

---

## Effects of Weeds on the Growth of Maize in Zuru Local Government Area of Kebbi State, Nigeria

---

Mshelizah R. J.<sup>1</sup>, H. I. Germace<sup>2</sup>, M. S. Ribah<sup>3</sup> & U. Z. Senchi<sup>4</sup>

<sup>1</sup>Department of Agricultural Extension and Management, College of Agriculture, Zuru

<sup>2</sup>Department of Science, College of Agriculture P.M.B. 1018, Zuru, Kebbi State, Nigeria

<sup>3&4</sup>Department of Animal Health Technology, College of Agriculture, P.M.B. 1018, Zuru,

**Corresponding Author:** Mshelizah R. J

### ABSTRACT

---

The main objective of this study is the “effects of weeds on the growth of maize in Zuru local government Area of Kebbi State Nigeria”. The specific objectives are to identify the common types of weeds found in the study area, to identify the characteristics of weeds found in the study area, to determine the mode of weeds reproduction, to identify the method of spreading weed seeds and to identify the various weeds controls measures used in the study area. The research work was carried out in four (4) villages in Zuru Local Government Area, namely; Dabai, Rikoto, Zuru Center and Senchi, these four villages were purposively selected as sample villages. Fifteen (15) farmers were randomly selected from each of the villages, given a total number of 60 respondents as sample size for this study. Data were collected by the administration of structured questionnaire. The data obtained were analyzed using simple descriptive statistic (Frequency distribution and percentages). Results and discussion of major findings were made and recorded, necessary summary, conclusion and recommendations were drawn, with the hope that, at the end of reading this write-up the reader would find this project report useful in his/her various farm operations.

**Keywords:** Effects, Weeds, Growth, Maize and Kebbi State

### INTRODUCTION

A weed is a plant usually an annual herb or perennial herb, shrub or even a tree which is growing in the wrong place or where it is not wanted and therefore is in competition with crop plants. Even crop plant grown where it is not wanted can be termed as a weed (Walker, 1971). We'd need little

encouragement and can persist even under unfavourable conditions. They tend to grow faster than crop plants and are most dangerous in the early stages of crop development. Weeding should be done as soon as weeds appear on farm land and after planting (Arney, 1915). Weed may also contaminate produce reducing the quality of the

crops. Weed can sometime act as host plant for insect-pest and disease, but they are mainly undesirable for competing with the crop for space, air, light, water and mineral. Once the crop has developed well, the threat from weed is less important (Shawn, 1954). Weeds can contaminate crops and in extreme cases act as food poison, which indicates that some weeds may contain toxic substance which adversely affects crop growth (Arney, 1951). According to Shawn (1954) a plant growing where it is not wanted is regarded as weed. It follows that a plant may be a weed in some places and not in others. Shawn (1954) reported that one mustard plant required twice as much as nitrogen, twice as much as phosphorus, four times the potassium and four times as much as water as one out plant, that any weed that may tend to disturb the plant to have the value will reduce the yield of that mustard seed.

Weidemon *et al;* (1951) found that no appreciable benefit from cultivation of corn as compared with removing the weeds at the surface of the soil with hoe or mechanical means regardless of whether the land was fully ploughed or not. Arney (1915)

reported that comparing different methods of eradicating weed that the cost of the additional labour are necessary for growing the crop on weed land rather than growing identical crops under good condition. The author reported that the expenditure of the amount for additional labour using drought animal through the rotation period resulted in complete eradication of the weeds.

William (1859) stated that the labour of the agriculturist are a constant struggle on one hand by preventing the most favourable condition possible, the author endeavour to make certain plant grow and produced to their up-most capacity. On the other hand the author has to prevent the growth of certain other plant that is ready to avoid them of this favourable condition. Cate *et al;* (1917) pointed out that the principal virtue of cultivation of row crops is weed control and the method for handling weed that minimized or eliminates tillage is advantageous from the stand point of soil structure. On the other hand, a well prepared seed bed to a row crops is subjected to crusting if heavy precipitation is followed by hot sunshine, and the result impervious soil surface layer may so restrict

gaseous exchange as to reduce crop growth.

Komolafe *et al*; 1 (1981) define weed as a plant usually an annual herb, but sometimes a perennial herbs, shrub or even a tree which is grown in the wrong place and is therefore in competition with crop plant, even a crop plant growing in the wrong place can be temporarily regarded as a weed. However, according to Ojomo (1976) weeds are unwanted plant which grows in farm pasture and lawn; they compete with crop plant for food, light and even air. Walker (1971) expressed his opinion that weeds are most often defined as plant grown where man does not want them, and in the context of temperate agriculture, this has generally come to mean any plant other than crops however under some condition e.g. in the wet tropics complete weed control may be undesirable as well as impracticable. According to Hawc (2008) weed can compete with productive crop or pasture, or convert productive land into unusable scrub. Weed are also often poisonous, distasteful, produce burrs, thorns or other damaging body part, or otherwise interfere with the use and management of desirable crop by contaminating

harvest or excluding livestock. Weed tends to thrive at expense of the more reformed edible or ornamental crops. They provide competition for space, Nutrients, water and light, although how seriously this will affect crops depend on a number of factors. Some crops have greater resistance than other smaller. Slower growing seedling are more likely to be overwhelmed than those that are larger and more vigorous.

Hubby (2009) revealed that the presence of weeds does not necessarily mean that they are competing with a crop, especially during the early stages of growth when each plant can find the resource it required without interfering with the others. However, as the seedling size increases, their root system will spread as they each begin to require greater amount of water and nutrients, estimates suggest that weed and crop co-exist harmoniously for around three weeks, therefore it is important that weed are removed early on in order to prevent competition occurring. Weed competition can have quite dramatic effect on crop growth. Weed can also host pest and disease that can spread to cultivated crops.

Charlock and shepherd's purse may carry clubroot, eelworm can be harbored by chickweed, fat hen and shepherd's purse. While the cucumber mosaic virus which can devastate the cucurbit family is carried by a range of different weeds including chickweed and groundsel (Komolafe and Joy, 1981).

As Hubby (2009) described the above methods of weed control, avoid using chemicals, however, this method may damage a fragile soil by restructuring it, hence are not always used, but the organic farmers prefer using the above method described by the author. However, weed control can also be achieved by the use of herbicides. Selective herbicides kill certain targets while leaving the desired crop relatively unharmed. Some of these act by interfering with the growth of the weed and are often based on plant hormones. Herbicides are generally classified as follows:

**Contact Herbicides:** It destroys only that plant tissue in contact with the chemical spray. Generally, these are the fastest acting herbicides. They are ineffective on perennial plant that is able to grow from root or tubers.

**Soil Borne Herbicides:** Are applied to the soil and are taken up by the roots of the target plant.

**Pre-emergent Herbicides:** Are applied to the soil and prevent germination on early growth of weed seeds. In agriculture large scale and systemic, weeding is usually required, often by machines such as liquid herbicides sprayer, or even by helicopter (such as in the USA) to eliminate the massive amount of weeds present on farm land. However, there are numbers of techniques that the organic farmer can employ such as mulching and carefully timed cutting of weeds before they are able to set seed.

### **Problem Statement**

The presence of weeds among the growing crops motivates us to carry out this study, to know if they are annual, biennial or perennial, and to know how they reproduce and spread their seeds, to be aware of their special peculiarity, that is, if they are parasitic, epiphytic, Xerophytic or hydrophytic plants. This is to help us know how best they will be controlled and prevented from being dispersed. The research work will also answer

the following question; what is the effect of weed on the growth of maize crops? What are the common types of weeds found in the study area? What are the major characteristics of weeds? What is the mode of weed reproduction and how do they spread their seed? And what are the various methods of weed control practiced in the study area?

### **Objectives of the Study**

The general objective of the study is “effect of weeds on the growth of maize in Zuru Local Government Area of Kebbi State”. The specific objectives are to:-determine the effect of weeds on the growth of maize, identify the common types of weeds found in the study area, identify the major characteristics of weeds found in the study area, determine the mode of weeds reproduction as well as the mode of spreading their seeds, and identify the various weed control use in the study area.

## **METHODOLOGY**

### **Population and Sample Size**

The population of this study was the maize farmers in Zuru Local Government area of Kebbi State. Four (4) villages (Administrative districts) were purposively selected

to serve as sample villages. This includes Dabai, Rikoto, Zurucentre and Senchi. Fifteen (15) Maize farmers were randomly selected from each village, given a total number of 60 respondents as sample size for this study.

### **Methods for Data Collection**

The data for this study were collected from two sources, namely primary and secondary sources. The primary data were obtained by the administration of structured questionnaire to the respondents, in order to obtain information on the stated objectives. The secondary data however were obtained from literature material relevant to the study such as consultation of textbooks, Journals, past projects, magazines, pamphlet and internet.

### **Analytical Techniques**

The data obtained for this study were analyzed using simple descriptive statistics (frequency distribution and percentages); this was used to achieve the stated objectives of the study.

## **RESULTS AND DISCUSSION**

The items discussed in this section includes, the effects of weeds on the growth of maize, the common types of weeds found in the study area,

the major characteristics of weeds found in the study area, mode of weed reproduction, methods of spreading weed seeds, and the various weeds controls methods found in the study areas.

### Effects of Weeds on the Growth of Maize

Weeds are plants grown where they are not wanted. They tend to grow faster than crop plant, they can

sometimes act as host plant for insect-pest and diseases, but they are mainly undesirable for competing with the crop for space, air, light, water etc. and are most dangerous in the early stage of crop development. They also contaminate produce reducing the quality of crops and adversely affect crop growth and development.

**Table 1: Distribution of Respondents' Effect of Weeds on the growth of Maize**

Effects of Weeds on Maize Seed	Frequency	Percentages
Harbour disease	12	20
Introduce pest & disease	15	25
Cause bad taste	8	13
Reduce yield crop	25	42
<b>Total</b>	<b>60</b>	<b>100%</b>
<b>Effects of Weeds on the Growth of Maize Plant:</b>		
Compete with soil nutrient	15	25
Compete with water	24	40
Block the air space.	21	35
<b>Total</b>	<b>60</b>	<b>100%</b>
<b>Causes of High Cost:</b>		
Hired labour	33	55
Pre-emergence herbicides	12	20
Mechanization	15	25
<b>Total</b>	<b>60</b>	<b>100%</b>
<b>Other Harmful Effect of Weed on Maize Plant:</b>		
Reduce the quality of yield	22	37
Wilting & reduction of	9	15
Poisonous effect & reduce market value	8	13
Compete with sunlight	4	7
None of the above	17	28
<b>Total</b>	<b>60</b>	<b>100%</b>

Base on this research work, it is obvious that the effects of weed on the growth of maize in Zuru Local Government cannot be over emphasized. Table 1 revealed that 42% of the respondents' farm were affected by weeds which reduce the yield of their maize crop, 25% of the respondents claimed that the weeds introduce pest and diseases in to their maize crop, while 20% and 13% of the respondents said that it harbour disease and caused bad taste to their maize crop respectively. Forty percent (40%) of the respondents also said that weeds compete with little water that is been supplied to the plants, 35% claimed that the presence of weeds in the farm blocks the air spaces around the plant which makes the plant not to transpire well which is needed for their growth and 25% of the respondents said that it compete with the fertilizer applied to the plant and the nutrients in the soil. Fifty five (55%) of the respondents claimed that weeds causes high cost of production through hired labor, while 20% of the respondents indicated that weeds requires pre-emergence herbicides in order to control its growth, and 25% of the respondents revealed that

mechanization of the weeds on their farm land makes them spent much money on their maize crop. Thirty seven percent (37%) of the respondents revealed that weeds reduces the quality of yield, apart from the other effects mentioned above, 15% of the respondents said, it lead to the wilting of the crop and reducing growth of the crop, 13% claimed that it introduce poisonous substance to the maize crop and reduced the market value of the crop, while 4% of the respondents revealed that it compete with sunlight with their main crops and 28% of the respondents claimed that weed has no any effect apart from those mentioned above.

### **The Common Types of Weeds Found in the Study Area**

Most of the common weeds found in the study area are Tridax, spear grass, goat weed, elephant grass and others. Most of these weeds complete their lifecycle annually, perennially and even parasitically. Most of these weeds can survive where cultivated crop do not survive and they are survived through soil nutrient, water in the soil, sunlight etc.

**Table 2: Distribution of Respondents' Common types of Weeds found on Farm**

Effects of Weeds on the Growth of Maize in Zuru Local Government Area of Kebbi State, Nigeria

<b>Common types of Weed:</b>	<b>Frequency</b>	<b>percentages (%)</b>
Tridax weed	18	30
Spear grass	18	30
Goat weed	15	25
Elephant grass	9	15
<b>Total</b>	<b>60</b>	<b>100%</b>
<b>Life cycle of Weeds:</b>		
Annually	33	55
Perennially	18	30
Parasitically	9	15
<b>Total</b>	<b>60</b>	<b>100%</b>
<b>Other Weeds apart from the listed above:</b>		
Guinea grass, Grant star grass	14	23
Bush marigoid, Bahama grass	12	20
Carpet grass & Giant star grass	14	23
Milk weed & stubborn grass	11	19
None of the above	9	15
<b>Total</b>	<b>60</b>	<b>100%</b>
<b>Method of Weeds survival:</b>		
Soil nutrient	18	30
Water in the soil	24	40
Sunlight	12	20
Others (Carbondioxide)	3	5
(Rainfall)	2	3
(Photosynthesis)	1	2
<b>Total</b>	<b>60</b>	<b>100%</b>

The Table above revealed the distribution of respondents' types of weeds found on their maize farm. The Table shows that 30% of the respondents farm was affected by tridax weed, also 30% of the respondents, were affected by spear grasses it was found that these weeds were the common weeds found their farm land. In the same vain 25% and 15% of the respondents indicated that goat

weed and elephant grasses were the major types of weeds that affect their maize farm, while 55% of the respondents claimed that those weeds complete their life cycle within a year (Annual) until next growing season. Thirty percent (30%) of the respondents revealed that the weeds on their maize farm live longer than a year and their effects on their maize crops is severe if care is not taken, 15% of the

respondents indicated that the weeds in their maize farm depends on the crop plants. Sixty five percent (65%) of the respondents agreed that those weeds can survive where cultivated crop do not survive and 35% said no. Thirty percent (30%) shows that they can survive on nutrient in the soil, 40% of the respondents revealed that weeds can survive on water in the soil, 20% of them revealed that weeds can survive on sunlight and 10% of the respondents indicated others, which includes (carbondioxide, rainfall

and photosynthesis) these are other means of weeds survival.

### The Major Characteristics of Weeds Found in the Study Area

Weeds found in the study areas were characterized by fast growth rate and slow growth rate and were very easy to establish. Most of these weeds are herbs, shrubs, trees and others e.g elephant grass etc. in nature, they have different roots in which they penetrate to the soil and obtain nutrient. It can be deep rooted, shallow rooted or spreading

**Table 3: Distribution of the Respondents' Major Characteristics of Weeds on their Farm**

Characteristics of Weed	Frequency	percentages (%)
Fast growth rate	30	50
Slow growth rate	18	30
Persistence	8	13
Drought Resistance	4	7
<b>Total</b>	<b>60</b>	<b>100%</b>
<b>How do they establish:</b>		
By reproducing seeds	18	30
Grow larger before planting	6	10
Fast growth with plant	10	17
With and without rainfall/water	12	20
Seed dispersal	4	6
None of the above	10	17
<b>Total</b>	<b>60</b>	<b>100%</b>
<b>Nature of Weeds:</b>		
Herb	24	40
Shrub	18	30
Tree	12	20
Elephant grass	2	3
Goat weed & spear Grass	3	5
Stubborn grass	1	2
<b>Total</b>	<b>60</b>	<b>100%</b>

Effects of Weeds on the Growth of Maize in Zuru Local Government Area of Kebbi State, Nigeria

**Types of Weeds Root:**

Deep rooted	24	40
Shallow rooted	12	20
Spreading root	18	30
Advantageous Root	4	7
Rhizomes	2	3
<b>Total</b>	<b>60</b>	<b>100%</b>

Table 3 present the distribution of the respondents' major characteristic of weeds found on their maize farm. Weeds found in the study areas are characterized by fast growth rate, 50% of the respondents revealed that the weeds found on their maize farm has fast growth rate, where 30% of the respondents indicated that, the weeds found on their maize farm is characterized by slow growth rate, due to the regular weeding and 20% of the respondents revealed other types of characteristics such as (Survive in stress condition, very stubborn, absorbing nutrient from the plant and seed re-growth). Sixty five percent (65%) of the respondents responded that weeds of their farm are established easily through rainfall, sunlight and so on. While 35% of the respondent stated (no) which implies that the weeds do not established easily. Also 40% of the respondents revealed that herbs are the major weeds found on their maize farm, 30% of the respondents revealed shrub as the

common weeds found on their maize farm and 20% of the respondents said that trees are the major weeds found on their farm which is perennial weeds affecting their crop plant, and 10% of the respondents indicated other types of weeds affecting their maize crop other than the above mentioned. This includes (elephant grass, goat weed, spear grass and stubborn grass). Thirty percent (30%) of the respondents revealed that weeds are also established by reproducing their seeds, 10% of the respondents revealed that the weeds are established by growing larger before planting, and 17% of the respondents stated that, the weeds of their farm established by fast growth with plants. Twenty percent (20%) of the respondents stated that weeds of their farm established with or without rainfall, and 6% claimed that weed established through seed spreading by the agents of weeds seeds dispersal e.g wind, water/erosion, animal and human-being, while 17% of the respondents

revealed that the weeds of their farm do not established easily. Forty percent (40%) of the respondents responded that the root of weeds found on their maize farm penetrates into the soil which is deep rooted weeds, while 30% of the respondents revealed that the roots of the weeds found on their maize farm are spreading type and 20% of them indicated shallow rooted weeds, and 10% of the respondents revealed other types of

root, this includes (Advantageous root, and Rhizomes).

### Mode of Weeds Reproduction and Methods of Spreading Weed Seeds

Most of the weeds found in the study areas are reproduced sexually by seeds and some are reproduced asexually or vegetatively by stolon, runner and rhizomes. The weed seeds are spread or dispersed through some agents which include wind, water/erosion, animal and Human being.

**Table 4: Distribution of the Respondents' Mode of Weed Reproduction/Methods of Weeds Dispersal**

Methods of Weeds Reproduction	Frequency	Percentage (%)
By seed	36	60
Vegetatively	18	30
By Rhizomes	3	5
By runner/stolon	2	3
<b>Total</b>	<b>60</b>	<b>100%</b>
<b>Agents of Weed Seeds Dispersal:</b>		
Wind	21	35
Water/erosion	21	35
Animal	6	10
Human being	12	20
<b>Total</b>	<b>60</b>	<b>100%</b>
<b>Method of Hairing Weed</b>		
<b>Seeds dispersal:</b>		
By Animal	12	20
By Wind	30	50
By Human being	18	30
<b>Total</b>	<b>60</b>	<b>100%</b>

From the above Table it was observed that 60% of the respondents responded that the weeds of their farm are reproduced

by seed due to the presence of much weeds that contain seed in their maize farm, while 30% of the respondents claimed that the weeds

seed in their maize farm are reproduce vegetatively, and 10% of the respondents indicated other methods of weeds reproduction, these includes (runner, stolon and rhizomes). Seventy percent (70%) of the respondents agree that wind and water/erosion are the major agents of weeds seeds dispersal in their maize farm with 35% and 35% of the respondents respectively. Ten percent (10%) of the respondents revealed that animal are the major agents that carry weed seeds to their maize farm due to the rearing of animal within the farm, while 20% of the respondents claimed that human being are the major agents of weed seeds dispersal, because during the harvesting period, people roams about in the farm and can easily carry the weed seeds from one place to another. Similarly, 50% of the respondents responded that, the hairy weed seeds in their

maize farm were been dispersed mostly by the blowing wind, 20% shows that animals were the carriers of the weed seeds on their hairing body when roamed within the farm and transfer from one place to another. Meanwhile 30% of the respondents revealed that human being are their major agents of hairing weed seeds dispersal.

### The Various Weeds Control Measures Used in the Study Area

The various methods used to control the weeds in the study areas were cultural method, biological method, mechanical method and chemical method. After each method applied, plants were able to regain the following: well growth and development, early maturity, adequate nutrient are supplied to the plant as well as good yields are obtained.

**Table 5: Distribution of Respondents' various Weeds Controls used on their Maize Farm**

<b>Methods of Weeds Control:</b>	<b>Frequency</b>	<b>Percentages (%)</b>
Cultural method	21	35
Mechanical method	6	10
Biological method	9	15
Chemical method	24	40
<b>Total</b>	<b>60</b>	<b>100%</b>
<b>Observation after application of Control Methods:</b>		
Well growth and development	12	20
Adequate nutrient supplied		

to the plant	6	10
Early maturity	15	25
Good yields	27	45
<b>Total</b>	<b>60</b>	<b>100%</b>
<b>Best Control Measure:</b>		
Cultural method	9	15
Biological method	18	30
Mechanical method	15	25
Clinical method	18	30
<hr/>		
<b>Total</b>	<b>60</b>	<b>100%</b>

As it is observed from this study that, 60% of the respondents agreed (yes) that the weeds of their maize farm respond to any methods of weed control they applied, while 40% of them responded (No) due to the low farm scale they have where some machine cannot be used to control the weeds, and also lack of enlightenment from extension agents on how to control their farm weeds with chemicals, which make them not to apply chemical control. Out of the various control measures, 35% of the respondents applied cultural method due to the small farm scale they have, and they are rotating their land to control weeds. Ten percent (10%) of the respondents applied machine to control weeds on their maize farm, this is because they have large farm scale. Fifteen percent (15%) of the respondents controlled weeds of their farm biologically through hired labour and 40% use pre-

emergency herbicides for their control. Observation after application of control methods shows that, 20% of the respondents observed well grown and development of their maize crop, 10% revealed that adequate nutrient are supplied to the plant, 25% of the respondents observed early maturity of their maize crops and 45% of the respondents indicated to have obtained good yields of their maize crop after application of control measure. Best control measure was shown on Table 5, which revealed that 15% of the respondents considered cultural method as the best control measure, 25% choose mechanical methods as the best method, while 30% of the respondents considered biological control method as the best method, and 30% of the respondents considered chemical method of weeds control as their best control measure.

## CONCLUSION

In conclusion, weeds are more dangerous in the early stage of crop development, they often grow faster than the crop plants, as a result, they compete with the plant in terms of nutrients, light, water etc. They are also effective in making the yield of plant low and give poor quality products. A lot of farm product losses are also experienced, making the task of frequent weeding of the maize farm very important during first few weeks after planting. Lastly, the various methods indicated in this study were used to control the weeds on their maize farm, because without controlling the weeds on the farm will leads to various problem which includes pest and diseases infestation, causes of bad taste, reduce the yield of crop, compete with soil nutrients, compete with water in the soil, block the air space for the crop and so on. But a lot of observations were made on the farmland after the application of the control measures, this includes well growth and development, good yields were obtained and the crop matures earlier.

## REFERENCES

- Arney, J.A and Ashton, M.O. (1915). *Weed Science Principles and Sciences*, revised edition, PP 3 – 4.
- Augie, A.C and Lawal, B. (2007). *Politics in Northern Nigeria Kaduna*, Jovince Publishers, PP 88 – 90.
- Cates, J.S and Cox H.R. (1917). *The weed factors in the cultivation of corn*, U.S.A. Department of Agricultural plant Industry, PP 68 – 74
- Chris, C.U and Ahmed, I. (2008). *Zuru Emirate Culture, Agricultural and Development*, Sokoto, Eaglewell publishers, PP 64 – 65.
- Correa, A. J. A, Dela, M. M, Rosa, M. and Dominguez, Y.J.A. (1990). Demonstration plots for chemical weed control in rain fed maize (*zea mays*) sown with minimum tillage in AcolmnMexicorevistachapin go 15: PP 164 – 166.
- Erebor, O. (1998). *Comprehensive Agricultural Science forsenior secondary school* First edition, A Johnson Publisher Limited Lagos, PP 239 – 240

- “Hemp.Asweedcontrol”[www.gametecc.com/http/www.gametecc.com/hemp/weed.control.htm](http://www.gametecc.com/http/www.gametecc.com/hemp/weed.control.htm). Retrieved on 09/07/2008
- “Hire a hubby” [www.hireahubby.co.nz](http://www.hireahubby.co.nz).<http://www.hireahubby.co.nz/news.asp?Page10=2145820979&Refid2141707203>. Retrieved on 11/01/2009.
- Komolafe, M.F. and Joy, D.C. (1981). *Practical Agricultural Science, for West Africa School and Colleges*, fourth edition, PP 78 – 102
- National Population Commission (NPC) (2006). *Annual Report*. Abuja federal government of Nigeria
- Olatunde, Y. O. (1976). *Agriculture for school certificates*, revised edition, PP 106 – 107.
- Owen, M.D.K, Hartzler, R.G, and Lux J. (1993) Woolly cupgrass control in maize with chloroacetamide herbicides. *Weed Technology* 7: PP 925 – 929.
- Samuel, T.D. (2003). *Farming in Savanna*. Kano Hall Mark house. Publisher.
- Shakoor, A.Nadeem, M. and Ahmed, C.O. (1986). *Efficiency of different herbicides for control of weed in maize under rain fed condition*, Pakistan J. Agric. Res 7: PP 264 – 268
- Shawn, W.C. (1954). *Recent Advance in weed control in the united state U.S*, Department of Agric, PP 148 – 154
- Walker, P.B. (1971). *Weed control in Tropics with a special section on statistics*, revised edition, PP 88 – 90.
- Weidemon, O. and Cate, O. (1951). *The weed problem in American Agricultural*.
- William, D. (1859). *Weed control*, Department of Agricultural Science U.S, PP 124 – 125.