GA₃ and Thinning Affect Fruit Quality and Yield of 'AU-Rubrum' Plum

G.E. Boyhan¹, J.D. Norton², B.R. Abraham³, and J.A. Pitts⁴
Department of Horticulture and Alabama Agricultural Experiment Station, Auburn University, AL 36849

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Gibberellic acid (GA₃) has been recommended for many horticultural and turf crops to improve size or quality (Earl, 1988). It is recommended on sweet cherries (*Prunus avium* L.) to produce better color and firmer and larger fruit (Early, 1988). Thinning to increase fruit size is a common practice on many horticultural crops. Belmans and Keulemans (1987) reported that early thinning (1 month after flowering) increased fruit weight and earliness without reducing yield in plums.

Enhancing firmness, fruit size, and sugar content with no adverse affect on yield would be advantageous in plums. The objective of our study was to investigate the effects of GA₃ and fruit thinning on yield and fruit quality of 'AU-Rubrum' plum, (*P. salicina* Lindl., *P. cerusifera* Ehrh., *P. angustifolia* Marsh., *P. munsoniana* Wight & Hedr.) as measured by firmness and soluble solids concentration (SSC).

The treatment structure was a 3 × 2 factorial in a completely randomized block design with four single-tree replications. Spray treatments were applied at the rate of 0, 50, and 100 mg GA₃(Pro-Gibb, 4% liquid, Abbott Laboratories, North Chicago)/liter. Thinning vs. no thinning was compared at each GA₃ treatment, resulting in six treatment combinations. Gibberellic acid was applied with a backpack sprayer to runoff on

those trees being treated when fruit was ≈ 1 cm in diameter. Hand thinning was done at the same time to a spacing of 10 to 15 cm between fruit. Treatments were applied on 27 Mar. 1990 and 9 Apr. 1991.

Fruit were harvested on 8 and 12 June 1990. Total yield per tree was recorded and the fruit were graded into five classes based on size. The first year the classes were as follows: 1) 12.5 cm; 2) > 2.5 to 3.2 cm; 3) > 3.2 to 3.8 cm; 4) > 3.8 to 4.4 cm; and 5) > 4.4 cm. The fruit were harvested on 4, 10, 14, and 17 June 1991. In general, the fruit were larger the 2nd year so the classes were adjusted up: 1) 53.2 cm; 2) > 3.2 to 3.8 cm; 3) > 3.8 to 4.4 cm; 4) > 4.4 to 5.1 cm; and 5) > 5.1 cm.

Ten fruit per treatment per replication were picked at random for further testing. Each fruit was cut perpendicular to the suture line for removal of a 1- to 2-mm slice exposing the flesh. The firmness of the exposed flesh was measured using an Instron Model 1122 (Instron, Canton, Mass.). The instrument had

a 500-kg reversible load cell set to 1 on the full scale load, with a crosshead speed of 500 mm·min⁻¹, and a chart speed of 50 mm·min⁻¹. The probe used was 7.9 mm in diameter, with a convex head.

SSC for a 10-fruit sample per treatment per replication was measured using a Kernco 0-32% temperature compensating refractometer (Kernco, El Paso, Texas).

Gibberellic acid applications reduced yield 34% from an average of 52.7 to 35.0 kg/tree. Thinning did not affect yield; non-thinned trees averaged 43.3 kg and those thinned averaged 44.3 kg.

The percentage of fruit in classes 4 and 5 reflects any increase in size from the various treatments. Neither GA₃ nor thinning had any effect on fruit size (Table 1). The lack of effect of thinning on size contradicts results for other studies on plums (Belmans and Keulemans, 1987; Wijsmuller, 1986). Our result suggests that 'AU-Rubrum' tends to be self-thinning.

Application of GA₃ linearly increased SSC by 7% from 9.2 to 9.9 (Table 1). Fruit firmness was not affected by thinning or GA₃ applications. There were no GA₃ × thinning interactions for any of the characteristics studied.

Literature Cited

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Table 1. Effect of GA₃ and thinning on yield, percent fruit in classes 4 and 5¹, soluble solids concentration (SSC), and firmness (combined over 2 years).

GA ₃ (ppm)	Thinned	Yield (kg/tree)	Fruit in classes 4 and 5 (%)	SSC (%)	Firmness (N)
0	-	50.78	43.5	9.2	36.9
50	-	44.40	43.9	9.6	40.1
100	-	34.59	43.0	10.1	31.9
0	+	54.59	42.2	9.2	34.2
50	+	42.87	49.2	9.7	38.0
100	+	35.35	56.5	9.7	40.3
Contrast (probability) ²					
GA ₃		0.038	0.634	0.012	0.260
GA ₃ linear		0.002	—	0.012	—
GA ₃ quadratic		0.966	—	0.579	—
Thinning		0.814	0.330	0.883	0.615

¹Classes 4 and 5: 1990, > 3.8 cm; 1991, > 4.4 cm. There was no GA₃ × thinning interaction.

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¹Senior Research Associate.

²Professor.

³Technician.

⁴Superintendent.