to which they adopted the necessary precautionary measures.

## MATERIALS AND METHODS

Data for the study was collected from a sample of highland farmers cultivating both brinjal (vegetable) and chilli (cash crop) in the jaffna district by personal interviews through the use of structured questionnaires. The items included in the questionnaires were based on the objective of the study and the preliminary information gathered by the researcher through the visits made to the study area in *Maha* 1986/87. In constructing the questionnaire items, both open and closed ended questions as well as statements were utilized wherever appropriate.

The population consisted of all the farm families in the Jaffna district. In view of the various constraints time, money and related factors only 6 of the 12 agricultural instructor ranges were selected

randomly. The list of farmers was obtained for each selected agricultural instructor (AI) range. Only the farmers growing both chilli and brinjal were considered for the study. Of these farmers a sample of 30 was drawn from each selected AI range. Therefore, the total sample consisted of 180 farmers.

The farmers in the study area were fully informed about the purpose and objective of the study and how it would be conducted. Special efforts were made to inform everyone that the anonymity of individual responses would be maintained. Data were collected by single, personal interviews by the researcher. Questionnaires were administered, in private, either in the farm or the homes of the respondents during 1987. Cooperation was very good with interview times extending from one to one and half hours. The data were then analysed by using simple non-parametric statistics.

## RESULTS AND DISCUSSIONS

### Pesticide spraying

It was found that nearly 80% of the farmers themselves do the spraying. Farmers preferred to do the spraying themselves because of the high cost involved in the labour for spraying and the inefficient job done by hired labourers. As the hired labourers were paid for the number of tanks they sprayed, it was observed that the labourers had the orifice of the nozzle enlarged so that the liquid in the tank drained out quickly. This led to inefficient spraying which in turn led to non-control of the target organisms effectively.

About 81% of the farmers used knapsack sprayers with various tank capacities ranging from 2.0 gallons to 5.0 gallons. Some of the tanks were locally turned out. Only 2.78% of the farmers possessed power sprayer while 16.11% of the farmers were using a double piston handsprayer where a clay pot is used instead of a plastic or brass tank.

Almost all the farmers read the label on the pesticide bottles before using the pesticide. However, as indicated in Table 1, about 94% of the farmers read only two of the seven items in the label.

Table 1. Items on label read by farmers (N=180).

| Items on label | % farmers |
|---|---|
| Trade name | 95.56 |
| Dosage | 93.89 |
| Precaution | 68.89 |
| Pests to apply | 65.56 |
| Chemical name | 8.33 |
| Pre-harvest interval | 7.22 |
| Active ingredient | 3.89 |

As revealed in Table 2, only half the farmers were using the measuring cup. This cup was obtained by the farmers 5-10 years back when they bought the pesticide Ekadax. This cup was supplied free of charge with the pesticide. It is astonishing to see that the farmers have preserved these cups and are using them still. The majority of farmers who used the bottle lid were faced with the risks of contamination with pesticides while measuring with these lids.

Table 2. Measurement of liquid pesticides by farmers (N = 180).

| Measuring device | % farmers |
|---|---|
| Bottle lid | 68.89 |
| Measuring cup | 49.44 |
| Ink bottle | 1.67 |
| Others | 0.56 |
| Total | 120.56* |

(* Multiple response, column total > 100%)

## Health hazards

Farmers' knowledge of the health hazards associated with the use of pesticides was determined by requesting them to respond to a set of statements. The responses appear in Table 3.

Table 3. Farmers' knowledge of the health hazards associated with pesticides (N = 180).

| Statement | % farmers | |
|---|---|---|
| | Agree | Disagree |
| Pesticides are not bad for health | 16.67 | 83.33 |
| Spraying pesticides with bare body | 18.89 | 81.11 |
| Usage of mouth to clear nozzle blockage | 23.33 | 76.67 |
| Using a sprayer with a leaking tank | 21.67 | 78.33 |

The majority of farmers agreed that pesticides were bad for health. But those who disagreed were of the opinion that even though they had been using pesticides for a long time they did not feel any bad effects. This may be because of adopting the necessary precautions in handling pesticides.

The farmers, in general, felt that spraying operations could not be done with bare body. Also, some of these farmers reported that earlier they had been engaged in spraying operation and exposure to pesticides had made them allergic to spraying. Yellow eyes, brittle nails, weak body with respect to their age were some symptoms observed in these farmers. Some of the other farmers, however, indicted that they were even immune to pesticides.

In fact a quarter of the farmers were ignorant of the serious exposure to pesticides dripping on their backsides where penetration into the body is high.

Almost all the farmers (97%) transported the pesticide from the shop to the field in a separate bag. Furthermore, it was revealed that

the pesticides were usually wrapped by the salesman in a shopping bag before handing over to the farmers. The introduction of shopping bags for wrapping has helped indirectly to minimize any pesticide accidents that may occur in the transport.

Of the 180 farmers interviewed 145 farmers did their own spraying. It is gratifying to note that most of these farmers (95%) did not smoke or chew betel during spraying operations; one third, however, reported drinking tea or other beverages.

A quarter of the farmers indicated that agricultural produce ready for the market could be sprayed with pesticide. They were of the opinion that during washing and cooking the pesticide residues diminished. Thus they felt that the consumers were not endangered. Table 4 indicated that of those 100 farmers engaged in green chilli production, 84% harvested their crop within a week of spraying pesticides. The same trend was observed in brinjal too. However, for most pesticides the pre-harvest interval is at least a week. Futhermore, as a rule, food processing (cooking, boiling, cleaning and removal of the non-edible parts) induces a decrease, on the average, of only 10% in the amount of residues (Anonymous, 1987). Consequently the short period of pre-harvest interval leads to pesticide residues reaching the consumers.

Table 4. Pre-harvest interval adopted by farmers.

| Pre-harvest interval (in days) | Chilli (N=100) | | Brinjal (N=180) | |
|---|---|---|---|---|
| | % farmers | Cu % | % farmers | Cu % |
| < 1 | 3.23 | 3.23 | 6.67 | 6.67 |
| 2 - 3 | 28.00 | 31.33 | 42.22 | 48.89 |
| 4 - 7 | 52.67 | 84.00 | 46.67 | 95.56 |
| 8 - 10 | 10.00 | 94.00 | 3.35 | 98.89 |
| 11 - 15 | 6.00 | 100.00 | 1.11 | 100.00 |
| Total | 100.00 | | 100.00 | |
| | Mean = 5.49 | | Mean = 4.00 | |
| | SD = 10.18 | | SD = 4.53 | |

Nearly 68% of the farmers indicated that they sold the empty pesticide containers to the ice cream vendor or nadar who collected these containers. Also, about one-third of the farmers reported that they simply threw away the empty pesticide containers in a corner in their fields. It was revealed that the children of the labourers usually collect these containers and exchange them for ice-cream. It was observed that stacks of pesticide bottles were dumped at a corner of the farming plot or rest hut. The farm children are exposed to great danger by the above two practices, *viz.*, dumping and selling pesticide bottles. These have led to pesticide poisoning incidents among children.

Ninety-one percent (165) of the farmers were aware of pesticide poisoning incidents and nearly 39% reported of such incidents occurring within the previous year. Furthermore, 30% of the respondents themselves were victims and other victims were either neighbours or labourers.

Main causes of the incidents were spraying for a long time in hot weather, drinking or eating while spraying and neglecting wind directions during spraying operations (Table 5).

Table 5. Main causes of pesticide poisoning reported by farmers (N = 165).

| Causes | % farmers | Cu % |
|---|---|---|
| Hot weather and long exposure | 49.09 | 49.09 |
| Drinking/eating/smoking during spraying | 15.55 | 63.64 |
| Wind direction and long exposure | 9.09 | 72.72 |
| Wounds on the body | 6.06 | 78.79 |
| High concentration of spray liquid | 6.06 | 84.85 |
| Sprayer leakage | 4.24 | 89.09 |
| Nozzle spray splashing on face | 2.42 | 91.51 |
| Wearing pesticide soaked clothes | 1.82 | 93.33 |
| Spraying with bare body | 1.21 | 94.54 |
| Others | 5.46 | 100.00 |
| Total | 100.00 | |

The farmers had to spray for a long time in hot weather and windy days due to the following reasons:

(i) Farmers want to finish spraying the plots in one day.

(ii) These farmers have to go to the market and sell their produce on market days. They return back to their fields only around 9:00 a.m. and start spraying. Consequently, most of the spraying is done during the hot period of the day.

(iii) In case of hired labourers, as they are paid on the basis of number of tanks sprayed, they tend to continue spraying throughout the day to earn more.

(iv) As the farmers or labourers have to spray for a long time, resorting to drinking, eating or smoking during spraying operations is unavoidable. Furthermore, as the operators have to spray before and after lunch they tend to stay with the wet clothes throughout the day till spraying operations are over.

Of the chemical types associated with the poisoning incidents, organophosphorus group of pesticides appear to be the most significant. This was also reported by Senanayake and Karaliedde (1986).

Nearly 47% of farmers were of the opinion if they could tell the name of pesticide to the doctor instead of taking the bottle with the victim to the hospital, the doctor would be able to treat the victims. However, it should be noted that the doctor cannot keep himself abreast of all the different types of pesticides in the market.

## RECOMMENDATIONS

Any measure recommended to avoid pesticide contamination and to reduce hazards has to be associated with farmer's social environment. Some measures that could be implemented are:

(i) Launching of an effective propaganda to educate the farmers to avoid the use of bottle lids to measure pesticides. It may be useful to supply free measuring cups with the bottles of pesticides. The farmers will accept with pleasure the measuring

cup free of charge and utilize it rather than buying it for a nominal fee. An alternative is to distribute the measuring cups one each only to those farmers who have registered at the nearest agricultural instructor's office and followed a training class on usage of pesticides. The farmers should, of course, be advised not to use these cups for any other purpose and to keep them out of reach of children.

(ii) Highlighting in the television, radio, newspapers and farmer magazines incidents of bad effects on health experienced by farmers who had sprayed pesticides without any consideration to protective clothing.

(iii) Encouraging the farmers to wash at least their hands and face with soap before partaking a meal or drink during spraying operations.

(iv) Setting up a unit to analyze the pesticide residues in consumable agricultural produce and highlighting the findings to the general public. Information on pesticide residues not destroyed during washing and cooking process should be disseminated.

(v) Pesticide legislation inspectors should enforce the legislation on pre – harvest interval strictly.

(vi) Advising all farmers to bury the empty containers. Selling empty pesticide containers to vendors should be strictly prohibited.

(vii) Enacting legislation to register all hired sprayer operators. These operators should ne provided with free protective clothing as they cannot afford to purchase the clothing. The registered pesticide sprayer operators should be required to undergo acetyl choline test at regular intervals and free medical advice and assistance should be rendered to them.

The above measures, if implemented effectively, will help reduce health hazards associated with the spraying of pesticides to chilli and brinjal.

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