



Full Length Research Paper

Factors Influencing Adoption of Chemical Weeding Among Farmers in North Central Nigeria; A case Study of Farmers in Idofian, Ifelodun Local Government Area, Kwara State

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Abstract

The major focus of this research is to examine the factors influencing the adoption of chemical weeding among farmers in Idofian, Ifelodun Local Government Area, Kwara State. The study also examine the benefits which farmers stand to gain by improving the agricultural production system and reduce drudgery in order to improve the quality of life of farmers in the study area and by extension the rural people in general. Relevant data such as the socio-economic characteristics of the respondents, the farmers' sources of information and inputs, and as well as awareness on the use of agrochemicals were examined and analyzed. Results of the study indicated that 75% of the respondents were males while female farmers accounts for the remaining 25%. Only 30% of the entire respondents are in their productive years. Most of the respondents (73%) were married, 71 % are small holder farmers with less than 5 acre farms and 57% attended formal schooling. Most of the respondents were full time farmers while few of them had more than 6 years of farming experience. The results also identified that most of the farmers rate the degree of weed infestation after applying various types of herbicides on their farms either as low or very low. Similarly, most of the farmers attested to the fact that they have noticed some forms of improvements in their farming activities; such as the overall yield. Other benefits derivable from chemical weed control (as attested by the farmers) include reduction in production cost, making the farms to be neat, and availing the farmers to have more time to attend to other jobs, especially the part-time farmers.

Key words: Adopting, Agricultural-Production, Benefits, Chemical-Weeding,

Introduction

Agriculture is the most important economic activity providing food, employment, foreign exchange and raw material for industries in many developing countries including Nigeria. Agricultural production certainly occupies a prominent position in every economy that is aimed at rural employment, sufficiency in food and fibre production and poverty alleviation. It is the mainstay of Nigerian economy as it provides employment for about 70% of Nigerian's population; it contributes 38% of the National Gross Domestic Product (GDP) and accounts for about 90% of the activities in the rural environment, (FMARD, 2006). Agriculture is, therefore, an important part of the Nigeria society. Conventional agricultural goals focus on increased yields and decreased costs of production (Norman *et al.*, 1997; Horrigan *et al.*, 2002).

The agricultural production system in developing countries such as Nigeria is highly dominated by traditional farming system where application of modern inputs and technology has been extremely limited. Farming is still widely carried out by human labour using mainly traditional tools. Labour components consume the highest factor in cost of production. Studies carried out on Nigerian agricultural production, for example, showed that labour accounted for 77% of the cost of maize production and about 60% to total cost of sorghum production in Nigeria, (FMARD, 2006). This results in low output and productivity as capital investment is minimal while land and labour constitute principal factors.

Weeds are stubborn unwanted plants that grow in conventional farms. They tend to compete with the crops for space, light, water and nutrients. Their ease of germination and rate of growth is very high. If not controlled, weeds tend to overshadow the crops that are planted resulting in low yields. Any attempt to eliminate them when they are overgrown results in increase in cost of production. Manual weeding is the most common method of weed control in Nigeria. Most farmers in rural Nigeria are peasants and aged who cannot effectively control weeds manually. This necessitates the adoption of chemical weeding as an alternative weeding system for a profitable crop production.

Methodology

Study Area

The study area is Idofian town and its surrounding villages. Idofian is situated in Ifelodun Local Government Area of Kwara State, Nigeria. Its geographical coordinates are 8° 23' 0" North and 4° 43' 0" East (IFLGA, 2012). The climate of study area is the humid tropic type and characterized by both the wet and dry seasons with a mean annual temperature that ranges from 25 – 28.9°C. The annual mean rainfall is about 1,150 mm; rainy season is between April and October of every year while the dry season is from November to March. Days are very hot during the dry season from November to February when temperature typically ranges from 33 – 34°C while the February to April the values are frequently between 34.6 and 37°C.

Essentially, the study area is located within the transition zone between the deciduous forest (rainforest) of the southwest and the savannah grasslands of the north (Jimoh and Ishola, 2009). The vegetation of the area is composed of species of plants such as locust bean trees, shear butter trees, acacia trees, elephant grasses, shrubs and herbaceous plants among others. The soils fall within the broad group of ferrallitic soils of the coastal plain sand and escarpment. The ecology favours growing of both cereals and root/tuber crops that are grown on smallholder plots usually in mixtures of at least two crops. Politically, Idofian falls in Kwara South Senatorial District (IFLGA, 2012; Map of Idofian, 2012).

Agriculture is the main source of the economy in the state. Majority of the people of this Local Government Area practice subsistence farming and petty trading to earn their living with as little as 5 acre farm holding in most cases. Primitive tools are still being used for farming in this area. Crops produced abundantly in this area include yam, cassava, maize, rice, okro, sorghum, locust-beans, and groundnut and soya beans. Generally the people are very hospitable, peace-loving, accommodating and famous for their high level of self help development efforts (IFLGA, 2012). The popular local industries in the area include Gari processing industries and Shea butter processing industries.

Data Collection and Survey Methodology

This study utilized primary data obtained from the farmers in the study area. Since the study focuses a large sample of individuals, a survey research method was selected (Babbie 2004). Considering that the sample villages are geographically scattered, the farmers were reached through the distribution of questionnaire. A structured questionnaire containing both closed and open-ended questions was designed. The sampling frame comprises 10 randomly selected farmers from the various communities cutting across the study area between February and March, 2013. Multistage random sampling procedure was employed in selecting the sample from where the data were collected Babbie, (1994). This method ensured a high degree of representation by providing the farmers with equal chances of being selected as part of the sample. A total of 100 farmers/respondents were selected from the study area for detailed study. In all thirteen (13) communities were involved in the survey from within the study area (Table 1). Respondents were contacted personally explaining the objectives of the project, encouraging them to participate and providing assurance about their confidentiality. They were also asked to liaise with other farmers within the study area who could also be willing to respond to the survey.

Table 1: Distribution of Sample Farmers Involved in the Survey

S/N	Ward	No. of Farmers
1	Idofian	28
2	Jimba-Oja	7
3	Kabba Owode	5
4	Gatta	8
5	Falokun	8
6	Ilota	5
7	Elerinjare	10
8	Okanle	3
9	Gaa Owonikoko	2
10	Igbo-Owu	4
11	Makolo	2
12	NCAM	10
13	ARMTI	8
	Total	100

Statistical Analysis

The data collected from this research were subjected to descriptive statistics (mean and frequency) to determine the benefits derived by the respondents as a result of adopting chemical weeding among farmers in the study area.

Results and Discussion

Socio-Economic Characteristics of the Respondents

Gender

Results obtained from the questionnaire administered (Table 2) show that 75% of the farmers were male and 25% female. Men, therefore, constituted a good proportion of those who engaged in various forms of agricultural production in Idofian and its neighboring communities. Studies on gender issues in agricultural production and technology adoption have been conducted by many researchers. Most studies indicated the different roles men and women play in technology adoption. In their studies on the

'Adoption of chemical weed control technology among cassava farmers in south eastern Nigeria' with special reference to Abia state', Udensi *et al.*, (2012) agrees with this finding concerning the roles played by both gender. However, since adoption is not a permanent behaviour, it implies that an individual may decide to discontinue the use of an innovation for a variety of personal, institutional and social reasons, one of which might be the availability of another practice that is better in satisfying the farmers' needs.

Marital Status

The study shows that majority of the farmers in the study area (73%) were married, 12% were single, 2% were divorced and 13% widowed, (Table 2). This means that married people dominate agricultural activities in the study area. Further analysis of this data on gender basis shows that 61% of the male respondents are married, 8% were single, 5% widowed and 1% divorced. With regards to the female farmers, the results indicated that 12% of them were married, 4% single, 8% widowed, and 1% divorced (Figure 1).

Table 2: Distribution of Farmers According to Socio-Economic Characteristics (%)

Variable	No. of Farmers (%)
Gender:	
Male	75
Female	25
Marital Status:	
Single	12
Married	73
Divorced	2
Widowed	13
Age:	
< 30	11
30 – 40	13
40 – 50	23
50 – 60	35
> 60	18
Educational Status:	
Non-Formal Education	43
Primary Education	13
Secondary Education	16
Tertiary Institution	28
Occupational Status:	
Part-time Farming	40
Full-time Farming	60
Farming Experience (Years):	
0 – 2	4
3 – 4	14
5 – 6	18
> 6	64
Farm Size (acre):	
<3	16
3 – 5	55
6 – 10	20
11 – 15	7
>15	2
Total Sample Farmers (N)	100

Age

Results in Table 2 shows that 11% of all the farmers in the study area were below the age of 30 years, 13% were between the ages of 30 – 40 years, 23% were aged between 40 – 50 years old. The 50 – 60 years age group was 35% while those above 60 years of age are 18%. This means only 30% of the entire respondents are in their productive years. Viewing the age groups on gender perspective, it shows that 6% of the male farmers are below the age of 30, 10% between the ages of 30 and 40, 14% between 40 – 50 years, 30% between 50 – 60 years and 15% above 60 years. For their female counterparts, 5% are less than 30 years, 3% between 30 -40 years, 9% between 40 – 50 years, 5% between 50 – 50 years and 3% above 60 years old, (Figure 2). Age is said to be a primary latent characteristic in adoption decisions (Udensi *et al.*, 2012). The study also agrees with Ogunsumi (2007) who revealed that there were significant positive correlations between age and adoption pattern.

Educational Status

The educational status of the sample farmers in the study area shows that 43% of the farmers had no formal education while 57% had at least one forms of formal education or the other. This indicates that majority of the sample farmers in the study area are literate. While 14% of the farmers are partially literate, the results show that 13% of the sample farmers had post college education (Table 2). Further analysis show that most of the sample farmers practicing both types of chemical weeding are

educated. This agrees with Nzomoi *et al.*, (2007) that educated farmers, if exposed to new technologies and innovations are more likely to adopt them. This is because they are predisposed to understand new ideas and concepts provided by extension workers and other extension service provider to reduce the amount of complexity perceived in a technology thereby increasing a technology's adoption, McNamara *et al.* (1991). Waller *et al.* (1998) also believe that education creates a favorable mental attitude for the acceptance of new practices especially of information-intensive and management-intensive practices.

Occupational Status

The occupational status of the sampled farmers in the study shows that 60% of them were full-time farmers while 40% were part-time (Table 2). Most of the part-time farmers were indicated to have had formal educational backgrounds, had one form of white collar job or the other. Others are secondary schools drop-outs that depend on one trade or the other as means of livelihood but takes farming as alternate means livelihood. Full-time farmers are expected to have a higher adoption rate of chemical weed control technologies than part-timers, (Udensi *et al.*, 2012).

Farming experience

Table 2 also shows Farming experience in the study area was presented. The result shows that 64% of the respondents had more than six years of farming experience while 18% had between 5 – 6 years of farming experience. Most of the farmers in this category are found to be 50 years of age and above. Udensi *et al.*, (2012) urged that a farmer can become more or less averse to the risk involved by adopting a new technology with more experience thereby creating a positive or negative effect on a farmer's decision to adopt any chemical weed control technology.

Farm Size

The study shows that majority of the respondents (55%) in the study area had farm holdings of between 3 – 5 acres (Table 2). This implies that small-scale farmers have dominated agricultural production in the study area, supporting the argument of IFLGA (2012) that "majority of the people of this Local Government Area practice subsistence farming and petty trading to earn their living with as little as 5 acre-farm holding in most cases". It also agrees with Olayide (1980), Ogunfeditimi (1983), Ochai (1995) and Ogunsumi (2004) that most of the agricultural farms in rural Nigeria are small-scale farmers, cultivating from 0.1 to 10 ha, making the farmers peasant in nature. Further, Figure 1 shows that 16% of the farmers practice their agricultural activities in less than 3 acre farm lands with only 2% having more than 2 acres, although our investigation during the survey revealed that some respondents under estimated the sizes of their farms either because they did not know how to measure the farms or they just ignore the importance of doing so.

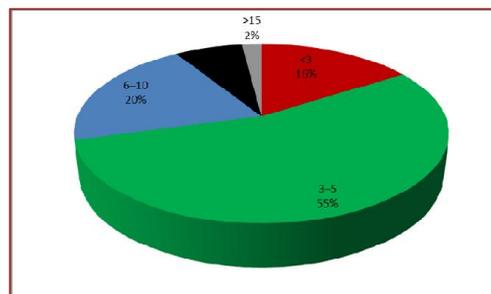


Figure 1: Farm holdings of the respondents (in acre)

Many studies also found a positive relationship exists between farm size and the adoption of technology. For example, Udensi *et al.*, (2012) found that farm size affects adoption costs, risk perceptions, human capital, credit constraints and labour requirements, among others. With small farms, Abara and Singh (1993) argued that large fixed costs become a constraint to technology adoption, especially if the technology is costly. Agunga (1995) also found that for small scale operators, it is easier to adopt rather than commercial farmers or larger farm operators who take more time to examine the risk involved with the adoption of new technologies or practices. It was argued that a negative relationship between farm size and the adoption of technology could be attributed to credit constraints. That is even though all the farmers might be interested in adopting the technologies only the large farmers would most likely to pursue them Weil (1970). Small-scale farmers' decisions to adapt or reject agricultural technologies depend on their objectives and constraints as well as cost and benefit accruing to it (Million and Belay, 2004). Similarly most of the innovations and improvements are received by a very small group of farmers because the innovative technological changes are associated with high capital investments. They also requires a certain farm size in order to ensure profits as it is correlated to the machinery and equipment investment (Hategekimana and Trant, 2002; Feder *et al.*, 1985).

Adoption Status of Chemical Weed Control

For a technology to be adopted, it must exist. Mahmood and Sheikh (2005) stated that creation of awareness is the first step towards the adoption process. Then information about the technology motivates it usage. Results of this survey identified the sources of information of chemical weeding in the study area. These include government agencies (23%), Radio/TV (15%), friends and other farmers (5%) and cooperative societies (3%). There are some respondents who are found to have more than one source as indicated in Figure 2.

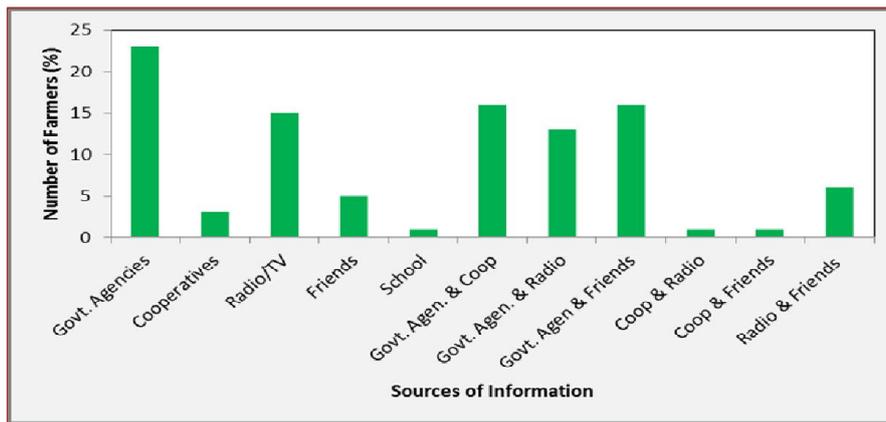


Figure 2: Source of information on chemical weeding

Results obtained with respect to sources of herbicides have been supported by some earlier discoveries. For example, Yapa and Robert (1978) opined that the adoption of an entrepreneurial innovation by an individual requires the availability of sufficient information on the innovation. Once farmers are aware of concise efforts geared towards total adoption and sustaining adopted technologies, they would gear up and organize themselves so as to benefit from such programmes and improve their status, Ogunsumi (2007). Similarly, Hussain, (1997), Hanif (1992) and Ali (1994) also found that radio/TV was the major source of information in educating farmers regarding recommended agricultural practices. Fellow farmers were also regarded as source of agricultural information by Farooque (2004), Ali (1993), Akhtar (1997) and Shuaib (2000).

Results of the survey conducted in the study area also indicate that 87% of the farmers practices both mechanical and chemical weed control methods (Figure 3). Combining the two methods was obviously due to the fact that most of the farmers use herbicides as pre-emergence only, thus necessitating supplementary mechanical weeding as only 7% of the farmers were found to use post-emergence herbicides at the later stage of their farming practices. No farmer was found to adopt the cultural and biological weeding methods while only 1% adopts integrated weeding system. Five percent (5%) of the respondents indicated to have practiced mechanical weeding only. This has been attributed to lack of knowledge/awareness on their part. These category of farmers are more likely to come from the less educated respondents (over 60 years). High cost of the herbicides and difficulty in application was also discovered to deny some respondents the benefit of using chemical weeding method.

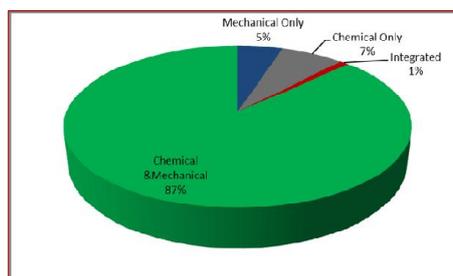


Figure 3: Adoption of weeding method (in %)

Source of Herbicides

There are three sources used for procuring herbicides by the farmers in the study area. These are open market where 43% of the respondents purchase their herbicides, farmers’ cooperative societies (1%) and through others farmers and friends (2%). However, most of the farmers relied on more than one source to purchase their needed herbicides as indicated in Figure 4. Results obtained further shows that 62% of the respondents were experiencing some difficulties in procuring the needed quantity of herbicides for their farms, perhaps due to non availability of reputable agro-chemical dealer within the study area. This necessitates most of them to rely on other farmers who have access to flourishing herbicides markets in Ilorin.

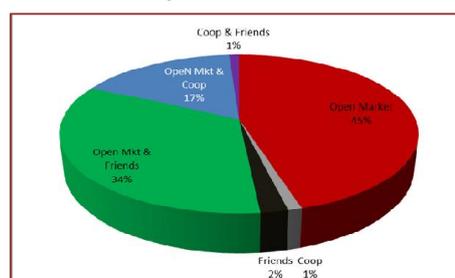


Figure 4: Respondent's sources of herbicides

Method of Chemical Weeding Adopted

Of the 95% respondents that were found to practice chemical weeding method, it was observed that most of them (81%) use the herbicides as pre-emergence only to suppress the initial weed growth then complements them with mechanical weeding. Only 14% of the farmers eliminated mechanical weeding by adopting both pre- and post-emergence weed control method in the study area thereby. These categories of farmers were all part-time farmers who have formal education at various levels and are somewhat employed. They, thus take farming either as hobbies or as source of income that will complement their main jobs/trades.

Farmers' assessment of chemicals used in weed control

Farmers in the study were found to have used various types of herbicides for quite a considerable time. It was discovered that 8% of the respondents have adopted the weeding method for more than six years while 18% of them have a record usage of between 5 – 6 years. But the bulk of those who adopt the technology (48%) have between 2 – 4 years experience, (Figure 7).

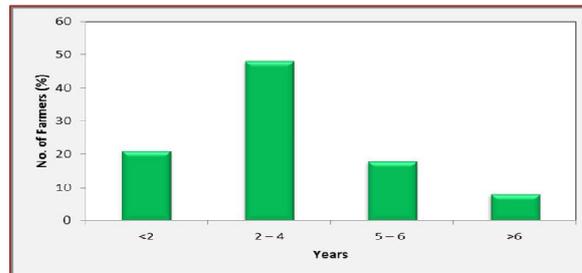


Figure 5: Farmers' experience on chemical weed control

Respondent's assessment of chemical weeding in the study is very encouraging. This is because most of the farmers (77%) rate the degree of weed infestation after applying various types of herbicides on their farms either as low or very low. However, 18% of the respondents were found to experience some difficulties in weed management after applying the herbicides, (Figure 8). Similarly, most of the respondents interviewed (95%) attest to have noticed some forms of improvements in their farming activities as a result of adopting chemical weeding method. Such improvements include increase in overall yield where 55% of the farmers consented to, avenue to reduce production cost (31%), keeping their various farms neat (77%) as well as providing them with time to attend to other jobs (42%) especially for those who took farming on part-time basis.

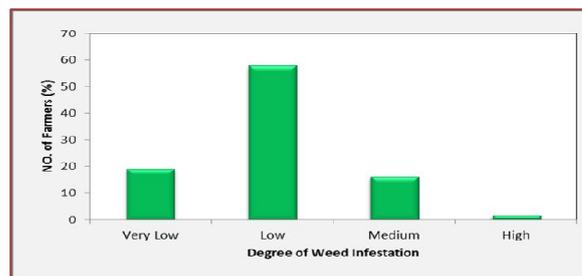


Figure 6: Farmers' assessment of chemical weed control

Interestingly, 28% of the respondents noticed other benefits such as scaring animals and other dangerous reptiles like snakes from their farms after herbicides application (Figure 9). Yield increase agrees with Beyer, *et al.* (1996) that herbicides are production tools that increase farm efficiency and reduce energy requirements. Feder *et al.* (1985) similarly confirmed technology as an opportunity that offers increase production and productivity. The study also attests to Fedtke's (1982) finding, who opined that herbicides usage reduce or eliminate labour and machine requirements and modify crop production techniques.

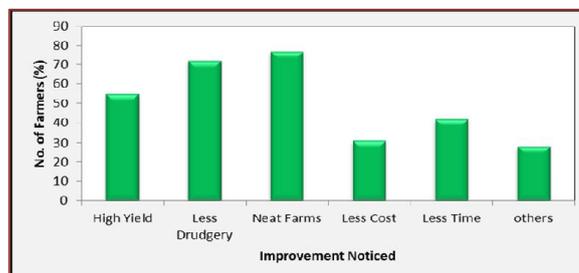


Figure 7: Improvements as a result of adopting chemical weed control

Conclusion

The degree of weed infestation after herbicide application could be attributed to either adulteration of the herbicides or lack of knowledge of its usage/formulation. Non-coverage of area of application and use of improper nozzle also affects the effectiveness of herbicides. Only 7% of the respondents were found to use both pre- and post-emergence herbicides as means of controlling weed in their farms. These farmers are basically those with formal education. Farmers who complained of poisoning reported that their children suffer nausea and vomiting whenever they come in contact with herbicides. Appropriate policies aimed at improving the level of awareness among farmers should be intensified to encourage adoption of the technology. Policies for produce marketing as well as provision and subsidizing chemicals for weed control should be created to encourage farmers to increase their adoption rate with a the goal of raising income and hence their living standards.

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