Appraisal of weed management effectiveness in North Eastern Nigeria: A study of Leventis Foundation trained farmers

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Abstract: The appraisal of weed management effectiveness in Northern Nigeria was carried out using Leventis Foundation Agricultural Schools' trained farmers as case study. A total of 150 respondents were randomly sampled from the list of all trained and practicing farmers in Kaduna and Kano states. The result of this study shows that 98% are engaged in farming as their major occupation, 85.3% are married while majority (50.7%) had secondary education. Majority (59.3%) cultivated between one and two hectares of farmland while 59.4% are confronted with both grasses and broad leaf weeds on their farmland. Significant relationships existed between weed management effectiveness and educational qualification, cost of weed management and weed type, all at p=0.05. However, no significant relationship existed between farm size and weed management effectiveness. Integrated weed management practices through adoption of proper land preparation that will minimise the cost and enhance effectiveness of herbicides application is recommended. Educational efforts which address weed management problems and associate such problems with other production practices must be intensified, if weed-induced yield losses must be minimised in the area.

Keywords: Weed management, Herbicides application, Northern Nigeria

INTRODUCTION

Weeds are plants found grown on lands where they are not particularly wanted; they represent important pest to crops, reducing world food and fibre production. Weeds are adaptable to all agronomic systems and have impacts on all aspects of crop production, competing favourably for water, space, air and nutrients with crops. Weeds also adversely affect humans in both agricultural and non-agricultural environments. Weed problem is a global phenomenon; it has been discovered that production systems have direct implications on weed management practices, difficulties, and future problems. Jason (2003) surveyed Soybean producers of South Carolina to determine which production practices limit seed yields the most, he discovered that improved weed control strategies would improve current soybean production. In Nigeria weed problem has reduced the interest of people in farming drastically. While it causes great loss in yield, its control requires more inputs in terms of cost and labour than any other farming activities. Marley et al (2004) reported that *Striga hermonthica* is a major biotic constraint to sorghum production in Nigeria, sometimes causing total yield loss. Their recommendations for striga management

include the use of cultural and agronomic practices, herbicides and host plant resistant when available. Lagoke et al (2006) reported that in the Southern Guinea Savanna Zone of Nigeria, where early grass weed control was more important, *alachlor* or *metolachlor* at 1.5 kg ha^{-1} gave adequate weed control and pod yields comparable with that of the hoe-weeded check. In the Northern Guinea Savanna Zone of Nigeria, grass and broad-leaved weeds were equally important. The bulk of cereals and pods that feed the people and poultry industries in Nigeria are produced in the Northern part of Nigeria. Yet, production capacity and output of farmers in Nigeria are limited by weed infestation. Therefore, for Nigerian farmers to contribute to the food production in Nigeria sufficiently, they must, as a matter of necessity, be helped to overcome or at least minimize the havoc of weed on their farmland, and consequently crop yield. Doing this will sustainably guarantee the efficient production of crops, especially cereals to feed humans and poultry in Nigeria. This therefore calls for a research into the appraisal of weed management effectiveness in the area. The following research questions were proposed to be answered by the study:

1. What are the demographic characteristics of respondents in the area?
2. What weed type is prevalent in the area?
3. What is the estimated cost of weed management in the area?
4. How effective are respondents in weed management in the area?

The study therefore appraised the farmers weed management effectiveness in Northern Nigeria, with the aim of achieving the following specific objectives, to:

1. identify the demographic characteristics of the farmers
2. identify the prevalent weed types in their area
3. estimate the cost at which weed is managed by the farmers in the area
4. appraise the effectiveness of weed management techniques adopted by farmers in the area
5. make recommendations that will further enhance weed management in the area

Hypotheses of the study

The following hypotheses, stated in null form, were tested in this study:

Ho 1: There is no significant relationship between farmers' education and their weed control effectiveness

Ho 2: There is no significant relationship between cost of weed control and farmers' weed control effectiveness

Ho 3: There is no significant relationship between farm size cultivated and farmers' weed control effectiveness

Ho 4: There is no significant relationship between weed type and farmers' weed control effectiveness.

METHODOLOGY

The research was carried out in Northern Nigeria to appraise the weed management effectiveness of Leventis Foundation trained farmers. Leventis Foundation is a Non-Governmental Organisation (NGO) that has the mandate to transform agriculture and

create sustainable employment among the rural poor in Nigeria and Ghana through training and acquisition of skills by youths who are desirous of taking up a profitable profession in Agriculture. The foundation has 4 agricultural schools in 4 states in the Northern Nigeria. These are in Kaduna, Kano, Gombe and the Federal Capital Territory (FCT), Abuja. Two of the schools; Kano and Kaduna in the North Western Agro-ecological zone of Nigeria were purposively selected for this study. In the area, farmers cultivate crops like maize, soya beans, millet, rice, wheat, cassava, sorghum, pop corn etc; and keep livestock such as poultry, cattle, sheep and goat. All practicing trained farmers of Leventis Foundation Agricultural Schools in the area constitute the population for the study. In Kano and Kaduna, an estimated 825 and 1,249 farmers respectively, have been trained from inception in 1988 to date, while an estimated 342 and 1,158 farmers respectively, are currently actively engaged in farming the area, and constitute the sampling frame. Ten percent, which is 150 respondents, were randomly selected for inclusion in the sample. Data for this study were collected in 2008 but updated in the year 2010.

Measurement of Variables

Independent Variables - The independent variables measured in this study include:

Educational Status: This was measured by asking the respondent to indicate their highest educational qualification from the categories listed: No education, primary school, secondary school and tertiary education

Cost of weed management: Respondents were asked to state the amount of

money paid to labourers for weeding per hectare. Amount spent to purchase herbicides and amount paid to labourers for spraying weed per hectare of farmland in the last cropping season was also estimated.

Farm Size cultivated: Respondents were asked to indicate their farm sizes from the farm size categories listed: Less than 1 hectare, between 1-2 hectares, more than 2 hectares.

Weed type: Respondents were asked to indicate the prevalent weeds on their farms from the categories listed: Grasses, broad leaves and both grasses and broad leaves

The Dependent Variable - The dependent variable measured was Weed Management Effectiveness. Using a 3-point Likert type scale with response options: Very effective, Effective and Not effective, respondents were asked to state the degree of their effectiveness in weed management using the following weed management practices: Land preparation, plant spacing, mulching, crop rotation, bush burning, use of insects, use of plant breeding, herbicides identification, herbicides spraying equipment calibration, choice of herbicides, herbicides formulation and herbicides application. The highest weed management effectiveness score was 36 while the least score was 12. Weed management effectiveness score was then operationalised and categorised as Low effectiveness scores (12-19), Medium effectiveness scores (20-27) and High effectiveness scores (28-36). Descriptive statistics was used to describe the demographic characteristics of the respondents while Chi square was used to test the relationships between the variables in the stated hypotheses.

RESULTS AND DISCUSSION

Demographic Characteristics of Respondents

The data in Table 1 showed that 60.0% of the respondents are between the ages of 30 and 39 years, the average age was 31 years old. This age structure indicates that majority of the farmers are still in their active and productive stage. Majority (85.3%) of the respondents are married. The data on the major occupation of the respondents showed that 98.0% are engaged in farming as their major occupation, implying that farming is the most prevalent occupation and income generating enterprise in the area. Some other income generating activities in the study area are trading, tailoring and photography. Some of the respondents also work in government ministries as civil servants. This showed the popularity of the training programme among people of various occupational calling including the government parastatals and departments. Results on educational status showed that majority (68.0%) had secondary and higher educational qualification. This is expected to convey on the respondents the ability to access technical information and other extension services that would further enhance their production capacity and enable them to overcome serious production constraints among which is weed control. This is also expected to have positive and very significant impact on their productivity. Majority (90.7%) of the respondents are Muslims while 9.3% are Christians; indicating that both Islamic religion and Christianity have successfully taken over and have relegated traditional form of worship to the background in the area. This however may not have effect on weed management effectiveness of respondents.

Table 1: Distribution of Respondents according to Age, Marital Status, Major Occupation, Education and Religion (n=150)

Characteristics	Frequency	Percentage
Age (in years):		
20-29	55	36.7
30-39	90	60.0
40-49	05	3.3
Marital Status:		
Married	128	85.3
Single	22	14.7
Major occupation:	147	98.0
Farming	03	2.0
Others		
Educational status:	09	6.0
No education	39	26.0
Primary education	76	50.7
Secondary education	26	17.3
Tertiary education		
Religion:		
Christianity	14	9.3
Moslem	136	90.7

Source: Field Survey, 2010

Farm size cultivated and common weed types in the area

Results in Table 2 revealed that the modal (59.3%) farm size cultivated by the respondents was between 1 and 2 hectares. This is an indication of the fact that farmers in the area are still small-holders and subsistence in nature. This finding is supported by Rahji (1999) who reported that in Nigeria, agriculture is the preserve of small holding farm households; and Akinsorotan (2000) who asserted that Nigerian small scale farmers usually crop small hectare of farmland because of lack of adequate capital, education, extension services, storage and marketing facilities as well as inefficient use of

agricultural inputs such as improved seeds, chemicals and fertilizer. Both grasses and broad leafed weeds are prevalent in the area as most respondents (59.4%) reported to have serious challenges with these on their farmland. This implies that for weed management to be very effective, combinations of weed management methods that can take care of both grasses and broad leaved weeds must be employed.

Table 2: Distribution of Respondents according to Farm Size cultivated and Common Weed types in the area (n=150)

Characteristics	Frequency	Percentage
Farm size cultivated (Ha):		
Less than 1	42	28.0
1-2	89	59.3
More than 2	19	12.7
Common Weed Type:		
Grasses	29	19.3
Broad Leaves	32	21.3
Both	89	59.4

Source: Field Survey, 2010

Weed Management method and Cost of weed management

Results in Table 3 show that 38% of the respondents adopted cultural method and 36.7% of them used chemical method of weed management. None of the respondents however adopted biological method in the area. This may be due to the fact that the biological method of weed management is still unpopular and difficult to practice in the tropical Africa. The data also revealed that 25.3% combine both cultural and chemical method of weed management on their farmland. Majority, 65.3% spent between #5,000 to #10,000 to control weed on their farmland while very few (10.7%) spent more than #10,000 on weed management. For weed management to be effective; there is the need for proper plant identification, selection of effective management methods and monitoring of the effects of the

management methods adopted over time. The weed management methods should include soil fertility maintenance, use of appropriate herbicide for appropriate weed type and proper handling through compliance with product requirement; and even awareness of the sources of weed seeds. All these, if properly understood and carefully applied; are expected to drastically reduce the cost of weed management.

Table 3: Distribution of Respondents according to Weed Management Methods and Cost of Weed Management (n=150)

Characteristics	Frequency	Percentage
Weed Mgt method:		
Cultural only	57	38.0
Chemical only	55	36.7
Biological only	0	0.0
Cultural and Chemical	38	25.3
Cost of weed mgt (N):		
Less than 5,000	36	24.0
5,000-10,000	98	65.3
More than 10,000	16	10.7

Source: Field Survey, 2010

Relationship between educational status of respondents, cost of weed management, farm size cultivated, common weed type in the area and weed management effectiveness

Results in Table 4 below show the relationship between educational statuses of the respondents; cost of weed management, farm size cultivated prevalent weed type in the area and weed management effectiveness. It showed that significant relationships exists between weed management effectiveness and educational qualification, cost of weed management and weed type, all at $p < 0.05$. This implies that education of the respondents had a bearing on their ability to manage the weed on their farmland effectively. They may likely have

accessed effective weed control methods through their contact with extension agents and other sources of information. It may also imply that training received while in schools by the respondents on weed management is well understood and is being effectively applied on the farm. Once a weed infestation exists on a farmland, management efforts become more expensive, more costs are expended to ensure that the weed is properly handled. However, no significant relationship exists between farm size and weed management effectiveness, implying that farmers with smaller farm size may not have managed weed differently from farmers with larger farm size.

Table 4: Relationship between Educational Qualification of Respondents, Cost of Weed Management, Farm Size Cultivated, Common Weed Type in the Area and Weed Management Effectiveness

Variables	X^2 Cal	X^2 Tab	P	Decision
Educational Qualification	25.47	12.59	0.05	Significant
Cost of weed management	9.93	9.49	0.05	Significant
Farm size cultivated	1.24	9.94	0.05	Not Significant
Weed type	10.57	9.94	0.05	Significant

Source: Field Survey, 2010

CONCLUSION AND RECOMMENDATIONS

The study appraised the weed management effectiveness of Leventis trained and practicing farmers in the North Western Agro ecological Zones of Nigeria. All the variables, except farm size; tested against the weed management effectiveness were found to be significant at $p<0.05$. Based on the result of this study, an integrated approach which would involve adoption of proper land preparation that will minimise the cost and enhance effectiveness of herbicides application to suppress growth of weed is recommended. Moreover, educational efforts which address weed management problems and also associate such problems with other production practices must be intensified by extension services providers in the area and trainers of agriculture in Leventis Foundation, if weed management is to be improved and weed-induced yield losses minimised. Soil fertility and management practices such as crop rotation, cover cropping, intercropping and proper soil fertilization as enshrined in the Leventis Foundation training curriculum must also always be properly taught at schools level. Proper monitoring and evaluation visits to trained farmers should be intensified to ensure correct applications of such agricultural practices by farmers. Trained farmers should also act as agents of change by sharing the knowledge acquired during training with other local farmers in their various communities. This will boost up the growth and competitiveness of their crop plant, retard the growth of weed and produce appreciable multiplier effects on farmers' productivity, income and their general standard of living.

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