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Assessment of Exposure of Pest Control Operators to Pesticides in Selected Centres in Nigeria

J.I. OLAIFA,

Department of Plant Science, Obafemi Awolowo University, Ile-Ife, Nigeria (Accepted 14 January, 1991)

ABSTRACT

The study is a profile of a sample of 135 pest control operators (PCOs) from 24 Federal and State Institutions, private and multinational companies in Nigeria with regard to their training, experience on the job, relative use of spraying equipment, work outfit, personal hygiene and health complaints. Majority (83%) of the PCOs were adults between 30-50 years of age, who learned on the job. The PCOs engaged mainly in the control of field insect pests (48.1%) and weeds (27.4%). About 50.0% worked part-time and 41% worked only during the rainy season. Rubber boots and overalls were the most popular clothing items and only 24.1% of the PCOs were fully satisfied with their work outfit. Improvements were needed on the shirt and trousers and on the cap for PCOs dealing with tree crops. Up to 54.2% of their work outfits were washed along with their household laundry. The commonest spraying equipment used were knapsack sprayers which after use were cleaned by 77.1% of the PCOs themselves or by 22.9% of the junior workers. Symptoms suspected to be related to pesticide exposure have been experienced by about 29% of the operators, yet 94.3% have never had their cholinesterase level tested. These findings are discussed in relation to pesticide legislation, education and training in Nigeria.

INTRODUCTION

Pest control operators (PCOs) are the persons who take as their profession the job of controlling pests (insects, rodents, weeds, fungi, molluscs, birds, bacteria, etc.) with chemicals. They hardly utilize any other method of control in their operations. Hazards of handling and applying insecticides, rodenticides, herbicides, fungicides, molluscides, avicides, bactericides, which are potent poisons are associated with their job. In Nigeria, these groups of workers are found in Universities, Research Institutes, few Government ministries and chemical companies. In big cities, there are very few private companies which engage in commercial pest control ser-

vices. Such companies restrict their activities to house-hold and structural pest control. The PC0s are thus a unique group of people appropriate for pesticide exposure studies because they are continually exposed to toxicants. In Nigeria, studies like this are very scanty in the literature despite increased usage of pesticides in agriculture and public health. Wright and Liedy (1980) have reported the insecticide residues in the air of buildings and pest control vehicles in the USA. Also in the USA, Hayes *et al.* (1980) have assessed occupational exposure to organophosphates in the PC0s and Talley (1973) at the University of Oklahoma, has documented occupational health hazards experienced by PC0s in parts of the USA. This study is a report of the training experience, personal hygiene, health complaints, individual habits, use and care of equipment and clothing by pest control operators in Nigeria.

MATERIALS AND METHODS

The study areas included Oyo, Lagos, Ondo and Kaduna States of Nigeria. At least one PC0 in the following institutions participated in the study: National Cereals Research Institute, Ibadan; International Institute of Tropical Agriculture, Ibadan; Institute of Horticultural Research, Ibadan; Department of Agricultural Biology, University of Ibadan, Ibadan; Cocoa Research Institute of Nigeria, Ibadan; Crop Research Station, Ilora; Farm Settlement, Ilora; Araromi Farms Limited, Ipetu-Jesha; Home Gardens, Ilesha; Oyo State College of Education, Ilesha; National Seed Service, Ibadan; Fabson Farms Limited, Ilesha; Onibonoje Farms, Ijebu-Jesha; Prudene Farms, Ijebu-Jesha; Farm Settlement Esaoke; Farm Institute Esaoke; Obafemi Awolowo University, Ile-Ife, Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife; National Institute of Trypanosomiasis Research, Kaduna; Swiss Nigeria Chemical Company, Lagos; Adeyemi College of Education, Ondo and Federal University of Technology, Akure. A questionnaire was designed to probe the PC0's social background, description of duty, training and experience, realistic exposure conditions, individual habits, dressing habit and choice of work outfit, relative use of equipment and health complaints. Letters to each participant explained the aim and scope of the questionnaire and invited the cooperation of the participants in the project. Personal visits were made to each institution concerned by either the author or the undergraduate vacation students who were hired to distribute the questionnaires. All the questionnaires were therefore hand-delivered. Completed questionnaires were also picked up personally. This enabled the collector to

further pursue vague answers. In few cases, the completed questionnaires were mailed to the authors. Responses of the PC0's were grouped into 8 categories of Training and experience, description of duty, dress, food habit at work, safety percaution, use and care of equipment, health complaints and personal background information.

RESULTS

Background Information on the PC0s

All the PC0s sampled were males, totalling 135 respondents out of which 104 (77%) were married. As table 1 indicates, more PC0s fell into the 40-49 year old category than any other category. Table 2 shows the height and weight distributions respectively of those surveyed. More than half (57%) were 1.80-1.89m tall while 40% of them weighed 50-59kg.

Training and Experience

Only 8.6% of all interviewees were recruited as PC0s. The others were either not employed originally as PC0s (80%) or did not have their job scheudles properly defined when they were initially employed (11.4%).

Table 3 shows that 8.9% of the PC0s did not complete primary education. If the latter group is added to those who possess only the primary school leaving certificate, they represent 40% of the

Table 1: Age and Marital Status of Pest Control Operators in selected parts of Nigeria

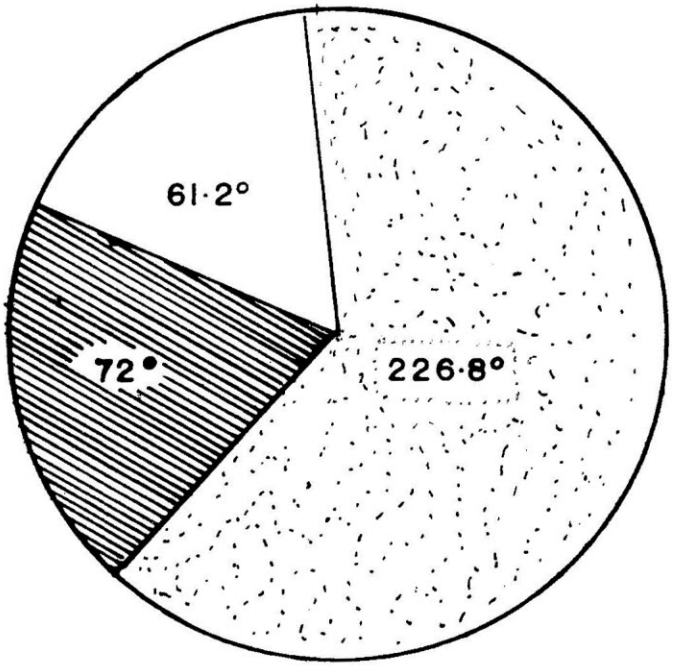
Age (year)	Frequency	% Relative Frequency
0-19	-	-
20-29	20	14.8
30-39	43	31.9
40-49	69	51.1
50-59	3	2.2
60	-	-
Total	135	100.0

Table 2: Distribution of pest control operators by height and weight in selected parts of Nigeria.

	Height (m)				Weight (kg)					
	1.50-1.69	1.70 1.79	1.80-1.89	1.90	50-59	60-69	70-79	80-89	90-100	100
Frequency	43	13	74	-	54	27	13	18	23	-
% Relative Frequency	33	10.0	57.0	-	40	20	9.6	13.3	17.0	-

Table 3: Distribution of Pest Control Operators by Educational Attainment

Category	Frequency	Relative Frequency (%)
Primary Education not completed	12	8.9
Primary Six completed	42	31.1
Modern III Certificate	12	8.9
West African School Certificate	50	37.1
Tertiary Institution Certificate	19	14.1
Total	135	100.0



University or Polytechnic courses in pest control

Organised Training and short term courses

Self Taught and/or by working with someone

Sample size = 135

Fig. 1: Pie Chart of relative frequencies of methods used to train PCOS

PCOs interviewed; 14.1% of all interviewees were either Higher National Diploma holders or University graduates. As indicated in Figure 1, majority of the PCOs (63%) learned on the job or by under-studying an expert. Approximately 17% of the PCOs learned about pesticide application while in the University or Polytechnic, while the remaining 20% learned through organised training and short-term courses. In terms of experience, 46.7% of all interviewees have been on the job for over 12 years while only 14% of the PCOs have been on it for less than 3 years (Table 4). As indicated in Table 5, 71.1% of the PCOs relied on their coworkers for current information on new developments related to pest control work.

Description of Work

Table 6 shows that majority (48.1%) of the PCOs sampled were engaged in the control of field insect pests. Approximately 14% were involved in the control of structural and household insect pests, some 27.4% were engaged in the control of weeds and only about 5% were engaged in the control of pests of ornamentals.

As indicated in Table 7, only few (9.0%) worked full time, i.e. 8 hours daily, Monday to Friday. Approximately half of the respondents worked 4 hours per day in a five-day week, while 41% claimed they had varying work schedules depending on the growing season that was being considered.

Dress

As indicated in Table 8, rubber boots and overalls appeared to be the most popular clothing items used by the PCOs sampled. Only about 24.1% of the PCOs interviewed were fully satisfied with their present mode of dressing. Although, most of them (57.9%) agreed that they were adequately dressed for pesticide application work they nonetheless felt that some improvements were needed (Table 9). However, it is interesting to note that those PCOs dealing with tree crops were more concerned about the cap or hat. A good number of the PCOs (54.2%) washed their work outfit along with their household laundry. A weekly washing of the work outfit was strongly favoured, daily washing was done by 37.5% of the interviewees.

Food

Cigarettes, sweets and kolanuts were consumed by 2.9%, 2.9% and 5.8% of the PCOs, respectively during working hours. These snacks were carried inside the shirt chest pockets (2.9%), overall pockets (2.9%) and trousers' pocket (5.8%) of the PCOs.

Table 4: Distribution of Pest Control Operators by Length of Service

Length of Service (Year)	Frequency	Relative Frequency (%)
Less than 1	4	2.9
1-3.9	15	11.1
4-6.9	15	11.1
7-8.9	19	14.1
9-11.9	19	14.1
Over 12	63	46.7
Total	135	100.0

Table 5: Distribution of Pest Control Operators by Source of Information

Source	Frequency	Relative Frequency (%)
Informed discussion with co-workers	96	71.1
Presentations at Meetings or Conferences	16	11.9
Technical Publications on Pest Control	23	17.1
Total	135	100.0

Table 6: Distribution of Pest Control Operators by Main Pesticide Application Job.

Main Job	Frequency	Relative Frequency (%)
Control of Field Insect Pests	65	48.1
Spraying mostly for Household Insects	12	8.9
Spraying mostly for Termites	7	5.2
Control of Ornamental Pests	7	5.2
Spraying to control Weeds	37	27.4
Others*	7	5.2
Total	135	100.0

*Others include: bio-assay tests in the laboratory and laboratory work involving the use of pesticides.

Table 7: Frequencies of Undertaking Pesticides Application Activity by Pest Control Operators.

Category	Frequency	Relative Frequency (%)
8 hours/day: 5 days a week	12	9.0
4 hours/day: 5 days a week	67	50.0
Others*	55	41.0
Total	134	100.0
Missing Case	1	

*Others include those who work full time or half-time only during the growing season (April-October).

Table 8: Frequency of Use of Protective Clothing by Pest Control Operators during Pesticide Application.

Clothing	No. of Cases	% of Respondents	% of Responses
Overalls	24	68.6	21.4
Cap/Hat	13	37.1	11.6
Jacket	7	20.0	6.3
Eyeglasses	18	51.4	16.0
Light weight gloves	16	45.7	14.3
Rubber boots	29	82.9	25.9
Cover shoes	4	11.4	3.6
Slippers	1	2.9	0.9
Total	112	320.0	100.0
Missing Cases	23		

Table 9: Responses of Pest Control Operators on Adequacy of Dressing for Each Spraying Operation

Response	Frequency	Relative Frequency (%)
Yes; Satisfied	32	24.1
Nearly satisfied, but improvement needed	77	57.9
Not satisfied	24	18.0
Total	133	100.0
Missing Cases	2	

Equipment

The commonest equipment used by the PC0s interviewed was the compressed air (Knapsack) sprayer. It was used by approximately 60% of the respondents. Other spraying equipment used in order of importance included the boom sprayer, power sprayer, Ultra-low-volume sprayer and electrodyn sprayer (Table 10). These equipment were carried by various means to the work site.

Used along with these equipment are different types of measuring devices for the pesticides. The common measuring devices included measuring cups (80%), match boxes 17.1%) and table spoons (8.6%).

After use, the equipment are cleaned either by the PC0s themselves (77.1%) or by other workers (22.9%) presumably suspected to be junior workers within the establishment. Only

Table 10: Frequencies of Use of various pesticide application equipment by Pest Control Operators

Types of Equipment	Frequency	Relative Frequency
Compressed Air Sprayer	73	54.1
Power Sprayer	17	12.6
Boom Sprayer	28	20.7
ULV/cda	10	7.4
Electrodyn	7	5.2
Total	135	100.0

Carriage in the rear compartment of a service vehicle was the most popular means; 40% of the PC0s interviewed used this method. Approximately 37% of the PC0s carried their equipment on motorcycles with another person sitting at the back holding the equipment, while only 5.7% carried their equipment on their head to the worksite.

37.1% of the PC0s used detergents regularly to clean their equipment and about the same proportion (34.3%) cleaned/serviced their equipment on a regular basis.

Health Complaints

Approximately 29.0% of the PC0s interviewed have been disturbed at one

time or the other by symptoms suspected to be related to pesticide exposure. These symptoms include rashes, drowsiness, irritation along breathing passages, chest pain, vomitting and itching. There were no cases of chloracne or cancer, although about 5.7% of the respondents reported that they were being treated for gastric ulcers. Only 15.6% of the PC0s took sick leave of 4-7 days in the last one year. Very few (5.7%) of the PC0s have ever had the cholinesterase levels determined. About 13% of them received hazard allowances, but this category work for a multinational chemical company.

DISCUSSION

This study showed that the overwhelming majority of the PC0s surveyed were adults between 30 to 50 years of age, who had been on the job for at least 7-12 years. Only a negligible proportion of them were self-employed. The above profile reflects the present situation in Nigeria where a high proportion of the PC0s are employed by Federal or State Government institutions. This is in sharp contrast to the experience in other countries. In the USA for instance, of the 2623 certified pest control operators in New York State, only 8% were found to be sales representative, government and institution workers (Health and Spittler, 1982). This shows that pest control work is really a profitable vocation which should be attractive to many entreprenurs in Nigeria.

Considering the extent of exposure to pesticides, the study showed that only 24.2% of the PC0s sampled were fully satisfied with their dressing while spraying. Majority of these workers indicated that the top dress (shirt, trousers and cap) needed improvement in terms of protection against pesticides. While this response showed a high level of awareness of the harmful effects of exposure to pesticides on the part of the PC0s, the fact that about 63% followed a one-month schedule in cleaning their work outfit and about the same proportion did not clean their equipment with detergents appeared to negate this awareness. Furthermore, more than half of the PC0s washed their work garments along with household laundry Given the fact that about 77% of the PC0s were married, it is obvious that their household members are also being exposed to the risk of pesticide related health hazards.

CONCLUSION

The study indicates that a high proportion of the pest control workers interviewed were not certified. This finding is borne out by the fact that 78% of the

PCOs were willing to participate in a short term course on pesticide application and technology. Frequently, methods of application, storage and transportation of pesticides, as well as the cleaning of the work outfit, were less than adequate. Given the present drive for increased agricultural production in Nigeria, it is likely that this development would be accompanied by increased pest problems as a result of secondary pest outbreak and resurgence. Consequently, this would create more work for the PCOs. In this regard, it is essential that proper training be given to the PCOs, and that they must be certified and protected by law. The proposed pesticide legislation for Nigeria should include provisions on certification and code of conduct for PCOs. In addition to this recommendation, public education on the hazards, handling, storage and disposal of pesticides is a major solution that can save millions of Nigerians from the health hazards of pesticides.

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