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Farmers Perception of Problems in the Cultivation of Selected Leaf Vegetables in South Western Nigeria

(Persepsi Petani Terhadap Masalah dalam Penanaman Sayur Berdaun Terpilih di Bahagian Barat Daya Nigeria)

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ABSTRACT

The development of alternative strategies for sustainable pests' management in vegetable production (using insecticides of plant origin) is particularly important in a country like Nigeria where synthetic insecticides are not readily available and farmer s are poorly equipped to handle them. This research was conducted to unravel farmers' perception of insect pest activities as a constraint to vegetable production and to ascertain the most important pests and indigenous methods of control (using plant extracts). Baseline surveys were conducted using well structured questionnaire on farmers' plots in farming communities of Akure North and South Local Government Areas of Ondo State. Results from the study affirmed, that all the farmers had the problem of pests on their farms. They have ranked Podagrica sjostedti, P. uniforma, Sylepta derogata, Dsydercus superstitiosus, *and* Zonocerous variegata *as the most important insect pests of the selected leaf vegetables:* Amaranthus hybridus, Celosia argentea, *and* Corchorus olitorius. *The results further indicated that 76% of the farmers were aware of the use of indigenous methods of control (using different plant extracts) for the control of pests. The study showed that there was no significant association between education and the use of plant extracts. However, age, sex, and farming experience influenced the use of the plant extracts for insect pest control on the respondents' farm.*

Keywords: Indigenous knowledge; insecticides; insect pest; leaf vegetables; plant extracts

ABSTRAK

Pembangunan strategi alternatif untuk pengurusan perosak secara mampan dalam penghasilan sayur-sayuran (penggunaan racun serangga berasas tumbuhan) adalah penting dalam sesebuah negara seperti Nigeria kerana racun serangga tidak mudah diperoleh dan petani tidak bersedia untuk mengendalinya. Kajian ini dijalankan untuk menghuraikan persepsi petani terhadap aktiviti serangga perosak sebagai pengehad kepada penghasilan sayur-sayuran, mengenalpastikan perosak yang paling penting, dan kaedah kawalan asli (menggunakan ekstrak tumbuhan). Tinjauan garis asas telah dikendali dengan menggunakan soal selidik terstruktur ke atas plot petani dalam komuniti petani dari Akure Utara dan Kerajaan Tempatan Kawasan Selatan negeri Ondo. Hasil kajian mengesahkan semua petani mempunyai masalah perosak dalam kebun mereka. Mereka menyenaraikan Podagrica sjostedti, P. uniforma, Sylepta derogata, Dsydercus superstitiosus *dan* Zonocerous variegata *sebagai perosak serangga yang paling penting ke atas sayuran berdaun terpilih* Amaranthus hybridus, Celosia argentea *dan* Corchorus olitorius. *Hasil kajian seterusnya menunjukkan bahawa 76% daripada petani sedar tentang penggunaan kaedah kawalan asli (menggunakan ekstrak tumbuhan) dalam pengawalan perosak. Kajian ini menunjukkan tidak ada hubung kait signifikan antara pelajaran dan penggunaan ekstrak tumbuhan. Namun, umur, jantina dan pengalaman dalam pertanian mempengaruhi penggunaan ekstrak tumbuhan dalam pengawalan serangga perosak.*

Kata kunci: Ekstrak tumbuhan; pengetahuan asli; racun serangga; sayuran berdaun; serangga perosak

INTRODUCTION

Vegetables are of good nutritional value, with considerable potential as income-generating crop and as a supplements to diet consisting mainly of carbohydrates (Chadha & Oluoch 2003). Despite the importance of these crops there are various production constraints wherever they are grown in the country, which includes high cost of input, transportation, accessibility to market and insect pests and disease infestation.

The attack by various insect pests is a major factor limiting increased production of vegetable and is the primary cause of low quality and yield (Sithanatham et al. 2003). Nigel (1980) suggested that 8.7% losses in vegetable production are caused by insects. These insect pests attack the foliage, stems, buds, flowers, fruits and seeds resulting in substantial losses of marketable yield (Beevi et al. 1992).

Ewete (1978) stated that one of the major factors limiting the yield of okra (*Abelmoschus esculentus*) in the

tropics was the range of insect pest associated with the crop. In a survey of destructive and beneficial insects and mites associated with the crop, 77 pests species were found, 43 of which are considered important (Akinlosotu 1983). Forty insect species from six orders and 19 families were further identified as insect pests of economic importance.

Most farmers, especially the small-scale farmers, who grow vegetables year round using both rain-fed and irrigation water, identified insect pest infestations as a major constraint to their production (Okunlola 2007; Olasantan 1972). Despite these problems, farmers continue to grow vegetables. It is therefore important to study farmers' perception of insect pest activities as constraints to vegetable production and the methods of control in Southwestern Nigeria.

The general objective of the study was to examine farmers' perception of problems in cultivation of selected leaf vegetables in South Western Nigeria. The specific objectives of the study include to examine the socio economic characteristics of respondents and ascertain the type of insect pests affecting respondents vegetable farms, to identify the most important pest that is affecting farmers production level and to determine the level of awareness of the use of plant extracts for the control of the pest by the farmers.

Materials and Methods

The survey was conducted in 2003/2004 during the dry season (December to March) and wet season (June to September) in the farming communities of Akure North and South Local Government Areas of Ondo State, Nigeria. Ondo State is bounded in the North by Ekiti and Kogi States, in the East by Edo State, in the West by Osun and Ogun States and in the South by the Atlantic Ocean. The state lies between 4° 30[1] and 6° 40° East of the Greenwich meridian and latitudes 5° 45[1] and 8° North of the Equator. It is located in the forest zone with two distinct seasons. The temperature ranges from 21 to 29°C, while relative humidity is high. The annual rainfall varies from 2000 mm in the Southern parts to 1150 mm in the Northern parts. The state generally enjoys luxuriant vegetation. The soil in the state is deep and very fertile; free from iron concentrates and well drained. These characteristics support the growth of leaf vegetables. The people in the state are predominantly farmers growing cash and food crops.

Vegetable farmers in Akure North and South Local Government of Ondo State formed the population for the study. Akure South and North Local Government were randomly chosen for the study. From each selected local governments two villages, where vegetable production is prominent, were purposively chosen making a total of four villages. Each of the villages was divided into four (4) wards out of which two wards were randomly selected. From each ward, 15 respondents were randomly selected and interviewed, thus making a sample size of 120 respondents. However, a total sample size of one hundred (100) were eventually used for final analysis being those who gave adequate information required during the survey

Both primary and secondary data were used for the study; the primary data were collected through the use of pre-tested questionnaire and observation technique while secondary data were obtained from relevant publications.

Data obtained from the study were analysed using frequencies and percentages. Chi square (x^2) analysis was also carried out to test for significant difference using the statistical package for social scientists (SPSS 10) computer software:

$$x^2 = \sum \frac{k}{i} = \frac{1(O_1 - e_1)^2}{e_1},$$

where O is the observed frequency, e is the expected frequency and k is the total number of cells (category).

Results and Discussion

Sixty percent of the respondents were male and 40% female (Table 1). Thirty eight percent were aged between 41 and 55 years, 34% were 26 to 40 years, 16% were less than 25 years and 12% were above 55 years which showed that 72% of the populations studied were in their active and productive age.

Forty two percent of the farmers attended primary schools, 44% had secondary school education, 6% had tertiary education, while 6% had adult literacy school education. This implied that most of them were sufficiently literate to understand some of the important research findings thereby enhancing adoption of new technologies and improving the farmers' access to information on relevant research findings. Ninety one percent of the respondents indicated farming as their primary occupation, Forty eight percent had been farming for 6 to 10 years, 27% for less than 5 years, 18% between 11 and 15 years while 6% had 16 to 20 years of farming experience. The fact that farming is their source of livelihood would engender willingness to carry out practices (research findings) that would enhance their productivity and by extension derivable income. Fifty percent of the respondents had farm size of less than 2.5 acres, 38% had between 2.5 and 5.0 acres, 10% between 5.1 and 7.5 acres and 2% above 7.6 acres. The background of these respondents further showed that most of them were small scale farmers, while about 38% were medium scale farmers which could be attributed to inadequate resources to embark on large scale farming.

Farming Activities and Vegetable Production

Seventy percent of the farmers were into crop production only, 26% into both crop and ruminant production, while 4% were into food crops and poultry production (Table 2). Most of the farmers lack the required capital to embark on large scale production. This is the general trend in Ondo State where majority are peasant farmers.

TABLE 1. Socio-economic characteristics of respondents

Characteristics		%
Sex	Male	60
	Female	40
Age	< 25	16
	26 – 40	34
	41 – 55	38
	56 and above	12
Educational Level	No formal education	2
	Adult literacy school	6
	Primary school	42
	Secondary school	44
	Tertiary school	6
Religion	Christianity	80
	Islam	18
	Traditional worshippers	2
Primary occupation	Farming	91
	Civil service	1
	Artisanal work	3
	Trading	5
	Others	6
Farm size	0.1-2.5 acres	50
	2.5 – 5.0	38
	5.1 – 7.5	10
	7.6 and above	2
Farming Experience	1 – 5 years	27
	6 – 10	48
	11 – 15	18
	16 – 20	6
	21 and above	1

Source: Field survey 2004

Sixty five percent of the farmers produce leaf vegetables only while 35% combined the production of fruit and leaf vegetables. The vegetable commonly cultivated by the farmers include: *Telferia occidentalis, Amaranthus hybridus, Abelmoschus esculentum, Celosia argentea, Solanum* sp., *Corchorus olitorius, Basella alba, Cucurbita pepo* etc. The study indicated that 54 % of the farmers cultivated *A. hybridus*, *A. esculentus* and *C. olitorius*, 42% produced a combination of *A. hybridus*, *C. argentea*, *A. esculentus* and *C. olitorus*, 2% cultivate only *A. hybridus* while 2% cultivated all the listed vegetables. Although some farmers prefer to grow vegetables as sole crops, it is common to find mixtures of different vegetables on the same piece of land. Most of the farmers practiced mixed cropping- which is the planting of two or more crops in mixtures in the same plot (Bunting 1979). This practice is common among the traditional farmers; many of them use mixed cropping as a means for better utilisation of environmental factors, greater yield stability, soil protection, variability of food supply, increasing the return per unit area and insurance against crop failure (Njoku et al. 2007).

INSECT PESTS INFESTATION AND RANKING

The D. superstitiosus and *S. derogata* as the most important pests of *A.hybridus* followed by *Zonocerus variegatus*, *Aspavia armigera* and *Gasterodisus rhomboidalis*. For *C. argentea*, *Sylepta derogata*, *Dysdercus superstitiosus*, *Zonocerus* spp. and *Lixus camerunus* were ranked as the dominant pests, while P*odagrica sjostedti, Podagrica uniforma*, *Acraea terpsichore*, and *Zonocerus* spp. were ranked as the dominant pests of *C. olitorius* (Table 3).

TABLE 2. Respondents (a) types of farming activities and (b) species of vegetables produced

(a)

Type of farming activities	%
Type of farming	70
Crop only	26
Crops and ruminant	4
Crops and poultry production	

(b) Species of vegetables produced

Types of Leafy vegetables	Frequency	%
A. hybridus, *C. olitorius*, *T.occidentale*, *Solanum nigrum* and *Abelmoshus esculentus*	54	54
A. hybridus, C.olitorius, *Basella alba*, *C. argentea* and *A. esculentus*	42	42
A. hybridus only	2	2
All of the above	2	2
total	100	100

Source: Field survey 2004

The results from the study confirmed that farmers encountered the problem of pests and diseases on their vegetable farms resulting in reduced quantity and quality and by extension derivable income. Furthermore, the most prevalent insect pests of the selected vegetables during the wet and dry seasons were *D. superstitiosus*, *S. derogata* which are leaf eating caterpillars that skeletonise the leaves. *Podagrica* spp. *Aspavia armigera*, *Acraea terpsichore* and *Zonocerus* spp. also play major roles in defoliating the leaves of these vegetables. These observations is in line with the reports of (Akinlosotu 1983; Anene 1987; Egwatu 1982; Epidi 1986; Mohammed 2002; Ogbalu et al. 2005). These pests attack the leaves and inflict much injury by making small round holes and pinching off parts of the plants thereby reducing the leaf area which affects plant assimilation and leaf surface for photosynthesis and consequently economic loss due to reduced yield (Ogbalu & Ekweozor 2002).

Table 4 shows the major insect pests affecting the vegetables cultivated. All the respondents affirmed that they had the problem of insect pests on their farms. During the wet season (June-September) most of the farmers (40%) who cultivated *A. hybridus* reported that *Z. variegatus*, *S. derogata* and *G. rhomboidalis* were the major pests on their farms, 32% indicated that a combination of *Z. variegatus, D. superstitiosus*, and *Aspavia armigera* dominated their farm while 14% asserted that leaf hopper, leaf borer and *G. rhomboidalis* were the dominant pests on their *A. hybridus* farm.

In the dry season, (December-March) a combination of *D. superstitiosus*, and *Z. variegatus*, dominated the *A. hybridus* farm of 58 % of the respondents, while 26% asserted that *Zonocerus* spp., *Aspavia armigera* were the major pests on their farm during this season.

For *C. argentea*, 26% stated that *Z. variegatus*, *S. derogata* and *Hymenia recurvalis* were the major insect pests affecting their farms in the wet season.

Thity eight percent of the respondents indicated that *D. superstitiosus*, *Zonocerus* spp. were the dominant insect pests on their *C. argentea* plots during the dry season while 28% of the respondents stated that, *Lixus camerunus* and *Zonocerus* spp. were the major pests of cultivated *C. argentea*.

During the wet season, 30% of the respondents stated that a combination of *Podagrica* spp., *Acraea terpsichore* and *Zonocerus* spp. affected their cultivated *C. olitorus*, while 12 % were affected by a combination of P*odagrica sjostedti* and *Podagrica uniforma*. The study indicated that 54% of the respondents' *C.olitorius* farms were affected by a combination of *Acraea terpsichore* and *Zonocerus* spp., while 24% stated that a combination of *Podagrica* spp. and *Zonocerus* spp affected their farms during the dry season.

Although management of insect pests in vegetables have been achieved successfully with the use of conventional pesticides, the development of pest resistance, negative impact on beneficial non-target insects, environmental pollution and problems associated with mammalian toxicity, coupled with the fact that most farmers cannot afford their use has resulted in the shift in pest control from the chemical era to the environmental era. This has necessitated the development of alternative strategies for sustainable pests' management in vegetable production (Urah 1992). The extents of awareness by the farmers in the study area were discussed below.

The result from the study as shown in Figure 1 indicates that 76% of the farmers were aware of indigenous methods for the control of vegetable pests. 42% of the farmers stated that they were aware of the use of A. *indica* leaves and (*P. guineense*) while 34% stated that they were aware of the use of some plant species such as *Diospyros affinin*, *Anamirta cocculus*, *Ananas comosus* (pineapple), that produce substances which repel or poison insects. The farmers crush and place these leaves at points of

TABLE 3. Ranking of pest infestation on respondents farm

Type of crop	Type of pest		Ranking
A. hybridus	Leaf borer	*Dysdercus superstitiosus*	1st
	Webbers	*Sylepta derogatus*	2nd
	Grasshopper	*Zonocerus variegatus*	3rd
	sting bug	*Aspavia armigera*	4th
	weevils	*Gasterodisus rhomboidalis*	5th
	Leaf Caterpillar	*Psara bipunctalis*	6th
C. argentea	Webbers	*Sylepta derogatus*	1st
	Leaf borers	Dysdercus superstitiosus	2nd
	leaf hoppers	*Zonocerus variegates*	3rd
	weevils	*Lixus camerumuss*	4th
	Caterpillars	*Hymunia recurvalis*	5th
C.olitorus	Flea beetle	*Podagrica sp*	1st
	Leaf worm	*Acraea Terpsichore*	2nd
	Leaf hopper	*Zonocerus variegates*	3rd

Source: Field survey 2004

TABLE 4. Types of pests affecting species of vegetables in respondents farm

Type of crop	Pests Wet Season	%	Dry Season	%
C. argentea	Leaf hopper, Leaf borer, webbers, weevils,	30	Leaf borer, leaf hopper, and webbers	38
	Leaf hopper, leafborer and sting bug	28	Leaf borer, leaf hopper, and webbers	28
	Leaf borer, weevils and Grasshopper	26	Leaf borer, grasshopper	
	Leaf borer, leaf hopper, and weevils	8	Leaf borer, mealy bug	16
	Leaf hopper, leaf borer and grass hopper	8	Leaf borer, leaf hopper, and sting bug.	18
C. olitorus	Leaf hopper, leaf borer, flea beetle and leaf miners, weevils.	8	Leaf borer, weevils and Grasshopper	54
			Leaf borer, leaf hopper and flea beetle	24
	Leaf borers, leaf hopper, leaf weevils and sting bug	8	Leaf borer, flea beetle and grasshopper	18
	Leaf hopper, leaf borer and flea beetle	12	No Response	4
	Leaf borer, weevils and leaf hopper	30		
	Leaf borer, weevils and Grasshopper	36		
	No response	6		
A. hybridus	Leaf hopper, leaf borer, sting bug.	32	Leaf borer, weevils and Grasshopper	58
	Leaf borer, and weevils	40	Leaf hopper, leaf borer, sting bug, webbers	26
	Leaf hopper, and leaf borer.	14.0	Leaf hopper, sting bug	2.0
	No Response	14.0	No Response	14.0

Source: Field survey 2004

impounding water so that their poison spread all over the field (Ulluwishewa 1992). Other plants which have repelling smell are *Cycas circinalis*, *Cymbopogon* sp, which the farmers believe generate smells that serves as insect pest repellant thus, they are planted around the field. During the study it was also observed that wood ash is a popular pesticide among the respondents. The ash is put in a cloth bag, tied to the end of stick and the ash sprinkled on the crop by beating the stick. Farmers also use very sticky substance derived from *Artocarpus heterophyllus* to trap some harmful insects (Akinlosotu 1983).

This study showed that there was no significant association between education and the use of plant extracts for pest control by respondents (Table 5). However, results of the association between socio-economic characteristics and use of plant extract to control vegetable pests revealed

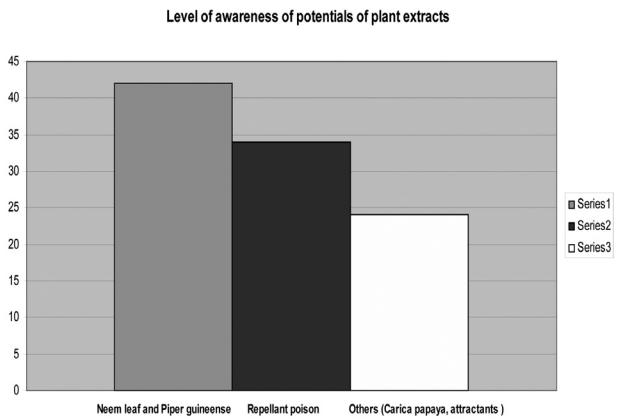

FIGURE 1. Level of Awareness of potentials of plant extracts. Series 1 - Neem leaf and *Piper guineense* = 42, Series 2 - Repellant/poison = 34, Series 3 - Others (Carica papaya, attractants) = 24

TABLE 5. Chi square analysis of questionnaire responses

Variable	Cat X_2 Cal	X^2 Cal	Decision
Tab			
Age	13	7.81	S
Education	11.9	9.48	N. S
Religion	5.8	5.99	N. S
Farms experience	14	7.81	S
Sex	5	3.84	S

$P < 0.05$

that there were significant association between age, sex, farming experience and use of plant extract for insect pest control of the selected leaf vegetables. The reasons for the above could be due to the fact that with increasing number of years of vegetable cultivation, by the farmers, their experience in the utilisation of the plant extracts also increase. The result confirmed the work of Okunlola (1998) who asserted that utilisation of indigenous method for pest control is influenced by age of farmers. That age of farmers influenced their use of plant extract for pest control could be adduced to the fact that use of plant extracts are practices which are transferred orally from one generation to the other and not documented. Hence, older farmers have knowledge of these practices more than the younger ones whose years of farming experience are low. It should also be realised that the indigenous pest control method are evolved through local experimentation over years (Warren 1999).

The level of education does not also affect use of plant extracts because the method is indigenous, simple and locally available. Hence, level of education does not influence the decision to use plant extract.

Conclusion

The study examined farmers perception of types of insect pests affecting the cultivation of vegetables, identified the most important pests affecting farmers production level and awareness of the use of plant extracts for their control. The results from the study affirmed that farmers encountered insect pests' on their vegetable farms resulting in reduced quantity, quality and by extension derivable income. The most prevalent insect pests of selected vegetables during the wet and dry seasons were *Podagrica sjostedti, P.uniforma, Sylepta derogata, Dsydercus superstitiosus,* and *Zonocerous variegata* which defoliate the leaves of these vegetables. Seventysix percent of the farmers were aware of indigenous methods for the control of these pests.There were significant association between age, sex, farming experience and use of plant extract for the control of insect pest the leaf vegetables. The level of education does not affect use of plant extracts because the method is indigenous, simple and locally available.

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