Nigerian Journal of Basic and Applied Sciences vol. 16 No. 2 December 2008 221 - 226

Incidence of *Thrips tabaci* on Onion (*Allium cepa* L.) and their Control in Sokoto and Kebbi States, Nigeria

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ABSTRACT: Primary data were generated on insect pests of onion using structured questionnaire on one hundred farmers from Kebbi and Sokoto States. Results obtained indicated that all farmers identify the major insect pest affecting onion as tiny, whitish or brownish insect, present mostly in hot season. Majority of the farmers use insecticides in controlling it whenever the crop shows sign of insect feeding, such as stunting, in addition to silvery sheen. 41.5% of the respondents use Karate, 33.49% Cotalm P168, 18.87% Gammalin, 4.72 % Nuvan and 1.42% Cymbush. However, some combine ash with chemicals, probably to minimize production cost.
Key words: Onion, thrips, chemical, control.

INTRODUCTION

Onion (*Allium cepa* L.) is a member of the family *Liliaceae*. It is an important vegetable crop and the most widely cultivated in the world (Purseglove, 1972). Purseglove (1972) reported onion is now grown from the coldest area of the temperate zones to the tropics. Approximately 30 million tonnes of dry bulb are produced each year in the world (FAO, 1994).

According to Hanelt (1990) onions are biennial, herbaceous plant with tubular leaves and a swollen pithy stem base, which function as a drought-resisting organ. Most onion varieties are grown from seeds sown either in boxes or nursery beds and transplanting the young seedlings into the field at two true leaf stages. The crop can be harvested immature or fully bulbed; stored for long period or cooked immediately after harvest.

Onions are relatively high in food value, intermediate in protein content and rich in calcium and riboflavin (Purseglove, 1972). He added that mature onion contains approximately 86% water, 1.4% protein, 0.2% fat, 11.0% carbohydrate, 0.8% fibre, and 0.6% ash. The odour is mainly due to organic sulphur compounds, mostly by n-propyl disulphate that is produced only when the tissues are cut or injured by enzyme action on water-soluble amino acid.

Ayodele (1996) reported that in Nigeria, commercial onion production is predominantly in the North, with bulb yield of up to 25t/ha. It was estimated that land area of between 0.1 and 0.2 million hectares is cropped annually (Ayodele, 1996). The crop is cultivated in two marked seasons: rainy season (April-September) and dry season (September through December- April), but the bulk of this was cultivated in the dry season because the high incidence of pest and diseases prevalent under hot humid condition of the rainy season restricts the major onion production to the dry season (under irrigation) in the sudan Savanna ecological zone, a semi-arid belt in West Africa (Nwadukwe and Chude, 1995). Uzo (1983) has, however reported on the induction of biennial reproductive in short-day onion in the eastern Nigeria. Similarly, Babatola and Lawal (2000) have recorded up to 16.7 tones in western Nigeria.

The production of Allium crops involves interaction with pathogenic microorganisms, weeds, and pest species. However, these harmful organisms are themselves subject to natural control by disease and predation, so technique for their control need to be precisely targeted at harmful species to minimize damage to beneficial species (Brewster, 1994).

Onions are attacked by many pests that seriously reduce yields by stunting or kill the plants. These pests include the stem nematode, onion fly, bean seed fly, cutworm and thrips (Anon., 1988). The most damaging insect pests are onion thrips and cutworms worldwide, the former being gregarious and large numbers are usually found together on a single leaf (Straub and Emmett, 1992). In Sudan light infestations of thrips on late transplanted onions lead to yield losses of 40%, while severe attacks reduced yield by almost 60% (Kisha, 1977).

FAO (1991) reported that onion bulbs are easily stored and transported and there is international trade of about 2 million tonnes annually, worth U.S. $400 million. According to Brewster (1994) onion prices tend to fluctuate rather widely from year to year making onion bulb production a somewhat risky enterprise. Because there is a global market for onion bulbs, there is little a producer in any one region can do to control the market and stabilize prices.

In India, good results were achieved up to 90% onion thrips mortality when insecticides were applied to onion crops between 0500 and 0800 hours or between 1700 and 1900 (Mote, 1987).

METHODOLOGY

The Study Area

Sokoto and Kebbi states were chosen from which Goronyo, Kware and Wammako local governments areas were in Sokoto and Aleiro local Government in Kebbi state were selected. The towns in the two states were located in the Sudan Savanna zone in Northern Nigeria. Sokoto is located on Latitude 13^o 04’ and Longitude and Longitude 5^o 15’E, while Kebbi is within Latitude 10-13^o N and 3^{o}6’E. The average annual rainfall in Sokoto state ranges from 300-500mm, which is recorded between April and September, the peak usually being July or August. The areas are characterized by high and moderately cold temperature and dust coupled with strong winds. Onion production usually commences in October and ends in April /May.

Sampling Technique

Random sampling was used in administering questionnaire to the farmers. From Kebbi State only Aleiro Local Government Area was chosen because it is famous in onion production and marketing. Aleiro town is considered as the center or home of onion in the state in particular, and the nation in general.

Farmers were randomly selected at the farm sites at the peak of onion production during which hand lens was used for ease of identification of insects. Twenty-five farmers were interviewed from each of purposively selected four local governments (Table 1). Farmers were asked various questions and responses recorded therein, while those found to be literate were allowed to fill it themselves.

Table 1: Distribution of respondents according to State, Local Government and Village

State	L.G.A.	Village	No. of Respondents
Sokoto	Goronyo	Boyekai	13
		Giyawa	12
	Kware	Kware town	19
		Runji	5
		Moreh	1
	Wammako	Kwalkwalawa	14
		Sayya, Gidan Gada	
Kebbi	Aleiro	Aleiro town	14
		K/Hausawa	4
		K/Fulani	7
Total			100

Source: Field survey 2000/2001.

Data Collection and Analysis

Data for the study were obtained in a field survey conducted by the authors during the 2000/2001 growing seasons. Data were obtained on farm sizes, years in onion production, crop growing season, yield per acre, and nature of insect pest, chemicals used and number of sprays. The data were analysed using descriptive statistics.

RESULTS AND DISCUSSION

Resource use

Information on farm size, years in onion production and yield in Table 2 shows that 46% of the respondents are producing on an area less than 2 acres and 14% are growing on an area above 5 acres. Yield obtained was below 50 bags by 22% of the respondents, and those whose resources can permit producing above 50 bags are 78%, indicating that quite a number of them are ' large scale' producers. On the years in onion production, it shows that bulk of those in the enterprise are between 21 and 30 years, followed by those with 11-20 years experience and least is from 1-10 years.

Table 2 indicated that some of the farmers who engage in onion production are peasants. This may be due to several factors; they do not have enough suitable *fadama* land or due to lack of capital to invest in dry season farming which is capital intensive.

In Table 2, one can deduce that under good management, an onion farmer can produce very high yield, which translate in to high income. Many farmers interviewed showed that they often break even and in some years they have money sufficient to pay for pilgrimage to Mecca especially when it is stored until prices are attractive. This means that onion prices are not constant in the area; this may be because of glut immediately after harvest and lack of storage facilities, which may result in rotting and or sprouting some months later. This opinion agrees with Brewster (1994) that prices of onion are never stable.

Incidence of insect pests and control

Table 3 indicated that all the farmers interviewed observe insect pest on onion crop, whose colour description is usually subjective. Over 60% of those interviewed described it as whitish and tiny, while 36% found it to range from white to light brown. The insect is normally controlled by the use of chemicals (Table 3); where 82% of them use only chemicals and 18% use both chemicals and local methods.

One hundred percent incidence occurred, which occurs with Brewster (1994) that production of Allium crops involves interaction with pathogenic organism, weeds and pests animals and this is an indication that this insect is the major pest of onion in the study area. This characteristic makes it easier to relate this with what is known world wide to be a serious pest of onion known as thrips.

Table 2: Land area devoted to onion production, years in onion farming and yield

Level of production	%	Onion yield (Bags)	%	Period in production (years)	%
Major > 5 acres	14	Above 50	78	1-10	10
Average (2-4 acres)	40	Below 50	22	11-20	32
Minor < 2 acres	46			21-30	40
				31 and above	18
Total	100		100		100

Source: Field survey 2000/2001.

Table 3: Incidence of Pest, Description and Control Method

Incidence	%	Description	%	Control Method	%
Yes	100.0	White and tiny	64	Chemicals only	82
No	0.0		26	Chemicals and local	18

Brewster (1994) and Straub and Emmett (1992) described the body of adult onion thrips to be pale yellow to dark brown. Thirty six percent (36%) of respondents identified it as brown to white. This insect was found to be white at the early stages and when they get older, the colour changes from white to brown. It is not surprising that a pale yellow may be understood to be white to a local farmer, since not all of them have a good understanding of major colour differences.

When the insects were found in large numbers mostly on the newly formed leaves, and the crop not protected, the symptom usually observed is described as 'Dankuturu' meaning stunting and no sooner the crop is sprayed with the appropriate chemical, the foliage will regain their height and the crop has recovered, unless if the damage is very severe.

The high percentage (82%) of those using chemicals was perhaps due to the efficiency of the chemicals in insect control. This agrees with Mote (1981) that high mortality was recorded following the use of insecticides. The local method entails use of ash from different sources (most preferred is cornstalk), which is spread on the crop whenever insects are observed, and this is followed by chemical application, this is because ash controls insect only in light infestation.

From Table 4 it can be observed that majority of farmers do not own sprayer, but instead they either contract spraying out to sprayer owners or hire the sprayer on hourly basis and use it for a specified period. Non-ownership of sprayer may be due to economic reasons because of high cost. These categories of producers are therefore left to the mercy of commercial sprayer operators who are themselves farmers and go out for commercial spray at their convenience even at the wrong hours. In addition, they are illiterate in western education; do not follow any manufacturers' instruction regarding dilution, safety even at odd hours.

Spray

A sizeable number was observed not to follow any calendar (Table 4) as only 17% of those interviewed have a designed calendar, which may be due to experience acquired overtime. Nearly 50% of the farmers spray above 4 times and 51% sprays 1-3 times only (Table 4).

Table 4: Sprayer acquisition and spray schedule

Mode of acquisition	%	Spray schedule	%	Number of spray	%
Owned	34	Calendar	17	1-3	51
Hired	66	No calendar	83	4 and above	49

Table 5 indicated that karate is the dominant chemical in the control of insect pests of onion constituting 41.5%, followed by cotalm P168 (33.49%), and the least was cymbush (1.42%). Straub and Emmett (1992 showed that insecticides that were found to be effective in large number of Asian and Indian trials to include acephate, carbaryl, carbofuran, cypermethrin, deltamethin, endosulfan, fenitrothion, malthion and qinalphos.

Farmers preference for karate may be due to its efficacy, low cost or availability during the growing season. This number of (212) was because of multiple uses of different chemicals by one farmer in a growing season (Table 5).

Some of the chemicals in Table 5 are used on both field and storage insect pests even though the manufactures do not recommend their dual use, all the farmers want was to get the insects killed no matter the environmental implications.

Table 5: Distribution of respondents according to type of chemicals

Type of chemical	Frequency	%
Karate	88.0	41.50
Cotalm P 168	71.0	33.49
Gammalin	40.0	18.87
Nuvan (EC)	10.0	4.72
Cumbush	3.0	1.42
Total	212.0	100.0

Source: Field Survey 2000/2001

Respondents have observed that incidence of insect pests on onion was less on the first/early crop (Table 6) because over 90% of those interviewed revealed that application of chemical is required before any yield is recorded in the second crop (late crop). The second crop is vulnerable to attack because the period of growth is characterized by hot weather, which they said is more favourable for the survival of insect pests. The most important stimulating factor in the occurrence of insect pest is environmental condition prevailing during the growing period as stated by Brewster (1994) that damage is more severe when plants are water stressed. In these conditions, leaf expansion is slow and increase in thrips number is rapid.

All the farmers interviewed observed insect pests to affect roots, shoots and 'hearts' of onion resulting in twisting, crinkling and curling of leaves as stated by Straub and Emmett (1992) that onion thrips develop white silvery blotches; these blotches later turn yellow and affected tissues dry out or become mottled with fungal growth, leaves may twist, crinkle and curl or even die if heavily infected.

Table 6: Distribution of Respondents According to Insect Prevalence

Period of occurrence	%
First crop	8.00
Second crop	92.0
Total	100.00

Source: Field Survey 2000/2001

Chemicals applied were found to be effective in the control of pest for the crop is usually saved. However, one respondent noted that (Table 7) early planting beyond the month of September and before December is almost free from insects and diseases.

Transplanting done after December suffer heavy insect attack, but those made before or in December may be infested by insects with little yield loss due to their ability to escape most vulnerable stages.

Farmers commented that chemicals are essential in onion production and requested government to make them available in times of need and at affordable prices.

Contract spraying indiscriminately regardless of type of chemical and disregard for precautionary measures often lead to contact with chemicals by spray operators and also by others working on nearby fields through drift (Magaji, personal communication)

Table 7: Distribution of respondents according to the effect of chemical spray

Effect of chemicals	%
Rescue	99.0
No rescue	1.0
Total	100.0

CONCLUSION

The findings of the research have indicated that *Thrips tabaci* is the major insect pest affecting onion wherever the crop is grown and farmers use chemicals indiscriminately to save their crop from attack. Farmers do not follow instructions of the manufacturer and some times do not use the right chemical probably because of ignorance or poverty.

RECOMMENDATIONS

It is recommended farmers need to be educated by extension agents on the right chemical and always follow manufactures instruction in order to achieve desired results. Farmers should also be encouraged to plant early to in the season to avoid peak populations of onion thrips as suggested by some farmers.

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