

FINAL REPORT

Project Title: Evaluation of calcium chloride sprays for delaying maturity and improving storage quality of Bartlett pears.

PI: David Sugar, Professor

Organization: Oregon State University, Southern Oregon Research and Extension Center
david.sugar@oregonstate.edu

Contract Administrator: Dorothy Beaton; email: dorothy.beaton@oregonstate.edu
541-737-3228

Objectives:

This project addressed the question: can calcium applications to Bartlett pears during the growing season delay maturity sufficiently to allow delayed harvest, with larger fruit size? Secondly, the project compared the storage quality of calcium-treated and non-treated Bartlett pears.

Methods:

Replicated, randomized plots were established at the Southern Oregon Research and Extension Center. Treatments were applied by powered handgun sprayer.

Significant Findings:

1. In 2004 plots Bartlett pear trees sprayed three times during mid-late summer with calcium chloride applied at 1, 3, or 5 lbs. actual calcium per 100 gallons of water suffered increasing leaf burn as the dosage increased. Leaf injury at 1 lb. calcium per 100 gallons was minor. In 2005, leaf injury was minor with 1 lb. calcium per 100 gallons, whether applied 3 times or 6 times during the growing season. Calcium-containing products Calcium Metalosate and Nutri-Cal did not cause visible leaf injury.
2. Fruit size and soluble solids, which were diminished in association with leaf injury in 2004, were not affected by any treatment in 2005 (Table 1).
3. Blackened lenticels were observed with dosages of 3 or 5 lbs. calcium at the first harvest in 2004, but were barely noticeable at later harvests. Dark green areas around lenticels were observed in 2005 where 1 lb. calcium per 100 gallons was applied 6 times.
4. Fruit firmness and color were not affected by any treatment in 2005 (Table 1).
5. Calcium treatments in the programs tested did not affect storage quality of the pears (Table 2).

Results and Discussion:

1. Bartlett pear trees appear to be more sensitive than Bosc trees to leaf burn and lenticel blackening by calcium chloride. Excessive leaf burn reduces fruit size and soluble solids. Leaf burn was minor when calcium chloride was applied at 1 lb. calcium per 100 gallons.
2. At dosages that did not cause significant leaf injury, there was no detectable benefit to calcium applications to Bartlett pears. Fruit firmness was not significantly enhanced; there was no indication that if harvest were delayed to increase fruit size, calcium treatments would compensate for the loss of firmness.

3. There was no indication that calcium treatments to Bartlett pears help maintain fruit quality during cold storage.

Table 1. Fruit characteristics in Bartlett pears following various foliar calcium programs.

Harvest 1

Treatment	Average fruit weight (g)	Fruit firmness (lbs)	Soluble solids (°Brix)	Color (hue)
Check	188.3	18.3	13.8	107.8
CaCl ₂ 1 lb Ca 3 applications	189.5	18.9	13.9	108.3
CaCl ₂ 1 lb Ca 6 applications	177.4	20.1	13.8	107.8
CaCl ₂ 5 lb Ca Preharvest	188.9	18.4	14.2	107.7
CaCl ₂ 1 lb Ca 3 applications + Auxigrow	176.7	19.4	14.0	107.1
Ca Metalosate	178.6	19.1	13.4	105.1
NutriCal	178.3	19.4	13.7	108.3
<i>P</i> value	0.876	0.162	0.735	0.361

Harvest 2

Treatment	Average fruit weight (g)	Fruit firmness (lbs)	Soluble solids (°Brix)	Color (hue)
Check	207.4	15.2	14.1	108.0
CaCl ₂ 1 lb Ca 3 applications	210.0	16.6	13.7	108.1
CaCl ₂ 1 lb Ca 6 applications	210.5	17.5	13.9	109.0
CaCl ₂ 5 lb Ca Preharvest	219.8	16.2	14.2	107.0
CaCl ₂ 1 lb Ca 3 applications + Auxigrow	205.5	17.1	13.7	107.1
Ca Metalosate	202.3	16.0	14.0	107.1
NutriCal	200.3	17.0	13.2	108.2
<i>P</i> value	0.961	0.164	0.262	0.468

Harvest 3

Treatment	Average fruit weight (g)	Fruit firmness (lbs)	Soluble solids (°Brix)	Color (hue)
Check	233.2	14.2	14.7	105.6
CaCl ₂ 1 lb Ca 3 applications	242.4	15.5	14.5	105.9
CaCl ₂ 1 lb Ca 6 applications	213.6	14.5	14.0	105.9
CaCl ₂ 5 lb Ca Preharvest	227.1	15.1	14.1	105.8
CaCl ₂ 1 lb Ca 3 applications + Auxigrow	223.6	14.4	14.6	103.8
Ca Metalosate	227.1	15.5	14.5	106.6
NutriCal	234.5	15.0	14.3	106.2
<i>P</i> value	0.904	0.910	0.589	0.849

Table 2. Quality of Bartlett pears grown under various calcium programs, following storage at 31°F.

Evaluation 1 mid-November

	Harvest 1	Harvest 2	Harvest 3
Check	fair	good	fair
CaCl ₂ 1 lb Ca x 3	fair	fair-good	fair
CaCl ₂ 1 lb Ca x 6	poor-good	fair-good	fair
CaCl ₂ 5 lb Ca Preharvest	fair-good	fair-good	fair-good
1 lb x 3 + Auxigrow	poor-good	fair	fair
Ca Metalosate	poor	fair	fair
NutriCal	poor-fair	fair	fair

Evaluation 2 mid-December

	Harvest 1	Harvest 2	Harvest 3
Check	poor	poor	poor
CaCl ₂ 1 lb Ca x 3	poor	poor	poor
CaCl ₂ 1 lb Ca x 6	poor	poor	poor
CaCl ₂ 5 lb Ca Preharvest	poor	poor-fair	poor
1 lb x 3 + Auxigrow	poor	poor	poor
Ca Metalosate	poor	poor	poor
NutriCal	poor	poor	poor

Budget:

Project Title: Strategies for thinning Bartlett pears using caustic materials
PI: David Sugar

Project Duration: 2004-2005

<u>Item</u>	<u>Amount</u>
Salaries and Wages	5,505
Benefits (0.09)	495
Services and Supplies	800
Travel	200
Total	7,000 (Oregon Bartlett Pear Commission)