Enhancement of Avocado Productivity

Plant improvement, selection and evaluation of improved varieties and rootstocks

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Overall Project Objective

To produce new avocado varieties, superior to 'Hass' in consistent productivity and postharvest fruit quality and marketability, with fruit of optimum maturity and size year-round. The main component of this project is the development of new varieties using material from past efforts as breeding parents

New Selections for the Future

Our progress report summarizes the various activities we have regarding selection of new varieties. This work is currently being carried out at the UC South Coast REC in Irvine. The oldest seedling block was planted in 1999 and has now given us 4 years of fruit to evaluate. From this first seedling block we have selected a further 6 selections in 2006 (shown below). This brings us to a total of 14 selections to move to the next round of evaluation. Table 1 reports the number of seedlings from open-pollinated maternal sources planted since 2000. We have also established isolation blocks of specific lineages. Table 2 reports the number of seedlings planted thus far since 2003.

464918
Maternal Parent:BL516
Tree habit: Upright, open
% Pit/Skin/Flesh Ratio by weight:15:09:76
Average fruit weight: 4.9oz.
Skin texture:Medium smooth
Flower type: A
Note: Black when ripe, Good Flavor January thru June

Table 1. Open pollinated seedlings from varying maternal sources planted at the UC South Coast Research and Extension Center from 2000 to Spring 2006 as well as anticipated plantings for Fall 2006 and 2007.

Year Planted	5-552	5-Star	Bacon	BL1088	GEM	Green Gold Gwen	Harvest	Lamb Hass	Marvel	Nabal	Murietta Green SirPrize	XX3	Total Planted
2000*	32				39		14	5	90	37			217
2002					91			20	75	51			237
2003					41		55		50	25			171
2004	30				42		55		61	48			238
2005			3		99		23		60	60	73	36	11	341
2006					54	1	25	14	29	19	37	1	2	182
2006 (Fall)		1			28	4	8	3	39	19	2	37	18	159
Totals* **	**62**	**1**	**3**		**394**	**5**	**180**	**17**	**153**	**374**	**273**	**74**	**31**	**1545**

* 81% of these seedlings have now fruited and been evaluated. Tree removal of non-promising material will occur in Fall 2006 as well as trees which have not borne fruit.

465025
Maternal parent: BL667
Tree habit:Upright, obovate
% Pit/Skin/Flesh Ratio by weight:09:14:77
Average fruit weight: 9.1oz.
Skin texture:Medium
Flower type: B
Note: Large greenskinned fruit, to be propagated as a seed parent

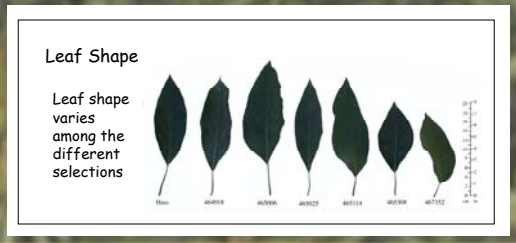
465308
Maternal parent:BL516
Tree habit: Spreading
% Pit/Skin/Flesh Ratio by weight:16:16:68
Average fruit weight: 6.3oz.
Skin texture: Medium smooth
Flower type: B
Note: Consistent good flavor through spring, Dark when ripe

Table 2. Seedlings from isolation blocks that are (or will be) planted at the UC South Coast Research and Extension Center from 2000 to Spring 2006 as well as anticipated plantings for Fall 2006 and 2007.

Year Planted	GEM x GEM	GEM x Marvel	GEM x Thille	Lamb Hass x Lamb Hass	Lamb Hass x Nabal	Lamb Hass x Marvel x GEM	Nabal x Lamb Hass	Reed x Stewart	Thille x GEM	Total planted
2003									15	15
2004		6								6
2005		113	179			12				304
2006		2	50		1	1				54
2006 (Fall)		1	96	60	7			1	3	168
Totals* **		**121**	**325**		**8**	**13**			**18**	**485**

465006
Maternal parent: BL667
Tree habit: Upright, columnar
% Pit/Skin/Flesh Ratio by weight:18:17:65
Average fruit weight: 6.1oz.
Skin texture:Medium
Flower type: B
Note: Somewhat 'Hasslike' appearance, Black or dark green when ripe, Early season

465114
Maternal parent:5-552
Tree habit: Upright, open
% Pit/Skin/Flesh Ratio by weight:12:12:76
Average fruit weight: 12.6oz.
Skin texture: Smooth
Flower type: A
Note:Very good early season flavor, black when ripe



467352
Maternal parent:BL667
Tree habit: Pyramidal, open
% Pit/Skin/Flesh Ratio by weight:22:15:63
Average fruit weight: 8.9oz
Skin texture: Medium
Flower type:N/A
Note:Precocious producer, greenskinned, Ripens in late spring

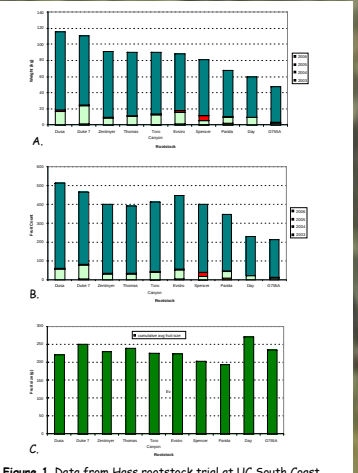


Figure 1. Data from Hass rootstock trial at UC South Coast Research and Extension Center, Irvine CA. A. Cumulative yield. B. Cumulative fruit count. C. Average fruit size of Hass as influenced by rootstock (2003-2006).

'Hass' and 'Lamb Hass' Rootstock Trial

In 1999 we established a rootstock trial at UC South Coast REC in Irvine. This trial includes both 'Hass' and 'Lamb Hass' on several interesting rootstocks from the Menge program (Day*, Duke 7*, Dusa, Evstro*, G755A, Parida, Spencer, Thomas*, Toro Canyon*, and Zentmyer; * = 'Lamb Hass').

Figure 1 illustrates that 2006 is the first year with appreciable yield for the 'Hass' from this trial. We did detect significant differences in 'Hass' yield (Figure 1A), total fruit count (Figure 1B) and average fruit size (Figure 1C) due to rootstock. For more detail refer to Table 6 in our Annual Report.

We have 'Lamb Hass' on 5 rootstocks as indicated above. Figure 2 presents the same type of data for the 'Lamb Hass' as presented in Figure 1. There was no significant difference between rootstocks with regard to cumulative weight (Figure 2A), fruit count (Figure 2B) or average fruit size (Figure 2C) for the 'Lamb Hass'.

We have also done a preliminary analysis of the rootstock – scion interactions in this trial. When the data is combined for 'Hass' and 'Lamb Hass' for the 5 rootstocks shared in this trial we observe the following:

- there is a significant difference between the two varieties in terms of cumulative yield (88.6 kg per tree for 'Hass' vs. 100.0 kg/tree for 'Lamb Hass', $P<0.01$), and average fruit size (242 g for 'Hass' vs 276 g for 'Lamb Hass', $P<0.001$)
- there were no significant differences detected in cumulative fruit number (386 fruit for 'Hass' and 373 fruit for 'Lamb Hass').
- in terms of the impact of rootstock on yield when looking at the combined data, yield for both varieties is significantly less on the Day rootstock (74.5 kg/tree) as compared to the Duke 7 (105.6 kg/tree), Evstro (100.5 kg/tree), Thomas (95.5 kg/tree), and the Toro Canyon (95.4 kg/tree).
- rootstock also significantly impacted cumulative fruit count. Again fruit numbers of both varieties were less on the Day rootstock ($P<0.001$).
- rootstock did not have a significant impact on average fruit size when compared across the 2 varieties.

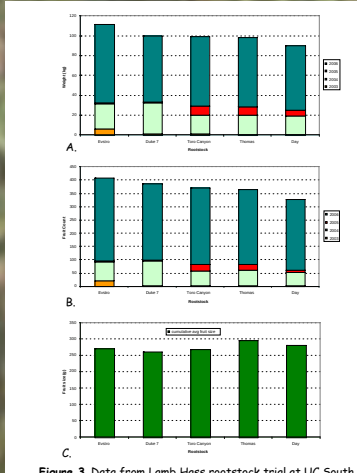


Figure 3. Data from Lamb Hass rootstock trial at UC South Coast Research and Extension Center, Irvine CA. A. Cumulative yield. B. Cumulative fruit count. C. Average fruit size of Lamb Hass as influenced by rootstock (2003-2006).