Use of Preharvest Gibberellin and ReTain Sprays to Improve Fruit Firmness of 'Andross' and 'Ross' Cling Peach, 2003

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Summary:

Treatment in 2002 with GA_3 (Pro-Gibb 4%, Valent Biosciences Corp., Libertyville, Illinois, USA) significantly improved the firmness of 'Andross' cling peach in 2002. Spray concentrations of both 20 and 32 g Pro-Gibb + 0.1% Regulaid per 100 gallons per acre were effective. GA sprays of 20 g/acre were most effective when applied about 12 days before harvest and 32 g/acre were most effective when applied about 4 weeks before harvest. GA sprays of 20 g/acre applied either 3 or 4 weeks before harvest on 'Andross' improved firmness on the second pick. The higher GA concentration applied at 3 and 4 weeks before harvest led to a slight delay in harvest of 'Andross'. GA sprays did not affect fruit drop. Similar GA treatments on 'Ross' did not improve firmness when compared with the control. ReTain applied at 50 g a.i./acre at 8 days before harvest did not improve firmness or reduce fruit drop on 'Andross' or 'Ross'. GA sprays from 20 to 40 g/acre applied at 7 days or less before harvest in 2001 resulted in an overall increase in firmness at harvest, and a better retention of firmness over a storage period than was found in the untreated control in 'Andross'. No difference in return bloom was found for GA treatments made in 2001 or 2002.

In 2003, we repeated these experiments with some changes. As before, we used both 'Andross' and 'Ross' cultivars and the plant growth regulators ProGibb (gibberrellin A_3 at 20 and 32 g a.i. per acre; gibberllic acid) and ReTain (Valent BioSciences; 50 g a.i. per acre). Firmness of 'Andross' peach was increased by GA sprays of 32 g/acre applied approximately 3 weeks before harvest on fruit harvested on July 31 (first harvest). These fruit maintained improved firmness compared to the control for 21 hours after harvest, and were as firm as the control after 5 days. Fruit treated with 20 g/acre GA on 9 July were numerically firmer than the control fruit after harvest and throughout storage, although not statistically firmer. Fruit treated at 32 g/acre of GA on 16 July were equal to the control at harvest but grew less firm than the control with extended storage. Percentage of undersized fruit, number of fruit that dropped cumulatively, and weight per fruit were not different among treatments at the first harvest. The number of external bruises per fruit at harvest was not different from the control, and while the number of internal bruises per fruit was greater in fruit treated with 20 g ProGibb on 30 July than the control, no differences in the number of internal bruises was apparent among other treatments compared to the control after storage. Number of fruit dropped over time did not vary among treatments. When visual color of skin and flesh were rated on the fruit harvested on 31 July, there was no difference among treatments compared to the control in skin color and no difference among treatments for flesh color; storage did not change this result. When fruit were evaluated by colorimeter, however, some differences among treatments were found for skin and flesh color for both harvests; however, differences in chromacity, lightness and hue angle have not consistently related closely to maturity. Fruit from the second pick (August 5) were not different with respect to firmness, fruit weight or visual skin or flesh color in 'Andross'.

ReTain did not improve fruit firmness in either 'Andross' or 'Ross'. GA and ReTain were ineffective in increasing firmness in 'Ross' when compared to the control, although 'Ross' fruit were firmer (numerically) when treated with 20 g ProGibb approximately 2.5 weeks before the single commercial harvest. Fruit size (weight) and fruit drop in 'Ross' were unaffected by either GA or ReTain in 2003.

Problem and its significance:

Several cling peach cultivars develop softening problems prior to harvest and in some orchards and seasons the problems can be pronounced. In field experiments conducted from 1993 to 1995 with 'Loadel' cling peach we found that an application of gibberellin A_3 (GA; or the commercial product) could be sprayed 1 to 3 weeks prior to

harvest to improve fruit firmness (Southwick and Fritts, 1995; Southwick and Glozer, 2000). Our results with 'Loadel' suggested an increase in fruit firmness of about 2 pounds (Southwick, et. al., 1995). Other cling peach cultivars showed similar increases in fruit firmness with the appropriate GA spray application (Southwick and Fritts, 1995). Further research with
GA to improve fruit firmness suggests a consistent response when applications are made 3 to 4 weeks prior to commercial harvest. The ethylene biosynthesis inhibitor ReTain (Valent Biosciences Corp., Libertyville, Illinois, USA) has also been shown to improve firmness, delay harvest and reduce fruit drop in pome and stone fruit. Our work with apricot and the work of others with peach suggest that ReTain may help to improve the firmness of cling peach cultivars. The improvement in fruit firmness may help to reduce fruit bruising and may also be used as a harvest management tool to extend the normal harvest period for particular cultivars. In addition, improved firmness of fruit may help overcome some problems associated with mechanical harvest, especially for those cling peach cultivars less amenable to machine harvest such as 'Andross'. The benefits from GA sprays may help to improve fruit quality from hand harvest as well. Our goal has been to demonstrate the utility of GA for harvest management and evaluate the potential of ReTain in cling peach production.

Objectives:

- Determine whether GA sprays prior to harvest can consistently improve the firmness of 'Andross' and 'Ross' cling peach.

- Determine whether GA sprays prior to harvest may alter the harvest date of treated fruit.

- Determine the effects of preharvest ReTain spray treatment on the firmness and fruit drop of 'Andross' cling peach.

- Determine the effects of preharvest GA sprays on return bloom.

Return bloom with 2002 GA sprays

Plans and Procedures, 2002:

The orchards used in 2002 were those used in the 2003 trials (see below for description). The treatments used in 2002 are the following:

Treatments (applied at 100 gallons per acre volume)

Orchard A, 'Andross': Commercial harvests, and fruit sampling, was performed on 1 August and 9 August.
1. Untreated control

ProGibb® (4% gibberellic acid; Valent Biosciences Corp., Libertyville, IL) + 0.1% Regulaid as a surfactant

2. 20 g a.i. per acre, applied (3 July) 4 weeks before first harvest, 5 weeks before second harvest
3. 20 g a.i. per acre, applied (10 July) 3 weeks before first harvest, 4 weeks before second harvest
4. 20 g a.i. per acre, applied (19 July) 12 days before first harvest, 20 days before second harvest
5. 32 g a.i. per acre, applied (3 July) 4 weeks before first harvest, 5 weeks before second harvest
6. 32 g a.i. per acre, applied (10 July) 3 weeks before first harvest, 4 weeks before second harvest
7. 32 g a.i. per acre, applied (19 July) 12 days before first harvest, 20 days before second harvest

8. ReTain® (aminoethoxy-butenoic acid hydrochloride, 15%; Valent Biosciences Corp., Libertyville, IL), 50 g a.i., applied approximately 7 days before first harvest, 15 days before second harvest (label says 1-4 weeks before harvest; in 2002 it was 8 days and 16 days, respectively)

Orchard B, 'Ross': Commercial harvest and fruit sampling was performed on August 9.

Treatments (applied at 100 gallons per acre volume)

1. Untreated control

ProGibb® (4% gibberellic acid; Valent Biosciences Corp., Libertyville, IL) + 0.1% Regulaid as a surfactant

2. 20 g a.i. per acre, applied (10 July) 4 weeks before harvest
3. 20 g a.i. per acre, applied (19July) 3 weeks before first harvest
4. 20 g a.i. per acre, applied (31 July) 8 days before first harvest
5. 32 g a.i. per acre, applied (10 July) 4 weeks before harvest (10 July)
6. 32 g a.i. per acre, applied (19July) 3 weeks before first harvest
7. 32 g a.i. per acre, applied (31 July) 8 days before first harvest

8. ReTain®, 50 g a.i., applied (24 July) 2 weeks before harvest

Return bloom was evaluated as counts of flower buds taken on two limbs per treated tree prior to full bloom on March 6. Return bloom was calculated as number of flower buds per centimeter of shoot length.

Data analysis:

Statistical Analysis Systems software (SAS Institute, Cary, NC) was used to perform analysis of variance (PROC GLM). Mean separation was by Duncan's Multiple Range Test, 5% level of significance.

Results:

No significant difference was found among treatments.

Plans and Procedures, 2003:

Orchards A and B, commercial orchards of 'Andross' and 'Ross' cling peaches, respectively, were used as UCD trial orchards in the same immediate area north of Marysville, Yuba County, in the Sacramento Valley; these same orchards were used for similar treatments in 2002. All treatments applied at Orchards A and B were sprayed at a volume of 100 gallons per acre (gpa; 936 $LAha^{-1}$), with the exception of 2 treatments with GA in 'Ross' at 200 gpa, applied with a Stihl SR 400 mist blower (Andreas Stihl, Waiblingen, Germany). In both orchard experiments, we used a complete random block design with 4 single tree replicates per treatment (4 blocks). Trees were guarded by unsprayed trees on all sides. Sprays were applied beginning approximately 7 to 8 am.

Orchard A, 'Andross':

Trees were planted at 18' x 16' spacing with 151 trees per acre. Trees were 5 years old; the rootstock was 'Lovell'. Irrigation was by micro sprinkler. Commercial harvests, and fruit sampling, was performed on 31 July and 5 August.

Treatments (applied at 100 gallons per acre [gpa] volume)

1. Untreated control

ProGibb® (4% gibberellic acid; Valent Biosciences Corp., Libertyville, IL) + 0.1% Regulaid as a surfactant

2. 20 g a.i. per acre, applied (23 July) ~2 weeks before harvest (anticipated harvest 15 Aug)
3. 20 g a.i. per acre, applied (30 July)
4. 20 g a.i. per acre, applied (6 Aug)
5. 32 g a.i. per acre, applied (23 July)
6. 32 g a.i. per acre, applied (30July)
7 32 g a.i. per acre, applied (6 Aug)

8. ReTain® (aminoethoxy-butenoic acid hydrochloride, 15%; Valent Biosciences Corp., Libertyville, IL), 50 g a.i., applied 16 July

Orchard B, 'Ross':

Trees were planted at 21' x 21' spacing with 99 trees per acre. The orchard was a mixture of 4 year- and 15 year old-trees on 'Lovell' rootstock. The orchard was flood-irrigated. Commercial harvest and fruit sampling was performed on August 8 at a single harvest, as was done by the grower.

Treatments (applied at 100 gallons per acre [gpa] volume or 200 gpa where indicated)

1. Untreated control

ProGibb® (4% gibberellic acid; Valent Biosciences Corp., Libertyville, IL) + 0.1% Regulaid as a surfactant

2. 20 g a.i. per acre, applied (23 July) ~2.5 weeks before harvest (anticipated harvest 15 Aug)
3. 20 g a.i. per acre, applied (30 July)
4. 20 g a.i. per acre, applied (6 Aug)
5. 20 g a.i. per acre, applied (6 Aug), **200 gpa**
6. 32 g a.i. per acre, applied (23 July)
7. 32 g a.i. per acre, applied (30July)
8. 32 g a.i. per acre, applied (6 Aug)
9. 32 g a.i. per acre, applied (6 Aug), **200 gpa**

10. ReTain®, 50 g a.i., applied (16 July)

Harvest, fruit sampling and evaluation:

Orchard A: 'Andross'

We harvested on 31 July and 5 August beginning at approximately 6:30 am. At each harvest we harvested 20 fruits from each treated tree selecting at random from the bin that had been hand-picked by the commercial crew. Cumulative fruit drop was counted on 31 July, on each replicate treated tree. After weighing all fruit sampled at the 31 July harvest, fruit were divided into three groups of seven for evaluation and storage, such that fruit were evaluated immediately after harvest or stored at 32 EF for approximately 21 hours (26 hours post harvest) or 5 days, then evaluated. Fruit from the second harvest were not stored. At each harvest, in addition to fruit mass (weight) and the number of undersized fruit in the 20-fruit sample (undersize diameter was less than 2 3/8 inches), fruit were evaluated for:

$ Fruit firmness, determined with the skin off on both cheeks (avoiding blushed areas) by an Imada digital force gauge fitted with a conical tip and the ability to read up to 11 psi (5 kg) of force. Readings from both cheeks were summed and averaged.

$ Fruit color, visually assessed cheek skin and flesh colors compared to the California Department of Food

and Agriculture's (CDFA) #2, green color chip (L*=75.0, C*=61.0, H o =85.9) to determine the percentage of green or yellow fruit.

$ Fruit color (cheek skin and flesh colors) using a Minolta colorimeter (Minolta Corp., Ramsey, NJ) that measured color parameters hue, lightness, chroma and color (red/green) balance. Blushed or bruised areas of the skin were avoided, as were bruised areas of the flesh. Flesh readings were taken with skin off.

Orchard B: 'Ross': This orchard was harvested on a single date, 8 August, at which time 10 fruit were randomly selected from each treated tree, collecting all colors and sizes throughout the mid-canopy. These 10 fruit were used for fruit mass determination, percent undersized, visual skin and flesh color. Five fruit were sub-sampled for firmness and color evaluation by colorimeter as above**.** As no firmness differences were detected among treatments immediately after harvest, no storage was used in this trial.

Data analysis:

Statistical Analysis Systems software (SAS Institute, Cary, NC) was used to perform analysis of variance (PROC GLM). Mean separation was by Duncan's Multiple Range Test, 5% level of significance.

Results and discussion:

Firmness of 'Andross' peach was increased by GA sprays of 32 g/acre applied approximately 3 weeks before harvest on first pick fruit harvested and sampled on July 31 (Table 1). These fruit maintained improved firmness compared to the control for 21 hours after harvest, and were as firm as the control after 5 days. Fruit treated with 20 g/acre GA on 9 July were numerically firmer than the control fruit after harvest and throughout storage, although not statistically firmer. Fruit treated at 32 g/acre of GA on 16 July were equal to the control at harvest but grew less firm than the control with extended storage. Percentage of undersized fruit, number of fruit that dropped cumulatively, and weight per fruit were not different among treatments on 31 July (Table 2). The number of external bruises per fruit at harvest was not different from the control, and while the number of internal bruises per fruit was greater in fruit treated with 20 g ProGibb on 30 July than the control, no differences in the number of internal bruises was apparent among other treatments compared to the control for either storage period (Table 2). Number of fruit dropped over time did not vary among treatments (Table 2). When visual color of skin and flesh were rated on the fruit harvested on 31 July, there was no difference among treatments compared to the control in skin color and no difference among treatments for flesh color (Table 3). Thus, the percentage of green fruit at harvest was non significant. Similarly, no differences for either skin or flesh color when rated visually was found after storage for 21 hr (Table 3), nor after 5 days storage (data not shown). When fruit were evaluated by colorimeter, however, some differences among treatments were found for skin color (Table 3) and flesh color (Table 4). Similarly, differences among treated fruit in skin and flesh color measured at the second harvest exhibited some significance (Table 5). Nonetheless, these differences should be evaluated with caution as differences in chromacity, lightness and hue angle do not always relate closely to maturity, as per reports to the California Cling Peach Board by Crisosto et al. reflect:

'...lightness (L*), chromacity (C), and hue angle (H o) color system. Since canning peaches do not darken excessively when ripe, like a plum for example, lightness is not an appropriate variable to express the relationship between color and maturity, where maturity is expressed in terms of fruit flesh firmness. Chromacity values are highly variable for a number of reasons. Therefore, hue angle which defines the actual hue in terms of red, green, yellow, blue, etc. as a 0-360 system is used for analysis of any color and maturity (as firmness) relationship. Hue angles of note for canning peaches are the ranges +50 o (orange) through +90 o (yellow) to +135 o (green), so as hue angle increases the fruit flesh color is greener. A significant, positive (P value=0.0001) relationship exists between skin hue angle values and flesh hue angle values as measured for 'Andross', 'Carson', and 'Ross' fruit.

However, it is a poor linear relationship with R 2 =0.36 (‘Andross’), R 2 =0.23 (‘Carson’) and R 2 =0.24 (‘Ross’). Skin hue angle does not predict flesh hue angle well.’

Fruit from the second pick (August 5) were not different with respect to firmness (data not shown), undersized fruit (Table 5), fruit weight or visual skin or flesh color (data not shown).

Fruit size (%undersized), visual color of skin or flesh (data not shown), weight (Table 6) or preharvest drop (Table 6) were not affected by the various treatments. GA sprays of 20 g/acre or 32 g/acre applied 4 weeks before harvest to ‘Ross’ did not improve fruit firmness compared to the untreated check (Table 6). ReTain did not improve fruit firmness in either cultivar. There was no harvest delay noted as a result of ReTain treatment in this experiment.

Pertinent literature:

Southwick, S.M. and R. Fritts. 1995. Commercial chemical thinning of stone fruit in California by gibberellins to reduce flowering. Acta Hort. 394:135-147.

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Southwick, S.M., K.G. Weis, J.T. Yeager, and H. Zhou. 1995. Controlling cropping in ‘Loadel’ cling peach using gibberellin: Effects of flower density, fruit distribution, fruit firmness, fruit thinning, and yield. J. Amer. Soc. Hort. Sci. 120:1087-1095.

Table 1. Effects of ProGibb and Retain on firmness in ‘Andross’ cling peach at first harvest (31 July) and after storage at 32 EF for 21 hours (26 hr postharvest, August 1) and 5 days (August 5).

Treatment (@ 100 gal/A)	Date applied	31 July		1 August		5 August	
		lb	N	lb	N	lb	N
Untreated control		3.9bc [x]	17.3bc	3.7ab	16.5ab	3.8ab	17.0ab
ProGibb 4% 20 g a.i./A, 0.1% Regulaid	9 July	4.5ab	19.9ab	4.3a	19.0a	4.1a	18.4a
	16 July	3.7c	16.6c	3.2ab	14.2ab	3.2bc	14.0bc
	30 July	3.9bc	17.2bc	2.7b	12.1b	3.0c	13.4c
ProGibb 4% 32 g a.i./A	9 July	4.6a	20.7a	4.0a	18.0a	3.9ab	17.2ab
	16 July	4.4ab	19.6ab	3.2ab	14.3ab	2.9c	13.2c
	30 July	3.8bc	17.0bc	3.4ab	15.3ab	3.7bc	16.6abc
ReTain 50 g a.i./A	16 July	4.1bc	18.0bc	3.2ab	14.2ab	3.2bc	14.0bc

[x] Mean separation within columns by Duncan’s multiple range test, $P = 0.05$.

Table 2. Effects of ProGibb and Retain on external bruising, fruit size and cumulative fruit drop in 'Andross' cling peach at first harvest (31 July) and, for internal bruising, after storage at 32 EF for 21 hours (26 hr postharvest, August 1) and 5 days (August 5). Undersized fruit had a diameter less than 2 3/8 inches.

Treatment (@ 100 gal/A)	Date applied	%Undersized	Weight per fruit		#External bruises per fruit	#Internal bruises per fruit		#Fruit dropped per tree
			ounces	grams		1 August	5 August	
Untreated control		5.0	5.7	162.5	0.21abc	0.14bc	0.54	63
ProGibb 4% 20 g a.i./A, 0.1% Regulaid	9 July	5.0	5.8	166.2	0.23abc	0.11bc	0.57	88
	16 July	6.7	6.1	173.8	0.34ab	0.32ab	0.50	56
	30 July	6.7	5.5	156.2	0.39a	0.54a	0.54	91
ProGibb 4% 32 g a.i./A	9 July	3.3	5.2	146.2	0.07c	0.22bc	0.25	71
	16 July	10.0	5.5	156.2	0.20abc	0.39ab	0.57	88
	30 July	3.3	5.5	156.2	0.16abc	0.07c	0.43	76
ReTain 50 g a.i./A	16 July	1.7ns	6.1ns	171.2ns	0.09bc	0.21bc	0.50ns	81ns

[x] Mean separation within columns by Duncan's multiple range test, $P = 0.05$; ns = non significant.

Table 3. Effects of ProGibb and Retain on skin and flesh color and percentage of green fruit in 'Andross' cling peach at first harvest (31 July), and skin and flesh color after storage at 32 EF for 21 hours (26 hr postharvest, August 1). Skin color evaluated by visual rating and colorimeter, flesh color evaluated by visual rating.

Treatment (@ 100 gal/A)	Date applied	Visual color[y] at harvest		% Green fruit at harvest	Visual color on Aug 1		Colorimetric indices for skin color at harvest				
		Skin	Flesh		Skin color	Flesh color	L	a	b	c	H
Untreated control		1.50ab [x]	1.75	41.7	1.6	2.00	69.3	3.7ab	42.9d	44.3c	84.2a

ProGibb 4% 20 g a.i./A, 0.1% Regulaid	9 July		1.30b		1.65		35.0		1.6		1.89	70.2		4.1ab		46.6ab		47.8ab		84.7a
	16 July		1.70a		1.90		21.7		1.7		1.89	69.7		7.2a		47.1ab		48.8a		82.7ab
	30 July		1.50ab		1.90		45.0		1.8		1.89	70.3		4.6ab		47.6a		48.8a		85.6a
ProGibb 4% 32 g a.i./A	9 July		1.60ab		1.80		26.7		1.8		1.89	68.8		5.7ab		43.6cd		45.4bc		85.4a
	16 July		1.70a		1.85		26.7		1.7		1.86	69.8		3.4ab		45.5a-d		46.7abc		80.0b
	30 July		1.55ab		1.75		33.3		1.7		1.92	68.4		2.6ab		44.0bcd		45.6bc		86.2a
ReTain 50 g a.i./A	16 July		1.75a		1.90ns		38.3ns		1.6ns		1.96ns	69.8ns		2.2b		45.9a-d		46.6abc		83.7ab

[x] Mean separation within columns by Duncan's multiple range test, $P = 0.05$; ns = non significant differences.

[y] Visual color: green = 1 (below minimum maturity) or yellow = 2.

Table 4. Effects of ProGibb and Retain on flesh color in 'Andross' cling peach at first harvest (31 July) after storage at 32 EF for 21 hours (26 hr postharvest) and 5 days.

		After 21 hours storage (1 August)					After 5 days storage (5 August)				
Treatment (@ 100 gal/A)	Date applied	L	a	b	c	H	L	a	b	c	H
Untreated control		69.3 [x]	3.7ab	42.9d	44.3c	84.2a	65.9ab	3.3b	55.6ab	55.8ab	86.7a
ProGibb 4% 20 g a.i./A, 0.1% Regulaid	9 July	70.2	4.1ab	46.6ab	47.8ab	84.7a	63.0b	5.0b	49.7d	50.3d	84.3ab
	16 July	69.7	7.2a	47.1ab	48.8a	82.7ab	64.3ab	5.5b	52.8bcd	53.2bcd	84.3ab
	30 July	70.3	4.6ab	47.6a	48.8a	85.6a	66.5a	9.6a	56.0a	56.8a	80.3b
ProGibb 4% 32 g a.i./A	9 July	68.8	5.7ab	43.6cd	45.4bc	85.4a	64.9ab	6.1ab	51.6cd	52.0cd	83.3ab
	16 July	69.8	3.4ab	45.5a-d	46.7abc	80.0b	65.0ab	4.2b	51.6cd	51.8cd	85.4a
	30 July	68.4	2.6ab	44.0bcd	45.6bc	86.2a	64.0ab	3.3b	52.4cd	52.6bcd	86.6a
ReTain 50 g a.i./A	16 July	69.8ns	2.2b	45.9a-d	46.6abc	83.7ab	65.6ab	3.3b	53.7abc	53.9abc	86.5a

[x] Mean separation within columns by Duncan's multiple range test, $P = 0.05$; ns = non significant differences.

Table 5. Effects of ProGibb and Retain on flesh color and fruit size in 'Andross' cling peach at second harvest (5 August).

Treatment (@ 100 gal/A)	Applied	Skin color					Flesh color					%Undersized
		L	a	b	c	H	L	a	b	c	H	
Untreated control		70.6	0.45ab	45.2	46.0	89.3	66.0ab	3.3b	55.6ab	55.8ab	87.7a	10.7
ProGibb 4% 20 g a.i./A, 0.1% Regulaid	9 July	71.4	-0.57b	44.9	45.4	91.2	63.0b	5.0b	49.7d	50.3d	84.3ab	10.7
	16 July	69.4	2.47a	45.2	45.9	87.1	64.3ab	5.5b	52.8bcd	53.2bcd	84.3ab	14.3
	30 July	71.2	-0.28ab	44.4	44.9	90.2	66.5a	9.6a	56.0a	56.8a	80.3b	14.3
ProGibb 4% 32 g a.i./A	9 July	70.6	0.90ab	44.6	45.1	89.0	64.0ab	6.1ab	51.6cd	52.0cd	83.3ab	7.1
	16 July	69.4	1.08ab	44.1	44.7	88.8	65.0ab	4.2b	51.6cd	51.8cd	85.4ab	21.4
	30 July	71.0	2.42a	45.0	45.5	87.1	64.0ab	3.3b	52.4cd	52.6bcd	86.6a	7.1
ReTain 50 g a.i./A	16 July	71.2ns	1.21ab	46.4ns	46.8ns	88.7ns	65.6ab	3.3b	53.7abc	53.0abc	86.5a	3.6ns

[x] Mean separation within columns by Duncan's multiple range test, $P = 0.05$; ns = non significant differences.

Table 6. Effects of ProGibb and Retain on fruit quality in 'Ross' cling peach at harvest (8 August).

Treatment (@ 100 gal/A)	Applied	Firmness		Fruit wt (g)	#Fruit dropped cumulatively
		N	lb		
Untreated control		15.6abc	3.5abc	192	37.8
ProGibb 4% 20 g a.i./A, 0.1% Regulaid	23 July	18.5a	4.2a	17.8	37.6
	30 July	15.6abc	3.5abc	184	43.2
	6 August	13.1bc	2.9bc	190	53/0
ProGibb 4% 20 g a.i./A **200 gpa**	6 August	15.8abc	3.6abc	177	44/4
ProGibb 4% 32 g a.i./A	23 July	17.7ab	4.0ab	208	66.2
	30 July	14.3c	3.2c	190	43.0
	6 August	17.0ab	3.8ab	208	57.6
ProGibb 4% 32 g a.i./A **200 gpa**	6 August	13.2c	3.0c	178	59.0
ReTain 50 g a.i./A	16 July	14.7bc	3.3bc	196ns	42.4ns

[x] Mean separation within columns by Duncan's multiple range test, $P = 0.05$; ns = non significant differences.