Low Temperature Tolerance of Cucurbitaceae and Solanaceae Scion and Rootstock Seedlings Toward Development of Storage Techniques in Vegetable Grafting

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Challenge of Industry:
Vegetable crop growers demand large quantities of high quality seedlings for out-planting each season. Seedlings are planted in narrow windows due to growers meeting market demands or seasonal restraints. Current production capacity of grafted vegetable seedlings by North American propagators is far too small to satisfy this need creating a bottleneck within the industry. Scaling up supply of grafted vegetable seedling production by propagators to meet this need is difficult requiring large amounts of capital for automation or seasonal labor for intensive grafting. Due to such limiting factors of production one plausible solution to mitigate the supply issue is to store grafted vegetable seedlings in low temperature conditions. Yet, non-grafted seedling storage performance of many crops in low temperature has not been characterized, nor grafted seedlings.

Summary:
To determine low temperature storage performance of Cucurbitaceae & Solanaceae vegetable seedlings 22 genotypes were evaluated under 2 different storage treatments. Seedlings were grown to their respective grafting size and stored for a period of 28 days at 5° C or 12° C under 2 µmol m⁻² s⁻¹ and 12 µmol m⁻² s⁻¹ photosynthetically active radiation (PAR), respectively. The charts to the left display average species visual score of each treatment on the final day of storage (day 28) and 14 days after storage; being grown in greenhouse for that period (day 42). See “Visual Score Criteria” chart where visual markers are used to determine visual score. After 28 days in the 5° C and 12 µmol m⁻² s⁻¹ light storage treatment no genotype of Cucurbitaceae or Solanaceae survived to day 42. At 12° C and 12 µmol m⁻² s⁻¹ squash rootstock (Cucurbita maxima × Cucurbita moschata) genotypes performed significantly better than all other Cucurbitaceae species, having an average visual score of 4.9 ± 1. By day 42, Lagenaria siceraria, Cucumis sativus, and squash rootstock had an average visual score of 5.0 ± 0, while melon (Cucumis melo) genotypes had an average score of 3.5 ± 1 and watermelon genotypes (Citrullus lanatus) had the lowest average score of 1.9 ± 2. At day 42, for Solanaceae genotypes, pepper (Capsicum annuum) genotypes had the highest average score of 4.4 ± 1 while eggplant (Solanum melongena) and torvum (Solanum torvum) genotypes had the lowest average visual scores at 3.3 ± 1 and 3.5 ± 1, respectively. At day 42, all solanaceous species had an equal average score of 5.0 ± 0.

Further study is underway to see the effects of low temperature storage on growth and development of cold sensitive scions that are grafted onto rootstock with high storability and if rootstock conveys this trait to scions.