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 sinuinalia, and Portulaca oleracea. 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 (Lamnoy, 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 3-2 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 weeder 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.

Herbical 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 oxyfluoren 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, sugarcanoe 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 11°40’ and 12°05’N
and longitudes13°50’ 12°20’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 15-20°C, while the maximum
temperature ranges from 37-45°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 Fada 1, Fada 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 (fada 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%) (Table 1).

<table>
<thead>
<tr>
<th>Socioeconomic Characteristics of the Respondents</th>
<th>Frequency (N=30)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 30</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>31-40</td>
<td>4</td>
<td>12%</td>
</tr>
<tr>
<td>41-50</td>
<td>17</td>
<td>56%</td>
</tr>
<tr>
<td>50 and above</td>
<td>7</td>
<td>27%</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 1: Socioeconomic Characteristics of the Respondents

**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>
<thead>
<tr>
<th>How do you perceive weed problem associating with Onion</th>
<th>Frequency (N=30)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less problematic</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Moderate</td>
<td>3</td>
<td>9%</td>
</tr>
<tr>
<td>Severe</td>
<td>27</td>
<td>91%</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100%</td>
</tr>
</tbody>
</table>

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

**What control measure 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>
<thead>
<tr>
<th>What control measure you take?</th>
<th>Frequency (N=30)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No control</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Hand weeding</td>
<td>11</td>
<td>38%</td>
</tr>
<tr>
<td>Use of herbicide</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td>Both (Hand weeding Use of herbicide)</td>
<td>17</td>
<td>58%</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 3: What control measure do you take?

**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

<table>
<thead>
<tr>
<th>S/N</th>
<th>Weed Species</th>
<th>Life Cycle</th>
<th>Morphology</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Amaranthus spinosus</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>2</td>
<td>Boerhavia diffusa</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>3</td>
<td>Cissia mimosoides</td>
<td>P</td>
<td>B</td>
</tr>
<tr>
<td>4</td>
<td>Cyperus esculentus</td>
<td>P</td>
<td>S</td>
</tr>
<tr>
<td>5</td>
<td>Cyperus rutundus</td>
<td>P</td>
<td>S</td>
</tr>
<tr>
<td>6</td>
<td>Cynodon dactylon</td>
<td>P</td>
<td>G</td>
</tr>
<tr>
<td>7</td>
<td>Chorchorus spp.</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>8</td>
<td>Digitaria horizontalis</td>
<td>A</td>
<td>G</td>
</tr>
<tr>
<td>9</td>
<td>Digitaria singualina</td>
<td>A</td>
<td>G</td>
</tr>
<tr>
<td>10</td>
<td>Echinochloa obitusflora</td>
<td>A</td>
<td>G</td>
</tr>
<tr>
<td>11</td>
<td>Echinochloa colona</td>
<td>A</td>
<td>G</td>
</tr>
<tr>
<td>12</td>
<td>Euphorbia hirta</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>13</td>
<td>Elesine indica</td>
<td>A</td>
<td>G</td>
</tr>
<tr>
<td>14</td>
<td>Ipomoea triloba</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>15</td>
<td>Portulaca oleracea</td>
<td>A</td>
<td>B</td>
</tr>
</tbody>
</table>

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, Cyperus spp., Digitaria singualina with the following percentages 40%, 26.7% and 33.3% respectively.

Table 5: Distribution based on the perceived most troublesome weed

<table>
<thead>
<tr>
<th>Weed Species</th>
<th>Respondents</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portulaca oleracea</td>
<td>12</td>
<td>40</td>
</tr>
<tr>
<td>Cyperus spp.</td>
<td>8</td>
<td>26.7</td>
</tr>
<tr>
<td>Digitaria singualina</td>
<td>10</td>
<td>33.3</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>

Discussion

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 oxyfluorfen 23.5EC before planting + one hand weeding at 40-60 days after transplanting or combined spray of pendimethalin 30EC + quialofop 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 annually, 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 singualina, and Portulaca oleracea this is in line with the findings of (Rao, 1968) who reported that the weed species are broad weeded constituting 47%, grasses constituting 40% and sedges of the weed species. (Putnam et al., 1978) this is in line with the findings of

IV. CONCLUSION

In conclusion, the weed species associated with onions included bread leaved (47%), grasses (40) and sedges (27%). The dormant weed species associated with onions are; Cyperus species Digitaria singualina, 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.

REFERENCES
