Screening of Garlic Lines Against Premature Sprouting

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Abstract

The experiment was conducted at Spices Research Sub-Centre, Faridpur and OFRD, Pabna during rabi season, 2013-14 and 2014-15 at SRSC Faridpur to select high yielding varieties which are resistance or tolerance against premature sprouting. Ten different collected garlic lines (GC001, GC005, GC0012, GC0017, GC0018, GC0024, GC0027, GC0028, GC0031 and GC0036) and three local germplasm (GC0038, GC0039 and GC0040) along with BARI Rashun-1 and BARI Rashun-2 as check were evaluated. The experiment was laid out in RCB design with three replications. The unit plot size was 1.5m x 1.2m. The spacing was 120 cm. The land was fertilized with cow dung 5ton/ha, N120, P120, K100 and S20 kg/ha. The entire quantity of cow dung, P, K, S and half N were applied during land preparation. Remaining N was applied in two equal splits at 25 and 50 days after sowing. The cloves were planted on 14 November, 2013 and 28 October, 2014. Different sources of protein, vitamin A and C (12). Production of cash crops like garlic and other spices is proved to be income generating activity for farmers, especially for those who have limited cultivated land or small holder farmers (5).

1. INTRODUCTION

Garlic (Allium sativum) belonging to the family Alliaceae is the second most important bulb crop grown in Bangladesh. It is widely cultivated during winter season. It is also used as medicine. It is one of the oldest cultivated vegetables and the second most widely produced Allium next to onion (7, 8, 16). Moreover, it contains considerable amounts of minerals like Ca, P and K, and its leaves are sources of protein, vitamin A and C (12). Production of cash crops like garlic and other spices is proved to be income generating activity for farmers, especially for those who have limited cultivated land or small holder farmers (5).

2. MATERIALS AND METHODS

The experiment was conducted during Rabi season of 2013-14 to 2014-2015 at Spices Research Sub-Center, Faridpur to select high yielding varieties tolerant/resistant to premature sprouting. The experiment was laid out in RCB design with three replications. The unit plot size was 1.5m x 1.2m. The spacing was 15cm x 10cm. The land was fertilized with cow dung 5ton/ha, N120, P120, K100 and S20 kg/ha. The entire quantity of cow dung, P, K, S and half N were applied during land preparation. Remaining N was applied in two equal splits at 25 and 50 days after sowing. The cloves were planted on 14 November, 2013 and 28 October, 2014. Different...
intercultural operations like weeding, irrigation, spraying of fungicides and insecticides were done as and when necessary. Two weeding were done at 25 and 60 DAS. Each replication received three times irrigation, 1st irrigation was applied immediately after sowing for enhancing germination. The following two irrigations were done at 25 and 50 DAS. Insecticides Malathion 57 EC @ 2 ml L⁻¹ and Rovral 50 WP @ 2 g L⁻¹ were applied three times with 7-10 days’ interval to control thrips as well as tip burn disease. The crop was harvested on 27 March 2014 and on 22 March 2015. Data on different morphological and yield contributing characters were collected and analyzed statistically.

3. RESULTS AND DISCUSSION

The yield and yield contributing characters and percent of premature sprouting of different garlic lines/varieties are shown in (Table-1 & 2). Significant variations were observed among the lines/varieties in respect of plant height, percent of premature sprouting, individual bulb weight, number of cloves/plant and yield t/ha except population per m² and bulb diameter.

In 2013-14, the highest percent of premature sprouting was observed from GC0038 (14.49%) in Faridpur (L₁) and from GC0039 (41.33%) in Pabna (L₂). The lowest percentage of Premature sprouting was observed from GC0024 (0.98 %) in Faridpur (L₁) and GC0031 (0.473 %) in Pabna (L₂). Both in Faridpur (7.01 t/ha) and Pabna (11.07 t/ha) the highest bulb yield was achieved from BARI Rashun-1. The lowest yield (4.43 t/ha) was recorded from GC005 at Faridpur. The result indicated that both in Faridpur (L₁) and Pabna (L₂), except GC0038, GC0039 and GC0040 all other lines and varieties had shown negligible premature sprouting (Table 1).

In 2014-15, the highest plant height (63.70 cm) was obtained from GC0027 and the lowest (51.67 cm) was obtained from GC0039. The highest individual bulb weight (22.19 g) was obtained from BARI Rashun-2 which was identical to most of the lines and varieties. The highest cloves/plant (27.37) were obtained from BARI Rashun-2. The highest percentage of premature sprouting was found from GC0040 (6.72%). The lowest percent of premature sprouting was observed from GC0038 (1.167%) and GC0039 (1.167%). The highest bulb yield was achieved from BARI Rashun-2 (8.867 t/ha) which was identical to BARI Rashun-1, GC0012, GC0017, GC0024, GC0027, GC0028, GC0031 and GC0040. The lowest yield (4.810 t/ha) was recorded from GC0036 (Table 2).

Despite its importance and increased production, garlic yield and quality is affected by various biotic and abiotic stresses, among which low and/or excess mineral nutrition, irrigation schedule or rainfall are among the major ones (4,9). Due to its importance and increased production, garlic productivity, in many parts of the world, is low due to genetic and environmental constraints affecting its yield and yield related traits (13). Major production constraints include lack of proper planting material (improved varieties), inappropriate agronomic practices, absence of proper pest and disease management practices and marketing facilities, and lower soil fertility status in many soil types particularly N and P nutrients (6).

Weak vegetative growth, poor bulb formation, undesirable crop quality and low nutritional quality result from inadequate levels of the primary nutrients namely: nitrogen, phosphorus and potassium (11). Sprouting is the major factor limiting storage life of garlic bulbs (3, 10).

N play an important role in the production of vigorous vegetative and optimum leaf expansion of crops and influences bulb size produced (17). Excessive application of N at a late vegetative stage of garlic crop can limit yields and increase storage losses (through premature sprouting) while inadequate N can hasten maturity and limit yield (2). It is best not to apply N when the bulbs are beginning to enlarge since it will encourage excessive leaf growth (enhance sprouting) and reduce bulb size (1).

![Table 1](https://example.com/tables/Table1.png)

Table 1. Yield and yield contributing characters and percent of premature sprouting of different garlic lines/varieties during 2013-14

<table>
<thead>
<tr>
<th>Accession No/ Variety</th>
<th>Plant height(cm)</th>
<th>Population/m²</th>
<th>% premature sprouting</th>
<th>Individual bulb weight(g)</th>
<th>Bulb diameter(cm)</th>
<th>No of cloves/bulb</th>
<th>Yield t/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC001</td>
<td>56.47±d</td>
<td>49.23</td>
<td>66.67 ±d</td>
<td>65.67 ab</td>
<td>1.41±i</td>
<td>1.50hi</td>
<td>12.60c</td>
</tr>
<tr>
<td>GC002</td>
<td>52.87±i</td>
<td>50.77</td>
<td>70.0 ±e</td>
<td>66.67 ±a</td>
<td>1.73±d</td>
<td>3.14If</td>
<td>12.00c</td>
</tr>
<tr>
<td>GC0012</td>
<td>55.68±f</td>
<td>70.10</td>
<td>62.33 ±f</td>
<td>70.67 ab</td>
<td>1.77e</td>
<td>2.130gh</td>
<td>12.30t</td>
</tr>
<tr>
<td>GC0017</td>
<td>54.60±c</td>
<td>67.93</td>
<td>68.00 ±g</td>
<td>66.00 ab</td>
<td>1.84±d</td>
<td>4.510de</td>
<td>12.37l</td>
</tr>
<tr>
<td>GC0018</td>
<td>59.67±a</td>
<td>69.80</td>
<td>65.67 ±b</td>
<td>68.67 ±b</td>
<td>2.50±e</td>
<td>3.047fg</td>
<td>13.10bc</td>
</tr>
<tr>
<td>GC0024</td>
<td>57.80±d</td>
<td>72.17</td>
<td>69.33 ±c</td>
<td>66.00 ab</td>
<td>0.98e</td>
<td>3.627d-e</td>
<td>13.17bc</td>
</tr>
<tr>
<td>GC0027</td>
<td>57.97±ac</td>
<td>67.13</td>
<td>65.33 ±e</td>
<td>67.33 ab</td>
<td>1.17e</td>
<td>3.480ef</td>
<td>13.13bc</td>
</tr>
<tr>
<td>GC0028</td>
<td>55.67±f</td>
<td>68.40</td>
<td>63.00 ±f</td>
<td>63.67 b</td>
<td>1.22±e</td>
<td>2.530h</td>
<td>13.27k</td>
</tr>
<tr>
<td>GC0031</td>
<td>56.80±e</td>
<td>68.00</td>
<td>69.67 ±g</td>
<td>70.67 ab</td>
<td>2.14±e</td>
<td>0.7233i</td>
<td>13.13bc</td>
</tr>
<tr>
<td>GC0036</td>
<td>56.13±a</td>
<td>76.27</td>
<td>69.67 ±h</td>
<td>68.00 ab</td>
<td>1.16e</td>
<td>4.687d</td>
<td>12.73bc</td>
</tr>
<tr>
<td>GC0038</td>
<td>55.47±f</td>
<td>69.80</td>
<td>62.00 ±i</td>
<td>73.33 ab</td>
<td>14.49a</td>
<td>16.72h</td>
<td>12.53c</td>
</tr>
<tr>
<td>GC0039</td>
<td>53.33±e</td>
<td>59.60</td>
<td>63.00 ±j</td>
<td>75.33 a</td>
<td>10.74β</td>
<td>41.3α</td>
<td>12.00c</td>
</tr>
<tr>
<td>GC0040</td>
<td>59.13±a</td>
<td>67.63</td>
<td>65.33 ±k</td>
<td>73.00 ab</td>
<td>3.32cd</td>
<td>31.15β</td>
<td>12.53c</td>
</tr>
<tr>
<td>BARI Rashun-1</td>
<td>54.07±f</td>
<td>68.17</td>
<td>70.00 ±l</td>
<td>67.00 ab</td>
<td>3.66c</td>
<td>0.7067i</td>
<td>15.60a</td>
</tr>
<tr>
<td>BARI Garlic-2</td>
<td>55.08±c</td>
<td>69.27</td>
<td>68.67 ±m</td>
<td>67.67 ab</td>
<td>2.94±e</td>
<td>0.8653l</td>
<td>14.40ab</td>
</tr>
</tbody>
</table>

Level of significance: NS ** ** ** **

CV (%) 4.00 6.98 8.09 7.55 20.33 8.22 5.42 8.24 11.85 9.95 13.02 9.93 7.17 10.43

L₁=Faridpur, L₂=Pabna, In a column mean followed by the same letter did not differ significantly at 5% level of significance.

![Table 2](https://example.com/tables/Table2.png)

Table 2. The yield and yield contributing characters and percent of premature sprouting of different garlic lines/varieties in 2014-15
### CONCLUSION

In 2013-14, the genotypes GC0024 and GC0028 gave identical bulb yield to check variety with negligible premature sprouting at Pabna and Faridpur location. In 2014-15, the genotypes GC0017, GC0024 and GC0027 performed better in Faridpur location. It was concluded that local lines (GC0038, GC0039 and GC0040) were more susceptible to pre-mature sprouting and gave lower yield and ultimately get lower income.

### REFERENCES

5. FAO (Food and Agriculture Organization). Food security in Ethiopia, Agriculture and Consumer Protection Department.2006.


