

Improving Reliability of Flowering in Bolting Resistant Carrot Seed Crops

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Project Number: VG06155

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Final Report – Public Summary

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The purpose of this report is to provide detailed information to the public about research conducted during this study on the use of growth regulating chemicals to promote flowering in temperate carrot seed crops.

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Media Summary

Australia has an export carrot seed industry worth over \$5 million annually with significant opportunities for expansion. One of the challenges for carrot seed producers is to achieve reliable flowering from flowering resistant seed parent lines. In Australian production locations restrictions on sowing dates and/or the duration and severity of winter chilling can prevent flower induction.

In this study the potential to manipulate flower induction in carrot with plant growth regulating chemicals was investigated. 2,2-dichloropropionic acid (2,2-DPA) was shown to strongly promote flowering in environments that were marginal for natural flower induction by reducing the requirement for winter chilling. Timely applications of 2,2-DPA allowed planting dates to be deferred by as much as 7 weeks beyond what was possible for flowering of untreated plants. Significant seed yield benefits from improved rates of flowering were observed. There was no evidence of effects on seed quality.

Using data collected during field and glasshouse trials, models were developed to predict the effects of 2,2-DPA on chilling requirements and the most effective times for 2,2-DPA application in different production environments. It is anticipated that these models will assist producers to effectively utilize 2,2-DPA in carrot seed production.

The potential implications of these outcomes for Australian carrot seed growers are significant.

- Firstly, 2,2-DPA offers a reliable means of ensuring adequate flowering in difficult lines.
- Secondly, 2,2-DPA may enable carrot seed production to extend into areas of Australia that are otherwise ideal except for inadequate winter chill or constraints on time of sowing.
- Thirdly, the capacity to plant later will enable Australian producers to take advantage of late seed orders that cannot currently be supplied.
- With the current and forecast trend of a warming climate, management strategies that reduce reliance on winter chilling for flower induction will be increasingly important for vegetable seed production into the future.

The outcomes of this work also offer exciting prospects to improve understanding of the biochemical and physiological pathways to flowering in carrot and other biennial crops and the potential for other novel strategies to manage flowering.