CALIFORNIA 2005 ANNUAL REPORT OF NC-140 COOPERATIVE REGIONAL PROJECT

PROJECT: **NC-140, California**

COOPERATING AGENCIES AND PRINCIPAL LEADERS:

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Objective 1. ROOTSTOCK – ENVIRONMENT INTERACTIONS

PROGRESS OF THE WORK AND PRINCIPAL -ACCOMPLISHMENTS

1999 Fuji Apple Rootstock Planting

Fireblight strikes were abundant on most trees despite regular antibiotic sprays during the bloom period. Infections were not removed in order to maximize fireblight pressure on the different rootstocks. By the end of the season no new tree deaths had occurred. Early in the spring, symptoms of zinc deficiency started showing up on many trees. These were rated on each tree and were found to be significantly more prevalent on certain rootstocks (Table 1). CG179 in the dwarf planting and CG30 (both N and T) in the semi dwarf planting had the most severe symptoms. Once the weather warmed up, the symptoms generally disappeared and seemed to have no lasting effects on the fruit or trees.

Yield measurements were not taken in 2005. A severe hail storm damaged much of the fruit and the highest labeled rate of chemical thinners was ineffective. Thus it was deemed uneconomical to harvest the fruit. As a result many of the trees had excessive fruit loads and limb breakage was extensive late in the season. One tree on CG30T broke off cleanly at the union. This block will be removed after assessing death from fireblight in early 2006.

Table 1. 1999 NC-140 Fuji apple rootstock planting established at the Kearney Ag Center – 2005 data.

	Root Suckers 04		**Trunk Circ. 2/05**		**Zn Def. Symptoms**		**Tree Height**		**Tree Spread (m)**
Rootstock	**(#)**		**(mm)**		**5/05**		**5/04**		**5/04**
Dwarf Planting									
Supporter 1	0.6		206 g		0.2 b		2.8 e		2.0 a
Suuporter 2	4.2		259 ef		0.2 b		3.1 e		2.5 de
Supporter 3	6.0		295 c-e		0.3 b		3.9 d		2.9 cd
CG41	0		297 de		0.2 b		4.2 b-d		2.8 cd
M9T337	0		306 b-e		0.2 b		4.3 a-d		2.7 d
CG179	0.7		237 fg		1.5 a		4.0 b-d		3.0 b-d
G16N	1.7		318 b-d		0.2 b		4.3 a-d		3.0 b-d
CG202	0		343 bc		0.8 ab		4.5 a-d		3.4 ab
M26EMLA	1.0		414 a		0.5 b		4.8 ab		3.4 a-c
CG935	1.3		285 d-f		0.3 b		3.9 cd		3.1 b-d
G16T	0		349 b		0.5 b		4.6 a-c		2.9 b-d
CG13	1.8		440 a		0.8 ab		4.8 a		3.7 a
Semi Dwarf Planting									
M26EMLA	0 b		385		0.4 c		4.1		3.5
Supporter 4	0.8 b		307		0.2 c		3.5		2.9
CG707	0.7 b		322		0.7 a-c		3.7		3.3
M7EMLA	40.8 a		206		0.5 bc		3.4		2.9
CG814	11.0 b		335		0.8 a-c		4.2		3.5
CG30N	0.5 b		333		1.3 ab		3.9		3.6
CG30T	1.7 b		329		1.5 a		3.9		3.6
CG210	0 b		387		1.0 a-c		4.7		3.6

[z]Mean separation within columns for each planting by Duncan's multiple range test, P=0.05.
[y]Zinc deficiency symptoms 0 = none; 1 = slight; 2 = moderate.

2003 Golden Delicious Apple Rootstock Planting

This trial got off to a rough start in 2003. About 20% of the trees had major problems as growth began in the spring. Many of them were dead by 2004. Since then, the trees have done much better, as only 3 experimental rootstocks have died, one CG.3041 tree in 2004, one J-TE-G tree (very weak rootstock) and one M9 Pajam2 tree in 2005 (Table 2). On the other hand, the standard rootstocks have done poorly. In 2005, 14 trees on M.26 and 4 on M.9 died. Several others on these rootstocks look weak and may not survive the winter. It appears most of these deaths were caused by fireblight. We have not been cutting out fireblight strikes in order to maximize pressure from this disease. The trees bore a few fruit in 2005 and yield and fruit weight varied considerably among the different rootstocks (Table 2). Several of the PiAu and JM rootstocks are very vigorous and will soon outgrow their space in this dwarf planting. At the other extreme, B.9 and J-TE-G are very weak and will probably not survive the next few years.

Table 2. 2003 NC-140 Golden Delicious apple rootstock planting at the Kearney Ag Center – 2005 tree survival, yield, fruit weight and trunk circumference measurements.

Rootstock	# Planted	# Died in 2005	2005 Yield (kg/tree)	2005 Fruit Weight (g)	10/05 Trunk Circumference (cm)
B.9	8	0	0.6 d-f	147 ef	6.9 h
Bud.62-396	8	0	0.8 c-f	159 d-f	11.5 g
CG.3041	8	0	0.3 f	146 ef	12.8 e-g
CG.4210	7	0	1.2 b-e	161 c-f	19.9 ab
CG.5179	8	0	0.9 c-f	152 d-f	13.9 d-g
CG.5935	8	0	1.4 bc	167 b-e	16.8 b-d
G.16	18	0	0.7 c-f	141 f	16.8 b-d
JM.1	7	0	0.8 c-f	173 a-d	15.8 c-f
JM.2	7	0	1.8 ab	176 a-d	22.0 a
JM.4	8	0	1.3 b-d	173 a-d	18.9 a-c
JM.5	5	0	1.3 b-e	204 a	23.3 a
JM.7	7	0	0.3 f	171 a-e	16.0 c-f
JM.8	7	0	0.2 f	160 c-f	16.3 b-e
JM.10	4	0	0.8 c-f	165 b-f	19.7 a-c
J-TE-G	7	1	0.2 f	155 d-f	6.9 h
J-TE-H	8	0	1.0 b-f	158 d-f	14.4 d-g
M.26	18	11	0.3 f	156 d-f	12.2 fg
M.9Pajam2	8	1	0.4 f	181 a-d	12.2 fg
M.9T337	18	4	0.5 ef	163 c-f	12.2 fg
PiAu 36-2	3	0	1.1 b-f	182 a-d	21.3 ab
PiAu 51-11	8	0	0.7 d-f	148 ef	16.4 b-d
PiAu 51-4	7	0	2.5 a	189 ab	22.9 a
PiAu 56-83	8	0	2.5 a	182 a-c	22.9 a
G Smith/M26 (Pollenizer)	20	3	-	-	-
Total	215	20			

2001 Red Top Peach Rootstock Planting

Several rootstocks in this trial are extremely vigorous compared to our industry standard, Nemaguard. The two with the most promise are BH-4 and Cadaman, as they have had high production of large fruit with no suckering and 100% tree survival (Table 3). They probably have too much vigor for standard plantings but could be useful in transplant situations.

Of the more dwarfing rootstocks, Pumiselect, K146-44 and K146-43 had small fruit size the last 2 years. In addition, one tree of Pumiselect collapsed in 2005. No other trees died during the year. Jaspi and Julior had better fruit size but both had a major problem with suckering in 2005. Suckering has not been a serious problem with any of the rootstocks until this year. The dwarfing rootstock that continues to hold some promise is VVA-1. Even though 2 trees died the first year, the other 6 have been productive and healthy since then. Fruit size has been good and there have been no root suckers.

Table 3. 2001 NC-140 Red Top peach rootstock planting at the Kearney Ag Center – 2005 data.

Rootstock	Trunk Circ. 12/04 (cm)	Yield 7-05 (kg/tree)	Fruit Weight (g/fruit)	Root Suckers 6/05 (#/tree)	Tree Survival (%)
BH-4	53.6 ab	62.4 a	205 b-d	0 c	100
Cadaman	56.2 a	64.1 a	210 b-d	0 c	100
SLAP	49.7 a-c	55.7 a-c	212 a-c	0 c	75
Lovell	46.4 c	59.3 a	200 cd	0 c	100
SC-17	49.6 bc	59.1 ab	198 cd	.4 bc	100
Nemaguard	46.3 c	52.6 a-c	201 cd	0 c	88
Hiawatha	38.0 e	48.4 bc	196 d	0 c	100
P30-135	44.9 cd	44.4 cd	200 cd	0 c	100
Bailey	39.5 de	52.3 a-c	204 b-d	0 c	100
Pumiselect	34.7 e	35.8 de	170 f	7.7 b	83
K146-44	27.5 f	27.5 ef	180 ef	0 c	100
K146-43	25.3 fg	27.4 ef	179 ef	0 c	100
Jaspi	24.9 fg	27.4 ef	194 de	16.9 a	88
Julior	27.2 f	29.4 ef	227 a	15.1 a	100
VVA-1	20.9 g	13.4 f	217 ab	0 c	75

[z] Mean separation within columns by Duncan's multiple range test, P=0.05.

2002 Redhaven Peach Rootstock Planting

As with the 2001 peach rootstock planting, VVA-1 is the dwarfing rootstock with the best potential (Table 4). Pumiselect, Adesoto 101 and VSV-1 all had excessive root suckering. In addition, fruit size was small on Pumiselect and VSV-1. Three trees on MRS 2/5 died in 2005 and were the only tree deaths in the trial. Penta also holds some promise. It is not as dwarfing as VVA-1 but has been productive with good fruit size and minimal root suckering.

Table 4. 2002 NC-140 Redhaven peach rootstock planting at the Kearney Ag Center – 2005 data.

Rootstock	Root Suckers 6/05 (#/tree)	Trunk Circ. 12-04 (cm)	2005 Yield (kg/tree)	2005 Fruit Weight (g/fruit)
Cadaman	8 bc	35.8 a	47.5 a	195 ab
Lovell	1 c	34.3 a	39.4 ab	179 b-d
Pumiselect	29 ab	27.7 b	35.9 b	170 cd
Penta	1 c	23.0 cd	23.1 c	191 a-c
Adesoto 101	44 a	21.0 de	23.0 c	212 a
MRS 2/5	12 bc	24.7 bc	24.8 c	198 ab
VVA-1	7 bc	17.6 ef	15.3 cd	199 ab
VSV-1	46 a	15.6 f	10.7 d	159 d

[z] Mean separation within columns by Duncan's multiple range test, P=0.05.

Related Rootstock Work

Peach rootstock breeding and evaluation studies. The rootstocks K146-44 and P30-135 have been patented and given the names of Controller 5 and Controller 9, respectively. They have now been released to nurseries for commercial plantings. We continue to evaluate the physiology of these rootstocks. We are particularly interested in their water and nutrient relations.

The peach rootstock breeding program includes a large number of selections from a wide array of crosses. In 2001, several of these with O'Henry peach grafted on top looked to be extremely promising. The trees ranged in size from very dwarfing to semi dwarfing and all had excellent fruit size. More than 20 of these have been identified and were planted in a large replicated trial in 2003. Others were added in both 2004 and 2005.

WORK PLANNED FOR NEXT YEAR: Data collection and rootstock evaluation will continue in 2006 following guidelines established by the NC-140 Technical Committee.

Publications

DeJong, T., D. Ramming, S. Johnson and J. Doyle. 2004. Peach and nectarine rootstock named 'K146-43.' United States Plant Patent No. PP15, 228. Oct. 12, 2004.

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DeJong, T.M., R.S. Johnson, J.F. Doyle and D. Ramming. 2005. Research yields size-controlling rootstocks for peach production. California Agriculture 59(2):80-83.

DeJong, T.M., R.S. Johnson, J.F. Doyle, A. Weibel, L. Solari, J. Marsal, B. Basile, D. Ramming and Dr. Bryla. 2004. Growth, yield and physiological behavior of size-controlling peach rootstocks developed in California. Acta Horticulturae 658:449-455.

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