

ANNUAL REPORT TO NC – 140

2003 APPLE PHYSIOLOGY TRIAL

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This trial was established in the spring of 2003 specifically to determine if the relationship between crop density and fruit weight is influenced by rootstock and location. 'Golden Delicious' was the scion cultivar and the rootstocks included M.26 EMLA, G.16 and M.9 NAKBT337. Most cooperators at 10 locations had adequate fruit set to adjust crop density to a range of about 2 to 10 fruit/cm² for at least two seasons. The trial was terminated following the recording of bloom data in 2011. Data will be used to write three manuscripts. The first manuscript is currently being reviewed by cooperators and focuses on the influence of rootstock on the relationship between fruit weight and crop density. The second manuscript that will be distributed to cooperators in late November focuses on the influence of crop density on return bloom as influenced by rootstock. The third manuscript, which is nearly written and will be distributed to cooperators in late December, focuses on the relationship between trunk growth and crop density as influenced by rootstock. Below are the important results and conclusions concerning fruit weight.

1. The relationship between fruit weight and crop density was linear and the slopes varied depending on the year, location and rootstock.
2. Since the slopes were not homogeneous for all combinations of rootstock, year, and location, a normal analysis of covariance was not appropriate for adjusting rootstock means for differences in crop density. This supports two previous reports for rootstock trials, so in future rootstock trials this assumption should be tested before using analysis of covariance.
3. Since the interaction of rootstock x crop density x year x location was significant, each combination was analyzed separately. When the rootstock x crop density interaction was not significant, a normal analysis of covariance was performed to compare adjusted rootstock means. When the interaction was significant, slopes were compared and means estimated at three levels of crop density were compared.
4. In most cases the slopes were most negative for trees on M.26 EMLA and least negative for trees on M.9. At low crop densities, trees on M.26 EMLA produced fairly large fruit, but fruit size declined most rapidly with increasing crop density.
5. In most locations, regardless of crop density, trees on G.16 produced the smallest fruit when adjusted for crop density.
6. In most cases, regardless of crop density, trees on M.9 NAKBT337 produced fruit with the highest fruit weight.
7. These results confirm previous reports that, when adjusted for differences in crop density, trees on M.9 tend to produced larger fruit than trees on M.26.