Evaluation of the traditional method of onion transplanting under Gezira conditions, Sudan

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ABSTRACT

Onion is one of the most important vegetable crops in the Sudan. The Gezira State is the largest producer of onion in the country. However, onion transplanting is the most expensive and labor demanding item of all cultural practices. This work was conducted in the Gezira State to evaluate the traditional method of onion transplanting compared to direct seeding. Data about onion cultural practices and their cost were collected using a questionnaire. The SPSS was used for the analysis of the questionnaire data. Results showed that 90% of the farmers used the conventional method of land preparation, 70% of them adopted pre-watering and 80% of them used a seed rate of about 6 kg/ha. Results showed that 50% of respondents irrigated transplants immediately after transplanting a given area at the end of the day. Most of the farmers (80%) used manual weeding in the nursery, while 10% of them used herbicides and 10% used both manual and herbicidal weed control. About 70% of the farmers transplanted onion seedlings within 43-49 days after sowing in the nursery. The study showed that transplanting comprised the highest cost of the cultural practices (3793 SDG/ha) followed by weeding (2601 SDG/ha) and seeds (1500 SDG/ha). Forty percent

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of the farmers estimated plant population at 50 plants/m². It is recommended to carry out more research work on the feasibility of direct seeding of onion.

**INTRODUCTION**

Onion is one of the most important vegetable crops in the Sudan. The Gezira, River Nile and Khartoum States are the main onion producers in the country (Mohamed et al., 2003). As compared to other vegetable crops, onion is a labor-intensive crop. The processes of transplanting, weeding and harvesting are expensive and labor demanding (George et al., 2009).

Onion establishment processes are of great concern for traditional onion growers, because of their high cost mainly at the early stages. They require close supervision starting from land preparation until the final stages.

Transplanting of onion requires intensive labor, close supervision, high seed rates and immediate irrigation. The resulting plant population using this traditional method is far below the recommended and, therefore, onion yield is below the expected target (Mohamed et al., 2003).

Direct seeding of onion is a common practice in developed countries. It is the dominant method for salad-onion production under mechanized cultivation systems. Seeds of high germination percentage, often pelleted, are sown to the desired stand, using a seed rate that takes into account a 'field factor' (ISTA, 1985).

Direct seeding of onion on raised beds was found to cut down the cost of production by using less amounts of seeds as compared to transplanting (Mortada, et. al., 2015). Direct seeding on dry or pre-irrigated seedbeds allows convenient time for irrigation without the expected risk of failure of some transplants.
due to delayed irrigation in transplanted fields. Practicing direct seeding on raised beds can increase the cultivated area compared with the traditional transplanting (Ibrahim, 2010).

The objective of this research was to evaluate the traditional method of onion transplanting adopted in the Gezira State compared with direct seeding.

**MATERIALS AND METHODS**

**The experimental site:**

Data were collected from Fadasi area using a questionnaire which covered information about cultural practices such as land preparation, seed rate and weed control. It also covered information about transportation of seedlings, plant population and the cost of some cultural practices when using transplanting. Data of plant population were taken 13 weeks after transplanting.

Four laborers were chosen to transplant a given area and the time needed was recorded. The average output ranged from 95.2 to 109.1 man-hr/ha, with an overall mean of 104.4 man-hr/ha (Table 1).
Table 1 Time required for manual transplanting (hr/ha).

<table>
<thead>
<tr>
<th>Task</th>
<th>Laborers</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>1</td>
<td>99.2</td>
<td>79.4</td>
</tr>
<tr>
<td>2</td>
<td>109.1</td>
<td>89.3</td>
</tr>
<tr>
<td>3</td>
<td>99.2</td>
<td>89.3</td>
</tr>
<tr>
<td>4</td>
<td>119.0</td>
<td>99.2</td>
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<td>5</td>
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<td>119.0</td>
</tr>
<tr>
<td>6</td>
<td>119.0</td>
<td>99.2</td>
</tr>
<tr>
<td>7</td>
<td>99.2</td>
<td>89.3</td>
</tr>
</tbody>
</table>

The questionnaire data were analysed using the SPSS method for data analysis.

RESULTS AND DISCUSSION

Land preparation:
Fig. 1 shows that 90% of the farmers used the normal disc plough as the primary tool, followed by ridging or smoothing and ridging. Also, about 80% of farmers adopted ridging twice or three times for primary land preparation and 70% of the farmers adopted pre-watering before planting. These cultural practices are consistent
The survey results showed that all respondents practiced hand sowing of onion seeds in the nursery. About 90% of the farmers used a seed rate of about 6 kg/ha and 10% of them used a seed rate of about 4.0 kg/ha (Fig.2). Similar results were reported by USAID (2012).

**Onion seed rate:**

Fig. 1.land preparation practices for onion nursery

Onion seed rate:

The survey results showed that all respondents practiced hand sowing of onion seeds in the nursery. About 90% of the farmers used a seed rate of about 6 kg/ha and 10% of them used a seed rate of about 4.0 kg/ha (Fig.2). Similar results were reported by USAID (2012).
Fig. 2. Seed rates used in the nursery for seedlings to plant one hectare

**Weed control:**

Fig. 3 shows that 80% of respondents used manual weed control in the nursery, while 10% used herbicides supplemented by hand weeding. Manual weeding is necessary to avoid damaging of the dense populated seedlings at the early stages of growth. However, hand weeding is a labor intensive and time-consuming process. Ali (2009) reported that weed control in onion in the Sudan is usually a manual process.
Transplanting of seedlings:
Results showed that 70% of the respondents transferred the seedlings from the nursery to the field within 43-49 days from sowing date in the nursery, while 30% transferred them after 50 days or more. Transplanting is composed of three operations; before the transplanting operation, namely, uprooting, preparation of transplants and transportation of seedlings to the field. The results showed that 80% of the farmers practiced hand pulling of seedlings, putting them in sacks and transporting them to the field. About 20% reported cutting the top third of the seedling shoots before packing them to improve the density of the plant in the permanent field (data not shown). These results are consistent with those of Nourai (1992).

Transporting of seedlings:
Fig. 4 shows that 50% of respondents carry the transplants in their hands to the field because the nursery is part of the
permanent field, while 40% used carts to transport seedlings. Only 10% used animals for long distance transportation.

![Means of transportation](image)

**Fig. 4.** Transportation means of seedlings

**Onion plant population in the permanent field:**

Fig 5 shows that 40% of respondents estimated the number of seedlings per square meter by about 50 seedlings or more, while rates of 20-29, 30-39 and 40 to 49 were recorded by 20% each. The range of 40-49 plants/m² is considered the recommended plant population for transplanted onion under Gezira conditions ((Mortada et al., 2015).

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First irrigation of seedlings:

The time elapsed between transplanting and the first irrigation was found to affect the expected plant population. Delayed watering may result in failure of some transplants (Mohamed and Nourai, 1988). Results showed that 50% of respondents irrigated transplants immediately after the completion of a given task at the end of the day. The other 50% irrigated after the completion of the whole process of transplanting and after sunset to avoid watering at high temperatures (data not shown). George et al. (2009) reported similar results.

Cost of some cultural practices:

Table 2 shows that transplanting was the most costly item (3793 SDG/ha), followed by weed control (2601 SDG/ha), seeds (1500 SDG/ha) and fertilizers (1107 SDG/ha) while pesticides, irrigation and land preparation were 823 SDG/ha, 670 SDG/ha, and 523 SDG/ha, respectively. One hectare of nursery is enough to provide

Fig .5. Onion plant population

![Bar chart showing plant population (plants/m²) with categories: 29-20, 39-30, 49-40, 50 or more, and corresponding percentages: 20%, 20%, 20%, 40% respectively.](image-url)
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seedlings for 30 hectares in the permanent field. These results are in accordance with those reported by Mohamed et al. (2003).

Table 2. Cost of some cultural practices of onion production.

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost (SDG/ha)</th>
<th>Percent of total cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transplanting</td>
<td>3793</td>
<td>34</td>
</tr>
<tr>
<td>Weeding</td>
<td>2601</td>
<td>24</td>
</tr>
<tr>
<td>Seeds</td>
<td>1500</td>
<td>14</td>
</tr>
<tr>
<td>Fertilizers</td>
<td>1107</td>
<td>10</td>
</tr>
<tr>
<td>Pesticides</td>
<td>823</td>
<td>07</td>
</tr>
<tr>
<td>Irrigation</td>
<td>670</td>
<td>06</td>
</tr>
<tr>
<td>Land preparation</td>
<td>523</td>
<td>05</td>
</tr>
<tr>
<td>Total cost</td>
<td>11 017</td>
<td>100</td>
</tr>
</tbody>
</table>

REFERENCES


Ibrahim, N. D. 2010. Effects of Transplanting Dates and Insecticide Frequency in the Control of Thripstabaci (Thysanoptera:Thripidae) on Onion (Allium cepaL.) in Sokoto, Nigeria, Department of Crop

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T景德镇传统方法在Gezira条件下的洋葱移栽评价

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