



A Survey of Weeds in Irrigated Onions

(A Case Study in Jere Local Government Area, Borno State)

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Abstract – A survey was conducted on weeds of irrigated onions in Jere local government area along the river Ngadda irrigation site. The findings of this study revealed that, majority of the farmers are between the ages of 41-50 years (56%), all respondents are male (100%), 73% had Qur'anic education only and 86% of them have been in farming for more than 10 years. Most farmers (91%) find weeds problem severe as a result of association with onions and that the most troublesome weeds are *Cyperus* species *Digitaria singuinalia*, and *Portulaca oleraceae*. These weed species under irrigated onion in Jere area were observed to be mostly annuals, constituting about 73% of the total weed species. Morphological classification has shown that majority of the weed species are broad leaved constituting 47%, 40% grasses and 23% sedges. Finally, on the kind of control measure taken to control weeds in irrigated onion, 58% use both hand weeding and herbicide application.

Keywords – Survey, Weeds, Onions, Irrigation and Control.

I. INTRODUCTION

Onion (*Allium cepa* L.) belongs to the family Alliaceae and is an important vegetable crop all over the world (Mohammad *et al.*, 2003). It is grown mainly for its bulb which is used almost daily in every home. It is rarely used as a sole dish or in large quantities. Its main use lies in flavouring and seasoning of a wide variety of dishes. (NAERLS) Onion is an important vegetable crop whose distinctive flavour is appreciated by people throughout the world. One of the advantages of onion is that the bulbs can be harvested and sold either 'green' in salads (Lannoy, 2001), while the mature bulbs are cooked or eaten raw as a vegetable (Straub and Emmett, 1992). Onion has an important medicinal herb in many communities, and is claimed to minimize high blood pressure and other heart diseases due to its flavourable action on the elasticity of blood vessel. As an item of world trade, onion ranks second in importance after tomatoes among the vegetables. In 1987 the total world export production amounted to over 2 million metric tons produced on an area of above 1.7 million hectares. These figure represent and percent increase in total production and at as respectively (NAERLS).

Onion is grown widely during wet and dry season. However yields are much higher during the dry season, because of fewer incidences of pest and diseases. Prices of onions tend to oxalate during the dry season before harvest begins due to large inability to store highly perishable crop.

Weeds are plants growing simultaneously in a managed ecosystem (irrigated farmland) that has negative impact on

human activities (IWSS, 1997) Season-long exposure of seeded onion to weed competition has been shown to reduce onion yield up to 96 percent (Bond and Burston, 1996). One of the main limiting factors is weed infestation. Weeds compete with onion crop for nutrients, soil moisture, space, light and considerably reduce the bulb yield, quality and value of the crop through increased production and harvesting costs (Hussain, 1983). Due to smaller leaf size, slow growth and very shallow rooted system onions can not compete well with weeds particularly at early stages of growth (Appleby, 1996). Losses caused by weeds have been estimated to be much higher than those caused by insect pests and diseases. Generally, the bulb yield of onion reduced by 30-60% due to weed infestation.

Effects of Weeds on Onion:

Weeds compete with onion crop for nutrients, soil moisture, space, light and considerably reduce the bulb yield, quality and value of the crop through increased production and harvesting costs (Hussain, 1983). Due to smaller leaf size, slow growth and very shallow rooted system onions cannot compete well with weeds particularly at early stages of growth (Appleby, 1996). Losses caused by weeds have been estimated to be much higher than those caused by insect pests and diseases. Generally, the bulb yield of onion reduced by 30-60% due to weed infestation. As weeds decrease the profitability of onion crops, therefore, weed must be controlled well in time. A good weed management programme is essential for good onion production.

Weed Species Associated with Onions

Purple nutsedge (*Cyperus rotundus* L.) is one of the most dominant weeds in many field and vegetable crops due to its unique biological and physiological properties. A perennial sedge which reproduces through an extensive network of underground tubers, it can produce up to 3–7 million tubers/ha from a single uncontrolled plant in the course of a cropping season (Rao 1968). Purple nutsedge has reached worldwide infestation in 52 crops across 90 countries and is therefore considered one of the world's worst weeds (Holm *et al.*, 1977). In rice-vegetable farms in the Philippines, purple nutsedge tuber populations as high as 2000 tubers/m² have been observed, possibly due to carry-over of tubers across crops during the rice-onion rotation (Baltazar *et al.*, 1999). Yield losses of up to 90% in onion and up to 50% in rice due to weed infestations have been reported (Baltazar *et al.*, 2000; Okafor and De Datta 1976). For adequate season-long weed control, farmers currently control weeds in rice-vegetable farms through single-crop, single-season approaches involving one or two applications of herbicides followed by two to

three handweedings. Applied every cropping season, these direct weed control inputs cost farmers in rice-vegetable growing areas about \$200/ha, 20% of their production costs (Baltazar *et al.*, 2000). In onions, Shadbolt and Holm (1956) found that at 40-220 *Amaranthus retroflexus* plants/m² this period occurs in the first 4 weeks after emergence, and they reported 90% yield reductions at longer competition period at low as well as at high weed densities. Williams *et al.*, (1973) reported that *Amaranthus retroflexus* interference at any time during growth reduced onion yields, while Wicks *et al.*, (1973) reported that control of *A. retroflexus* in onion should be carried out at 4-10 weeks after planting. However, other workers reported different critical periods of weed competition in onion. Putnam *et al.*, (1978) found the period occurs between 3-4 weeks in seeded onion at density of *Portulaca oleracea* between 50 to 450 plant m⁻². It was at 6-10 weeks with *Sisymbrium irio* (Menges and Tamez, 1981), and 6-8 weeks (Hewson and Roberts, 1973), or 6-20 weeks (Johnston *et al.*, 1969) after the emergence of mixed weed population, and 20-30 days after the planting of onion infested with *Cyperus rotundus* (Purwito, 1978). Bhan *et al.* (1976) reported that weed-free onion for 45 days after planting significantly increased bulb yield over a weedy control treatment. In a mixed population of *S. irio* and *Helianthus annuus*, onion yield was reduced when this weed population interfered for 7 weeks after emergence (Labrada, 1977). However, Thomas and Wright (1984) found that onion susceptibility to weed competition occurs between 2-10 weeks after 50% emergence, and the authors expected a photoperiodic basis for onset of the critical period. In another study, Menges and Tamez (1981) found that *Euphorbia glyptosperma* did not significantly interfere with onion.

Various Strategies Adopted to Control Weeds in Onion

To successfully achieve weed control in onions, one has to rely on different tools. In wide-row production, cultivation can help to keep the onions clean for a longer portion of the crop's development. These cultivations should be shallow to avoid damaging the roots and the bulb. Cultivation is a bit more difficult when producing onions in narrow rows on wide beds. Cultivation tools such as basket weeders exist for this, but they require extreme precision and are usually quite time consuming. Additionally, mechanical cultivation must be curtailed towards the end of the season, as the width of the bulbs leaves less room between the rows to place the implement. Hand weeding can also be employed in the fight against weeds. This can prove to be a slow alternative also, as well as possibly being cost-prohibitive (Nylund *et al.*, 1958). In another study by (Muhammad *et al.*, 2007) It is to concluded that the three onion varieties did not differ in their competitive ability with weeds and had the similar yield potential. Among the herbicidal treatments, three hand hoeing proved to be the best weed control practice.

Herbicidal Options in Onions

The study by (Tripathy *et al.*, 2013) exhibited that different weed management practices significantly reduced weed density and increase onion bulb yield with either

application of oxyflurofen 23.5EC before planting + one hand weeding at 40-60 days after transplanting or combined spray of pendimethalin 30EC + quizalofop ethyl 5EC at the time of planting and second application at 30 days after transplanting.

Statement of the Problem

Vegetables in general and onion in particular exhibit greater are susceptibility to weeds competition than many other crops, Sinha and Lagoke (1983) reported 49-86% loss due to weed competition in india, from U.K. Bond and Burston (1996) reported 96% yield loss. Generally, the bulb yield of onion reduced by 30-60% due to weed infestation. Weeds constitute a major production constraints to dry season cropping in Nigeria (Kafaru, 1994). Weed infestation in irrigated crops (tomatoes, pepper, sugarcane and onion) has been reported to cause between 12 and 78% reduction in yield, which varied with the weed species, intensity of weed infestation and the crop cycle (Yohanna *et al.*, 2004)

Objectives of the Study

- To identify the socio economic characteristics of the farmers
- To identify the weed species associated with onions.
- To identify dormant weed species in irrigated onions.
- To determine the kind of control measures adopted by the farmers in the study area.

Significance of the Study

The findings of this study will be beneficial to weed scientists who deal with different weed species, and guide them on what control measures to take. It will also assist students whose work is associated with crop production especially in onions. Researchers who wish to build on the findings will also find this work suitable.

Scope and Limitation

The study is limited to irrigation farms situated along the River Ngadda, comprising of Fadama 1, Fadama 2, Kashari, Shokari, Idrissari, Maramari and Kazallari. All of jere local government area, Borno State.

II. METHODOLOGY

Study Area

The study area is Jere local government area, one of the twenty seven local government areas of Borno state. The local government lies within latitude 11⁰40¹ and 12⁰05 N and longitudes 13⁰50¹ 12⁰20¹ E. it covers land mass of 160 square kilometers. (MLS, 2008). Within the state it shares boundaries with Mafa local government area to the east, Maiduguri metropolitan council to the north and Konduga local government area to the south. The climate is characterized by dry and hot seasons, minimum temperature ranging from 15-20⁰ C, while the maximum temperature ranges from 37-45⁰ C. The annual rainfall ranges 500mm 700mm per annum (NMA, 2008). The rainy season is usually from May to October with low relative humidity and short wet seasons. The topography is usually low and plain and soil is generally sandy with short grasses and thorny shrubs.

Jere is the passing point of river Ngadda which is sourced from Alau dam where the irrigation farmers source their water for irrigating their vegetable crops (onions, tomato, lettuce, amaranthus, pepper etc). Majority of the habitants are farmers, trader and civil servants. Jere local government area has a projected population of 211,214 people with annual growth rate of 2.8% (NPC, 2006). The majority ethnic groups are Kanuri and Shuwa Arab. Others are Hausa, Bura and Fulani and many immigrant settlers from within and outside Nigeria (BOSADP, 2008).

The data for the study were sourced from the following wards Fadama 1, Fadama 2, Kashari, Shokari, Idrissari, Maramari and Kazallari. Wards all of Jere local government area where the irrigation farms are situated. Out of these farms onion producing farms (fadama 2, Shokari, Idrissari and kazallari) where 30 farmers were randomly selected for the sake of the survey.

The data for the study were collected through administration of structured questionnaires for the literate farmers and interview for the uneducated farmers whose farms were selected along the irrigated farms randomly selected. Questionnaire was divided into 3 sections. Section A comprises of the socioeconomic characteristics of the farmers, section B comprises on the information on weeds and section C comprises of information on control measures taken to control the weeds.

Weed sampling procedure

At each selected farm, weeds were sampled from onion farms with the aid of quadrant (1 x 1 m). This was used to determine the distribution of weed species. This was further analyzed on:

- General classification of weeds
 - Distribution based on perceived most troublesome weed
- Data Analysis:* The data collected were analyzed using frequency distribution and percentage

III. RESULTS AND DISCUSSIONS

Socioeconomic Characteristics of the Respondents

Table 1 shows the socioeconomic characteristics of the respondents which indicated that most farmers are between the ages of 41-50 (56%) followed by 50 and above (27%). All the farmers were male (100%), most of them had quranic education (73%) followed by primary and secondary education (9 and 7%). Most farmers have 10 years and above irrigation farming experience (86%) (Table1).

Table 1: Socioeconomic Characteristics of the Respondents

Socioeconomic Characteristics of the Respondents	Frequency (N=30)	Percentage %
Age		
Less than 30	2	5%
31-40	4	12%
41-50	17	56%
50 and above	7	27%
Total	30	100

Gender		
Male	30	100
Female	0	0
Total	30	100
Educational level		
Primary	4	9%
Secondary	3	7%
Tertiary	0	0
Qur'anic	23	73%
Adult	0	0
Total	30	100
Number of years in farming		
5-10 years	4	14%
10 years and above	26	86%
Total	30	100

How do you perceive weed problem associating with Onion

Table 2 shows that most of the respondents find weed problem severe (91%) in regards with association with their onions on farm.

Table 2: How do you perceive weed problem associating with Onion

How do you perceive weed problem associating with Onion	Frequency (N=30)	Percentage %
Less problematic	0	0
Moderate	3	9%
Severe	27	91%
Total	30	100

What control measure do you take

Table 3 shows the kind of control measure taken by the farmers (respondents) with regards to the weeds infesting their onion crop. Table 3 shows that majority of the farmers use both herbicide and hand weeding in controlling the weeds of their onions (58%), followed by the farmers that adopt hand weeding only as a control measure (38%). The use of selective herbicide only is practiced by the minority of the farmers (4%).

Table 3: What control measure do you take?

What control measure do you take?	Frequency (N=30)	Percentage %
No control	0	0
Hand weeding	11	38%
Use of herbicide	2	4%
Both (Hand weeding Use of herbicide)	17	58%
Total	30	100

General Classification of Weeds collected from Jere Local Government

Table 4 shows the general classification of weeds found in the survey area, the weeds were classified based on their life cycle where; 73% of the weeds were annuals i. e. complete their life cycle within a year while the remaining 27% of the weeds were perennials (indefinite life cycle). The morphological classification further shows that 47%

of the weeds had broad leaves, 40% of the weeds were grasses while the remaining 13% were sedges (Table 4).

Table 4: General Classification of Weeds collected from Jere Local Government

S/N	Weed Species	Life Cycle	Morphology
1	<i>Amaranthus spinosus</i>	A	B
2	<i>Boerhavia diffusa</i>	A	B
3	<i>Cassia mimosoides</i>	P	B
4	<i>Cyprus esculentus</i>	P	S
5	<i>Cyperus rutundus</i>	P	S
6	<i>Cynodon dactylon</i>	P	G
7	<i>Chorchorus spp.</i>	A	B
8	<i>Digitaria horizontalis</i>	A	G
9	<i>Digitaria singuinalia</i>	A	G
10	<i>Echinochloa obitusflora</i>	A	G
11	<i>Echinochloa colona</i>	A	G
12	<i>Euphorbia hirta</i>	A	B
13	<i>Eleusine indica</i>	A	G
14	<i>Ipomoea triloba</i>	A	B
15	<i>Portulaca oleracea</i>	A	B

A = Annuals (73%) B = Broad leaved (47%)
 S = Sedge (13%) P = Perennials (27%)
 G = grass (40%)

Distribution based on the perceived most troublesome weed

Table 5 shows the response based on the perceived most troublesome weed in the study area. According to the respondents there are 3 most troublesome weeds affecting the growth of onion in the study area, these include *Portulaca oleracea*, *Cyprus spp.*, *Digitaria singuinalia* with the following percentages 40%, 26.7% and 33.3% respectively.

Table 5: Distribution based on the perceived most troublesome weed

Weed Species	Respondents	Percentage (%)
<i>Portulaca oleracea</i>	12	40
<i>Cyprus spp.</i>	8	26.7
<i>Digitaria singuinalia</i>	10	33.3
Total	30	100

Discussions

The findings of this study revealed that, majority of the farmers are between the ages of 41-50 years (56%), all respondents are male (100%), 73% had quranic education only and 86% of them have been in farming for more than 10 years. Most farmers (91%) find weeds problem severe as a result of association with onions this tallies with the findings of (Appleby, 1996) where he stated Losses caused by weeds have been estimated to be much higher than those caused by insect pests and diseases.

Furthermore on the kind of control measure taken to control weeds in irrigated onion, 58% use both hand weeding and herbicide application, this tallies with the work of (Muhammad *et al.*, 2007) three hand hoeing proved to be the best weed control practice and The study by (Tripathy *et al.*, 2013) exhibited that different weed

management practices significantly reduced weed density and increase onion bulb yield with either application of oxyflurofen 23.5EC before planting + one hand weeding at 40-60 days after transplanting or combined spray of pendimethalin 30EC + quizalofop ethyl 5EC at the time of planting and second application at 30 days after transplanting.

The weed species under irrigated onion in Jere area were observed to be mostly annuals, constituting about 73% of the total weed species. Morphological classification has shown that majority of the weed species are broad leaved constituting 47%, grasses constituting 40% and 23% sedges of the weed species. (Yohanna *et al.*, 2014) had similar findings.

Finally, this survey revealed that the most troublesome weeds are *Cyperus* species *Digitaria singuinalia*, and *Portulaca oleracea* this is in line with the findings of (Rao, 1968) who reported that *Cyperus* spp. Is perennial sedge which reproduces through an extensive network of underground tubers, it can produce up to 3-7 million tubers/ha from a single uncontrolled plant in the course of a cropping season (Rao 1968). *Portulaca oleracea* could resist desiccation when hoe weeded this coincided with (Putnam *et al.*, 1978)

IV. CONCLUSION

In conclusion, the weed species associated with onions included broad leaved (47%), grasses (40) and sedges (27%). The dormant weed species associated with onions are; *Cyperus* species *Digitaria singuinalia*, and *Portulaca oleracea*. The farmers adopted both hand weeding and herbicide application for controlling weeds in onion farm.

RECOMMENDATIONS

It will be recommended that research work to be carried out on the dormant problem weeds of onion in aspect of controlling them in order to boost its production, further studies should be carried out on weeds of other irrigated vegetables.

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