Sugar beet floral induction and fertility: effect of vernalization and day-length extension

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Abstract:

There are great needs to establish a local breeding program for sugar beet to select genotypes tolerant to the environmental condition dominating Egypt. It is essential to establish a database of the required process needed to induce sugar beet to flower under the Egyptian conditions. This work was carried out during 2002–2003 and 2003–2004 growing seasons to study the effect of vernalization duration and day-length extension on floral induction and fertility of some imported sugar beet cultivars. The experiment was carried out at Assiut University Experimental Farm at latitude of 27°N. Ten diploid cultivars imported from USA were used namely: C 14, C 146, C 205, C 211, C 221, C 261, C 283, C 9622, C 9720, US H11. Roots were grown in field for 5 months then vernalized at 4°C for three periods of 30, 45 and 60 days. The roots were then replanted in the field. Day-length extension treatment was secured by artificial illumination to extend day-length to 14 hours/day. The average light intensity above the soil was approximately 2222 Foot-candle. Extended day-length started 3 weeks after replanting and lasted for 45 days. Roots were also replanted under natural day-length conditions to serve as the second day-length treatment. The data recorder were; Bolting%, number of days from transplanting to bolting, pollen viability estimated as % of germinated pollen grains, single plant seed yield (gm), seed index (100 seeds), and seed germination%. The experimental design was a split block with 4 replicates. Each of the two day-length extension treatments was treated as a separate experiment. Within each experiment vernalization duration was assigned to the main plots and cultivars were allocated as the sub-plots. The results indicated that day-length extension and vernalization treatments had significant effect on the flowering of the cultivars. The response of the cultivars varied according to the combinations of the treatments. The results also indicated that the flowered cultivars maintained acceptable levels of pollen viability, seed setting and seed germination that could allow for the beginning of a breeding program. There are needs for further examination of other genetic materials to secure a successful sugar beet breeding program.

Keywords:

sugar beet, floral induction, fertility, vernalization

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