

Gibberellin on Orange Fruit

content of ascorbic acid, hydrogen ion and juice increased while rind color, thickness and texture coarseness decreased

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To evaluate the influence of gibberellin on citrus fruit development and quality—and other tree responses—Thompson Improved Navel Oranges were treated with potassium gibberellate during the first week of November 1957. Oranges 2.5"–2.6" in diameter were individually dipped along with four subtending leaves in the treatment solutions. Concentrations of technical gibberellin—containing approximately 82% potassium gibberellate—used were 500, 1,000, and 2,000 ppm—parts per million. A non-ionic wetting agent was added at 0.05%. Oranges which served as controls were selected for size but were not treated. A randomized complete block design with eight replications was used. Each plot consisted of three trees with 17 test oranges on each.

Nontreated oranges of the same size as the treated fruits were collected near treatment time. The percent juice was found to be 40.9%, soluble solids 11.7% and total acid—expressed as citric—0.98%. At treatment time the oranges were just beginning to lose the green color.

Thirty oranges per plot were harvested January 31, 1958, and data collected on color, transverse and longitudinal diameters, weight, rind thickness, and percent juice. The juice was analyzed for total soluble solids, total acids, hydrogen ion concentration, and ascorbic acid.

The remainder of the treated oranges were harvested March 13. The same data and—in addition—the number of puffy oranges were recorded.

Control fruit were more orange in color than those dipped in gibberellin.

Differences in color were very marked at both harvest dates. At the second harvest, small, pin-point size, depressed brown spots were numerous on the rind of treated fruit. Similar spots were present on untreated oranges, but to a low degree.

Treatment with gibberellin in this experiment increased percent juice. On January 31 untreated oranges contained 47.3% juice while those dipped in 500, 1,000, or 2,000 ppm gibberellin contained 50.4, 51.0 and 51.3% juice, respectively. Similar results were obtained for the March 13 harvest. The content of ascorbic acid in the juice was also significantly increased. Ascorbic acid content in untreated fruit was 63.8 mg—milligrams—per 100 ml—milliliters—of juice on January 13. Juice from oranges dipped in 500 ppm gibberellin contained 70.8 mg ascorbic acid per 100 ml. The value for 1,000 ppm was 71.4 mg per 100 ml and 69.8 mg per 100 ml for 2,000 ppm. Similar results were obtained for the second harvest. Hydrogen ion concentration of the juice appeared to be significantly higher January 31 in treated than in control oranges. Juice from untreated oranges contained a hydrogen ion concentration of 0.197 mg per liter. The values for 500, 1,000, and 2,000 ppm were 0.235, 0.227 and 0.232 mg per liter; no such difference was apparent on March 13.

Oranges treated with gibberellin appeared to have a rind smoother than the rind of untreated oranges. Small but significant differences in rind thickness were measured. At the first harvest only oranges dipped in 2,000 ppm appeared to

have a thinner rind than the control. All gibberellin treatments appeared to cause thinner rinds by the second harvest. Untreated oranges had a rind thickness of 4.81 mm—millimeters—whereas those dipped in 500, 1,000, or 2,000 ppm gibberellin had a rind thickness of 4.52, 4.51 and 4.47 mm. Significant differences in fruit drop, puff, weight or shape of oranges, percent soluble solids in the juice, and soluble solids ratio to acid were not detected.

The effects of treating navel oranges in November—when they were almost fully developed—suggest that this compound may have additional effects on the morphology and composition of citrus and other fruits, particularly if applied through a wide range of development stages.

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fruit is mechanically washed prior to processing, the problem of picking up extraneous matter is not an insurmountable one.

The capacity of the new type machine—22" swath width—was approximately one box per minute depending upon the fruit density on the ground, which probably would lead to an average output of 20–30 boxes per hour, comparable to machines of other types and is an increase of five or six times the rate of hand picking.

To minimize the importance of land leveling plans are under way to design and build a tractor mounted machine—with separately floated pickup units approximately 24" wide—attached in offset tandem.

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Influence of Gibberellin on Some Quality Factors of Navel Oranges Treated November 4, 1957. Harvested January 31 and March 13, 1958

Concentration of gibberellin ppm	Color ^a		Juice w/w %		Ascorbic acid mg/100 ml		Rind thickness mm		Hydrogen ion concentration mg/liter	
	Jan. 31	Mar. 13	Jan. 31	Mar. 13	Jan. 31	Mar. 13	Jan. 31	Mar. 13	Jan. 31	Mar. 13
0	7.3	8.5	47.3	45.5	63.8	63.6	4.62	4.81	0.197	0.141
500	4.6**	5.5**	50.4**	50.5**	70.8**	71.2**	4.49	4.52*	0.235*	0.157
1,000	4.6**	5.6**	51.0**	50.1**	71.4**	76.0**	4.45	4.51*	0.227*	0.158
2,000	4.4**	5.1**	51.3**	51.7**	69.8**	73.1**	4.37*	4.47*	0.232*	0.155
A (0.05) ^b	0.33	0.33	1.24	1.58	3.7	4.3	0.17	0.27	0.028	NS
A (0.01)	0.45	0.45	1.68	2.14	5.1	5.8	NS	NS	NS	NS

^a An arbitrary color rating estimated visually for each fruit with an index of 5 = pale yellow and 8 = good orange.

^b Dunnett's one-sided test was used in statistical treatment of these data.

* Significantly different from untreated oranges at the 0.05% level.

** Significantly different from untreated oranges at the 0.01% level.