THE EFFECT OF SEEDLING EMERGENCE UNIFORMITY ON SNAP BEAN YIELDS


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The uniformity of seedling emergence has been shown to be important on grade size and yield of several horticultural crops. Emergence uniformity was studied on snap beans in field studies in 1993 and 1994. The general procedures were as follows: Plots were initially overseeded with a mechanical planter, daily emergence counts were taken and individual plants were tagged. The plots were later hand thinned to 6 plants per 30 cm of row by cutting seedlings off at the soil surface to achieve the desired stand. In this manner, early, medium and late to emerge plants were neighbors in the same row. Rows were 91 cm apart. Seedlings were grouped into three categories based on their emergence rate; early, medium and late. In 1993, 'Bush Blue Lake 47' was studied and sown on June 14th, while in 1994, 'Bush Blue Lake 47' and 'Labrador' were used and sown on June 10th. Standard cultural practices were followed for fertilization and weed control. A once-over harvest was performed by hand harvesting plots. Yield data was recorded from plants pooled from each emergence group and pods were snipped and graded.

The emergence rate for both studies is shown (Figure 1). In 1993, emergence started seven days after sowing and was complete by 16 days. Emergence was much faster in 1994 due to the warm and moist soil conditions and most of the seedlings of both cultivars emerged during a 3 day period. The percent total emergence and the rate of emergence was greater for 'Labrador' than for 'Bush Blue Lake 47'.

In 1993, yield was more than twice as great from early compared to late emerging seedlings, while the medium group was intermediate (Table 1). There was also a trend that late emerging seedlings had a higher percentage of small sieve size beans indicating a longer period of time from planting to horticultural maturity for the late to emerge plants. In 1994, emergence...
was extremely rapid and no differences were measured in yield between the early and medium
groups for both cultivars. The late emerging plants consistently had lower yield which was
consistent with the 1993 field data. Little differences in size grades were recorded between
emergence groups within cultivars.

Table 1. Yield data from emergence uniformity studies

<table>
<thead>
<tr>
<th>Year</th>
<th>Cultivar</th>
<th>Emergence group</th>
<th>Yield Mg ha(^{-1})</th>
<th>Percent 2-3&amp;4’s</th>
<th>Percent 5&amp;6’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>BBL-47</td>
<td>Early</td>
<td>22.8 a *</td>
<td>43 b</td>
<td>57 a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>17.0 b</td>
<td>50 ab</td>
<td>50 ab</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Late</td>
<td>9.9 c</td>
<td>59 a</td>
<td>41 b</td>
</tr>
<tr>
<td>1994</td>
<td>BBL-47</td>
<td>Early</td>
<td>17.0 a</td>
<td>68 a</td>
<td>32 a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>14.7 a</td>
<td>72 a</td>
<td>28 a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Late</td>
<td>7.7 b</td>
<td>82 a</td>
<td>18 a</td>
</tr>
<tr>
<td>1994</td>
<td>Labrador</td>
<td>Early</td>
<td>12.2 a</td>
<td>99 a</td>
<td>1 b</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium</td>
<td>17.6 a</td>
<td>98 b</td>
<td>2 a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Late</td>
<td>8.8 b</td>
<td>100 a</td>
<td>0 b</td>
</tr>
</tbody>
</table>

* Mean separation within columns for each cultivar and year by LSD 5% level

Several factors can influence the rate of germination of a particular seed lot. Temperature
has a major effect on the germination and seedling emergence rate (Bierhuizen and Wagenvoort,
1974). The emergence rate was greater in 1994 than in 1993 which was attributed to the warm
soil temperatures in the latter study. The variation in seedling emergence may be attributed to a
variation in seed size or planting depth (Pearson and Miklas, 1992). Seed quality is another
important factor and seeds with low vigor have been shown to germinate slower and produce
smaller seedlings than high vigor seeds (Pandey, 1989). Yields may be lower from low vigor
compared to high vigor seeds (Tekrony and Egli, 1991). This study illustrates the importance of
the uniformity of emergence and that fast emerging seedlings generally make the greatest
contribution to yield potential. Slow to emerge seedlings have low yield potential probably due
to low seedling vigor and competition from fast emerging neighbors.

ACKNOWLEDGMENT
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LITERATURE CITED

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Pearson, C. H. and Miklas, P. N. (1992) Seed size and planting depth effects on emergence and
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