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Analysis of the phenotypic expression for direct sowing and transplanting of sugar beet hybrids

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Summary

In order to develop sugar beet (Beta vulgaris L) hybrids that are suitable for direct sowing, field trial was performed in direct sowing cultivation and transplanting cultivation using O-types, pollinators, single cross hybrids (CMS x O-type, as seed parents) and a three-way top-cross hybrid (CMS x O-type x pollinator). It was analyzed that the inheritance of top and root traits, and combining ability of the hybrids as well as the interaction between cultivation method and plant line. It was found that plant height was larger and row covering date was later, that roots were longer and branching roots were fewer, and that root weight was smaller but sugar content was higher in the direct sowing condition than in the transplanting condition. However, interaction between cultivation method and plant line was not found for any traits, suggesting that difference in traits by direct sowing cultivation were the same as those by transplanting cultivation. For plant height, covering date and root weight, the potence ratio indicated that there was super dominance in both the single cross and three-way top cross. For breeding a cultivar suitable for direct sowing, a single cross hybrid with an enhanced dominance effect should be combined with a diploid pollinator. Positive incomplete dominance was found for sugar content, indicating the importance of combining superior parents. Results of correlation analysis showed that covering date had negative correlations with plant height and sugar yield. Thus, for weed control in direct sowing cultivation, plant height should be increased to make covering date earlier.

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