

Full Length Research

Skills needed by farmers on the use of cow dung and urine for aphids control in spinach production in Taraba State, Nigeria

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Accepted 31 January, 2017; Published 23 February, 2017.

Aphids has been a challenge in spinach production especially spinach. The need for farmers to acquire skills in managing this menace cannot be overemphasized, hence this study on skills needed by farmers on the use of cow dung and urine for aphids control in spinach production in Taraba state, Nigeria was carried out in 2015 cropping season. Survey research design was used for the study as a set of questionnaire was used for data collection of a sample of spinach farmers. The population for the study was all the spinach farmers on River Nukkai Flood Plains. A purposive sampling technique was used to select 50 spinach farmers made up of 25 organic farmers and 25 inorganic farmers. A 14-item questionnaire on skills need in noticing signs and symptoms of aphids, formulating cow dung and urine, application of cow dung and urine formulations on spinach for aphids control was the instrument used for data collection. Fifty copies of the questionnaire were administered to the respondents and all were retrieved and analyzed using mean, standard deviation and rank order to answer the research questions and t-test was used to test the hypotheses at 0.05 level of significance. Findings from the study indicated that aphid infestation is obvious in the study area. It was recommended that vegetable farmers should embark on the use of animal waste based formulations like cow dung and urine as an alternative to synthetic pesticides.

Key words: Vegetable production , Spinach, skills, Farmer, cow dung, aphid control

Introduction

Vegetable is a general name for crops such as onion, tomato, okra, pepper, spinach, carrot, melon, lettuce, Sorel among many others. They have both nutritional and health value to human and animals.

Vegetables are of invaluable nutritional value with considerable potentials for ameliorating some of the world's most widespread and debilitating nutritional disorders, birth deters, mental and physical retardation, weakened immune systems and blindness if sufficient quantities are available to people in the right form, place and price (Ijarotimi, Eleyinmi and Ifesan, 2003). Micronutrient deficiencies impair cognitive and psychomotor skills, particularly in young children which can be alleviated through eating

a balanced diet, rich in vegetables and fruits (Ibeawuchi et al, 2015). Ekele (2015) reported that about half of all child death occurs because of malnutrition, which prevents children from fighting off even common childhood ailments.

According to Ibeawuchi et al. (2015) over two billion people suffer from micronutrient deficiencies through poor diets. However, the authors submitted that fruits and vegetables are the most appealing and affordable sources of these micronutrients; hence diet improvement increases person's productivity, reduces health care related costs and therefore raises the productivity and incomes of the poor.

In addition to the significant role of vegetables to human nutrition and health, they are also a source of income to many household. Corroborating this assertion, Okunlola and Akinrinnola (2014) stated that income earned from vegetable production has been identified as

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important contributor to household welfare, especially female headed households in Nigeria. Akinrinola as cited in Okunlola and Akinrinnola (2014) pointed out that vegetable production contributed between 33 and 37% of family income among peri-urban vegetable farmers in 2008 production season and is a veritable source of consumption smoothening during off-season.

Vegetable production as a vocational option in agriculture is left in the hands of the poor and peasant rural farmers especially the women who lack the skills that will enhance their effective productivity. Ibeawuchi et al. (2015) stated that fruits and vegetables production provides women with economic opportunities as women are the principal producers of most horticultural crops in developing countries.

Vegetable production in Nigeria is predominantly subsistence and is characterized by cyclic deficits and poverty prompted by unreliable rainfall patterns, declining soil fertility, pest and disease infestation (Department for International Development, 2002). Pest infestation is however, one of the greatest problems of sustainable vegetable production in Nigeria. In specific terms, insect pest infestations accounts for 20 to 60% pre-harvest vegetable losses (Okunlola and Akinrinnola, 2014). The agricultural significance of pests on crop plant is the damage they cause which reduces the quality or quantity (or both) of yield (Imam, Yusuf and Mukhtar, 2010).

One of the commonest insect pests of vegetables is aphids. They are small, soft-bodied insects with long smaller mouth parts that they use to pierce stems, leaves and other tender vegetable parts and suck out fluid. Also, Flint (2013) submitted that aphids may transmit viruses from plant to plant on certain vegetable and ornamental plants. The author further stated that large population of aphids can turn leaves yellow and stunt shoots, produce large quantities of a sticky exudate and inject toxins into vegetable which causes leaves to curl and further distort growth. More worrisome about aphids is their ability to have many generations a year.

Although, the use of synthetic pesticides have been promoted in the Nigerian agriculture for the past two decades, most vegetable farmers are yet to align the practice into their pest management system, owing to the subsistence nature of production and high poverty levels (Okunlola and Akinrinnola, 2014). However, the continuous use of pesticides by inorganic farmers on vegetables should not be encouraged because of the toxicity risks arising from the consumption of pesticide-treated vegetables. Organic Farmers therefore, need skills in the utilization of cow dung and urine for aphids control in spinach to enable them avoid these losses without necessarily using synthetic pesticides, (Ekele and Wombo, 2013).

Also, Onuka and Olaitan (2007) asserted that the production enterprise hinges upon the possession of a set of skills. Nwokike (2011) defined skill as the ability to do something well and expertly. Farmer Skill in this study

is defined as the ability of spinach producers to adopt the use of Animal Waste Based Formulations (AWBF) to control aphids on the field. AWBF involves the use of cow dung and cow urine. The chemical composition of cow urine is 95% water, 2.5% urea, 2.5% minerals, hormones, salt and enzymes (Vahanka, Chawada and Dubey, 2010).

The essence of AWBF is to effectively control aphids on spinach in order to enhance improved spinach production so as to increase the consumption of adequate quantity of micronutrients and raise the income base of the rural populace especially those involved in spinach production.

Statement of the problem

In Nigeria, spinach consumption is an integral part of the meal of almost every household. People consume it either cooked or uncooked due to its nutritional and health significance to human body. However, spinach production which is mostly carried out by the poor and peasant rural farmers is greatly hampered by insect pest infestation by different species of insects including aphids. Although, the use of synthetic pesticides by inorganic farmers has taken the centre stage in Nigeria's agriculture, spinach farmers are yet to fully align themselves to this practice. This could be attributed to their poor economic status and little knowledge about the skills required in the formulation and application of synthetic pesticides. This suggests that there is need to explore more insect pest management/control strategies that are cheaper and easier to use for a profitable and sustainable spinach production.

Objectives of the study

The objective of this study was to identify skills needed by farmers on the use of cow dung and urine for aphids control in spinach production in Taraba state. Specifically, the study sought to:

- i. examine skills needed by farmers on noticing signs and symptoms of aphids on spinach in Taraba State.
- ii. identify skills needed by farmers in formulating cow dung and urine for spinach production in Taraba State.
- iii. identify skills needed by farmers in the application of cow dung and urine formulations on spinach in Taraba State.

Research Questions

- i. What are the farmer skills need on noticing signs and symptoms of aphids on spinach in Taraba State?
- ii. What are the farmer skills need in formulating cow

dung and urine for spinach production in Taraba State?
 iii. What are the farmer skills need in the application of cow dung and urine formulations on spinach in Taraba State?

Hypothesis

- i. There is no significant difference in the mean responses of organic and inorganic farmers on skills needed by farmers in noticing signs and symptoms of aphids on spinach in Taraba State.
- ii. There is no significant difference in the mean responses of organic and inorganic farmers on skills need by farmers in formulating cow dung and urine for spinach production in Taraba State.
- iii. There is no significant difference in the mean responses of organic and inorganic farmers on skills needed by farmers in the application of cow dung and urine formulations on spinach in Taraba State

Methodology

Three research questions and hypotheses guided the study. Survey research design was adopted for this study. The study was conducted in River Nukkai Flood Plain located in Jalingo, Taraba State in North eastern Nigeria. The population for the study was all spinach farmers on the River Nuked Flood Plain. A purposive sampling technique was used to select 50 vegetable (spinach) farmers consisting of 25 organic and 25 inorganic farmers. This was in submission of Uzoagulu (2011), posits that no fixed and percentage is ideal, rather it is the circumstances of the study situation that determines what number or the percentage of the population should be studied.

The instrument used for data collection was a 14-item questionnaire which was developed from literature review by the researchers. The 14-item questionnaire tagged Farmer Skills Need on Cow Dung and Urine Formulation for Aphids Control in Spinach Production Questionnaire (FSNCDUFAPQ) was an instrument for data collection. The instrument had two sections; A and B. Section A solicited demographic data of the respondents while section B dealt with the research variables in the study with the following scales: Highly Needed (4), Averagely Needed (3), Slightly (2) and Not Needed (1). The instrument was face validated by three experts two of the experts from Department of Agriculture Education and one of the experts from Department of Animal science Federal University of Agriculture Makurdi. Reliability of the study was established using Cronbach alpha technique which yielded a coefficient of .89 indicating that the instrument is at reliable for use. The data collected from the respondents was analyzed using descriptive statistics of mean, standard deviation and ranking were used to answer the research questions while t-test was

used to test the hypotheses at .05 level of significance. The mean value: $4+3+2+1= 10/4=2.50$ as a bench mark

Results

Result Question 1

What are the skills needed by farmers in noticing signs and symptoms of aphids on spinach in Taraba State?

Hypothesis 1

There is no significant difference in the mean responses of organic and inorganic farmers on skills needed by farmers in noticing signs and symptoms of aphids on spinach production.

Table 1, the findings revealed that 6 isolated items revealed that the mean values between 2.54 to 3.84 are above 2.50 bench mark while ranked values showed the stages to follow in noticing of signs and symptoms of aphids on vegetable production. This revealed that the six skills were needed by farmer on the use of cow dung and urine for aphids control in spinach production are needed by famers in Taraba State for profitable production of spinach. The standard deviation ranged .49 to .76, which revealed that respondents were not too far from each other in their responses. The hypothesis tested in Table 1 revealed that the six skills items had their t-calculated values ranged from 0.11 to .91, which were less than table value of 2.02 at .05 level of significance and 48 degree of freedom. This indicated that there is no significant difference in the mean ratings of two group respondents on the 6 items on skills needed by farmers on the use of cow dung and urine for aphids in spinach production. The null hypothesis was not rejected for the six items.

Research Question 2

What are the skills needed by farmers in formulating cow dung and urine for aphids control in spinach production in Taraba State?

Hypothesis 2

There is no significant difference in the mean responses of organic and inorganic farmers on skills needed by farmers in formulating cow dung and urine for spinach production.

Table 2, the findings revealed that 4 isolated items with the mean values between 2.92 to 3.88 are above 2.50 bench mark, while ranked values showed the steps to follow in the formulation of cow dung and urine for the control of aphids in spinach production. This further

Table 1. Mean, t-test and Rank order Analysis of Respondents on the symptoms of aphids on Spinach (N=50).

S/No	Signs and symptoms of aphids	X	SD ₁	t-cal	t-crit.	Ranking	Remarks
1	Pierce stems and leaves	3.64	.49	.11	2.02	1 st	*NS
2	Turn leaves yellow	3.20	.76	.46	2.02	2 nd	*NS
3	Stunt shoots	3.58	.64	.45	2.02	5 th	*NS
4	Produce large quantities of a sticky exudates	2.64	.72	.57	2.02	4 th	*NS
5	Causes leaves to curl	2.54	.51	.89	2.02	3 rd	*NS
6	Distorts growth	3.84	.75	.91	2.02	6 th	*NS

Mean=X, SD=Standard Deviation, t-cal=t-calculated, t-crit=critical value, *NS=Not significant and Not Rejected.

Table 2. Mean, t-test and Rank order responses of the respondents on Skills Needed by Farmers in Formulating Cow Dung and Urine for Aphids control in Spinach (N=50).

S/N	Type of animal wastes	Skills need in formulation	X	SD	t-cal	t-crit.	Ranking	Remarks
1	Cow Urine	Collect urine in containers and store in pits for curing. After two weeks dilute the urine in water at ratio of 1 part urine to 6 parts water	2.92	.76	1.60	2.02	4 th	NS
2	Cow urine	Mixed the above cow urine with other plant extracts e.g. tobacco	2.99	.73	1.86	2.02	3 rd	NS
3	Cow dung	Crush the dry cow dung into powdered form using pestle and mortar. Make a paste of this dry cow dung powder by adding a little quantity of water to it.	3.88	.33	1.77	2.02	1 st	NS
4	Cow dung	Burn the cow dung to produce ash and then allow it to cool.	3.32	.48	0.95	2.02	2 nd	NS

Mean=X, SD =Standard Deviation, t-crit=critical value, *NS=Not significant and Not Rejected.

revealed that the 4 items on skills needed by farmers on the use of cow dung and urine for aphids control in spinach production are needed by farmers in Taraba State for profitable production of spinach. The standard deviation ranged .33 to .76, which revealed that respondents were not too far from each other in their responses. The hypothesis tested in table 2 revealed that the four skills items had their t-calculated values ranged from 0.95 to 1.86, which were less than table value of 2.02 at .05 level of significance and 48 degree of freedom. This indicated that there is significant difference in the mean ratings of two group respondents on the 4 skills needed by farmers on the use of cow dung and urine for aphids in spinach production. Therefore, the null hypothesis was not rejected.

Research Question 3

What are the skills needed by farmers in the application of cow dung and urine formulations on spinach in Taraba State?

Hypothesis 3

There is no significant difference in the mean responses of organic and inorganic farmers on skills needed by farmers in the application of cow dung and urine formulations on spinach in Taraba State.

Table 3, showed that 4 all the skills items had their mean values between 2.96 to 3.56 which are above 2.50 bench mark while the ranked values indicated the stages to follow in the application of cow dung and urine formulation for aphids control in the spinach production. This revealed that all the 4 skills were needed by farmers in the application of cow dung and urine for aphids control in spinach production in Taraba State. The standard deviation ranged .33 to .76, which revealed that respondents were not too far from each other in their responses. The hypothesis tested in Table 3 revealed that the four skills items had their t-calculated values ranged from 0.52 to 1.62, which were less than table value of 2.02 at .05 level of significance and 48 degree of freedom. This indicated that there is no significant difference in the mean ratings of two group respondents

Table 3. Mean, t-test and Rank order responses of the respondents on Skills Needed by Farmers in the Application of Cow Dung and Urine Formulations on Spinach in Taraba State (N=50).

S/No	Skills needed in its application	X	SD	t-cal	t-crit	Ranking	Remarks
1	Dip a branch of tree with leaves in the solution and spray it on the spinach	3.53	.65	0.56	2.02	1 st	NS
2	Smear the powder over the affected spinach leaves	2.96	.35	0.52	2.02	2 nd	NS
3	Sprinkle the ash on the leaves of spinach	2.65	.76	1.62	2.02	3 rd	NS
4	Use nose mask to cover the nose and eye goggle to avoid contact with nose and eyes.	3.56	.65	1.51	2.02	4 th	NS

Mean=X, SD =Standard Deviation, t-crit=critical value, *NS=Not significant and Not Rejected.

on the 4 skills needed by farmers in the application of cow dung and urine formulation for aphids control in the spinach production. Therefore, the null hypothesis was not rejected for the four skills items.

Discussion of findings

The data generated and analyzed from the research questions and hypotheses tested revealed that 6 skills in noticing signs and symptoms of aphids on spinach, 4 skills in formulating cow dung and urine for aphids control and 4 skills in the application of cow dung and urine formulations on were required by farmers for profitable spinach production in Taraba State. Findings on the skills needed by farmers in noticing signs and symptoms of aphids control in spinach production showed that farmers needed to be equipped with knowledge and skills on how to identify signs and symptoms of aphids on vegetable production by supportive personnel to aid reduce the attack of aphids on vegetable to boom their vegetable (spinach) production. This is in consonance with the view of Flint (2013) who state that aphids may transmit viruses from plant to plant on certain vegetable and ornamental plants, while viruses mottle yellow or curl leaves and stunt plant growth. The author further explained problems associated with aphids greatly affect the yield of vegetables, thereby significantly reducing crop harvest and income of the farmer. According to the results, the most common sign and symptom of aphids on spinach is the piercing of stems and leaves while distortion of growth ranked lowest. Olatunji and Oboh (2012) also state that, aphids are pests that destroy vegetable (spinach) making apertures on the leaves and stems resulting into stunted growth and eventually death. Similarly, Okunlola and Akinrinnola (2014) reported that, Aphids equally turn leaves yellow, produce large quantities of sticky exudates, causes leaves to curl and stunt shoots, thus insect pest infestations accounts for 20 to 60% pre-harvest vegetable losses.

The findings on skills needed by farmers in formulating cow dung and urine for control of aphids in spinach

production revealed that farmers needed to be competent (skilled) in the formulation cow dung and urine for aphids control in spinach production to boost their income/profit hence reduce the losses. This findings collaborates the study of Vahanka et al. (2010) which submitted that in addition to effective insect pest and disease control, regular use of cow urine will increase soil microorganisms; increase soil texture and structure and also works as growth promoters. The authors posited that mixture of cow urine with other plant extract like tobacco is meant to increase the pest spectrum; thus this practice is noble as it has little or no danger to both the farmer and the crops in addition to the low cost of formulating it and safety measures such as the use of protective clothes is also advocated to avoid contact with the skin and other delicate body organs.

The findings on the skills needed by farmers in the application of cow dung and urine formulation of spinach production indicated that famers needed the potentials (skills) how to apply cow dung and urine formulation and must perfect in it for aphids control for a productive yield of spinach production in Taraba state. This submission was in line with the view of Ekele and Wombo (2013) who stated that farmers therefore, need skills in the utilization of cow dung and urine for aphids control in vegetable to enable them avoid these losses without necessarily using synthetic pesticides.

Conclusion

This study showed that aphids' infestation is a major challenge in spinach production in Taraba State. Knowledge and skills is therefore, needed in the area of pest management and control especially, the use of ABWF, its formulations and application. The implication of relying on synthetic pesticides is the high cost of spinach production.

Recommendation

Based on the findings of the study, the following

recommendations were made by the researcher

1. Vegetable farmers should embark on the use of animal waste based formulations like cow dung and urine as an alternative to synthetic pesticides.
2. The identified skills in formulation and application of animal waste based formulations should be developed into a training guide and utilized by extension agents for training of spinach farmers.

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