EFFECT OF SEED SIZE ON GARLIC PERFORMANCE

Frederick J. Crowe and Rod Brevig

ABSTRACT

Small garlic seed (clove) produced small bulbs, in comparison with larger seed. The affect of seed size on planting rate, yield, and (especially) seed vigor is discussed.

It is general knowledge in the garlic industry that vegetative seed (clove) size greatly affects the size of a bulb produced from that seed. Parameters such as plant spacing presumably have significantly less effect on bulb size. The physiological reasons for this performance are not well understood, but the loss of seed vigor of smaller cloves is greater during long storage, from debilitating effect of hot water and formaldehyde seed treatment for stem and bulb nematode control, and from loss of seed quality from penicillium infection. Presumably, smaller seed provides less nutritive support during germination and stand establishment. The following trial was established to demonstrate the effect of garlic seed size to central Oregon growers.

Materials and Methods

Commercially cracked and hot water and formaldehyde treated seed was obtained from Vessey Company. The seed was virus-infected 'California Late' garlic. No additional hot water and formaldehyde treatments were made.

The trial was hand-planted, and cloves for individual treatments were counted by hand for each seedline and stored until planting. The seed lot was graded into two distinct size classes: Large seed averaged 3.5 gm/clove and ranged from 3.0 to 4.0 gm/clove. Small seed averaged 1.5 gm/clove and ranged from 1.4 to 1.6 gm/clove. Planting of individual trials was accomplished by having a standard two- or four-bed garlic

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planter make the desired two seedlines per bed without closing in the seedlines. It was found, however, that seedlines were partially closed anyway by the equipment, so these were re-opened by hand, using garden hoes. The cloves for each individual seedline of each plot replicate were planted and covered by hand. Plots were all single bed plots, either 5 to 10 feet long, and separated by a 2-foot alley unless noted. All garlic was planted at 16 cloves per bed foot, on 40 inch beds center-to-center.

The field received 400 lbs/A 16-16-16 in September, 1984. On April 7, 1985, 150 lbs/A of nitrogen as ammonium nitrate was applied. Standard chemical weed control was supplemented with some hand weeding. The field was watered by solid set sprinkler irrigation. The field was irrigated somewhat more frequently than typical for commercial practices in central Oregon. For example, seven short irrigations were applied between April 18 and May 15, 1985; whereas commercial growers typically applied one to three irrigations in this period.

Notes were collected weekly during the season. Stand counts were collected as listed in Table 1. Harvest data were collected in July, with plants dug by hand, observed for disease, and weighed after roots below the stem plate and foliage higher than 2 cm above the bulb were removed. Harvest was on July 12, although necks were not fully dried.

All treatments were in randomized block design and data were analyzed by analysis of variance.

**Results**

Results are shown in Table 1. Emergence was somewhat lower with small seed, but this was not statistically significant. The average weight per bulb was reduced by 37% for small seed and total harvest weight was reduced by about 41% for small seed.

**Discussion**

As expected, small seed performance was much reduced in comparison to large seed. Growers must realize, however, that standard spoon scoop garlic planters somewhat automatically compensate for reduced per bulb yield from small seed by planting more small seed per seed line. This ensures that more bulbs will be harvested and total yield remains somewhat equivalent irrespective of seed size. However, this is only true if the seed is of high quality and vigor at the time of planting and up to the time that soil moisture becomes available for growth. In our trial we spaced both seed sizes equally, by hand, simply to demonstrate the seed size effect per harvested bulb.
The greatest danger to the grower from handling small seed is the increased care that must be taken to ensure the seed remain vigorous -- delays in planting, poor storage conditions, and delays in applying water after planting are much more deleterious to small seed than large seed. In our trial, for example, emergence was lower for small seed, but because the difference was not great, our handling was probably not highly deleterious. Perhaps future experiments can be designed to demonstrate the handling problems for small seed.
### TABLE 1. Effect of Seed Size on Garlic Performance

<table>
<thead>
<tr>
<th>Seed SizeB</th>
<th>% of Stand Emerged (% Stand)</th>
<th>% of Stand Harvested as Bulbs</th>
<th>No. Bulbs/Bed Ft. Harvested</th>
<th>Average Weight Per Harvested bulb (gm)</th>
<th>Lbs/A HarvestedA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Seed (approx. 3.5 gm/clove)</td>
<td>88</td>
<td>96</td>
<td>135</td>
<td>27</td>
<td>10,256</td>
</tr>
<tr>
<td>Small Seed (approx. 1.5 gm/clove)</td>
<td>79</td>
<td>98</td>
<td>125</td>
<td>17</td>
<td>6,087</td>
</tr>
</tbody>
</table>

Coefficient of Variation: 9.0 | 2.5 | 7.6 | 6.0 | 5.4 |

LSD (.05)C: NS | NS | NS | 2.3 | 988 |

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A Tops were not fully dry at time of harvest.
B These sizes were selected as typical for this particular seed lot of late garlic, and may not represent other varieties, other seed lots, virus-free status, or other handling methods. Also, these seed were planted uniformly by hand—if planted by machine, seed lots of small seed will seed at higher rates than seed lots with large seed, compensating somewhat for smaller bulb size.
C F-test was significant at 1% level for bulb weight and harvest weight. Not significant at 5% level for other categories.