

EFFECT OF FOLIAR SPRAYS OF METALOSATE[®] CALCIUM AND METALOSATE[®] POTASSIUM ON YIELD AND APPLE QUALITY

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INTRODUCTION

The focus of this study was to improve fruit quality and storability as a result of foliar sprays of calcium (Ca) and potassium (K).

MATERIALS AND METHODS

This study was carried out in 2006 at the RIPF experimental orchard in Poland. It was conducted on five-year-old 'Jonagold' apple trees. No flower or fruitlet thinning was performed during the trial.

The experimental trees were sprayed with the Metalosate Calcium and/or Metalosate Potassium in the following scheme:

1. Six sprays of Metalosate Calcium: at the beginning of flowering (at 5% bloom), petal fall, and 15, 21, 28, and 59 days later, at the rate of 2 L/ha (27 fl. oz/acre) in each spray treatment;
2. Sprays of Metalosate Calcium at the same terms and rate as in the treatment 1 plus four sprays of Metalosate Potassium: 6, 4, 2, and 1 week before commercial harvest at a rate of 2.5 L/ha (34 fl. oz/acre) in each spray and;
3. Control – trees untreated.

MEASUREMENTS AND OBSERVATIONS

1. Fruit yield was measured separately for each plot.
2. Fruit quality at harvest was evaluated based on mean fruit weight, red color, flesh firmness and soluble solids concentrations.
3. Calcium status in leaf and fruit tissues. Composite samples of leaves from the mid third portion of one year old shoots were taken 35 and 70 days after petal fall

and at harvest. Fruit samples were taken at the same terms as leaf samples.

4. The incidence of physiological disorders and diseases at harvest was assessed using 15 kg (33 lb.) fruit samples per plot.
5. Fruit storability. The fruits were stored for 130 days in refrigerated air storage at 1-2°C (34-36°F) and a relative air humidity of 88-90%. Firmness, soluble solids concentrations of fruit, and the incidence of physiological disorders and diseases were assessed with the same method as they were at harvest.

RESULTS AND DISCUSSION

Yield of 'Jonagold' apple trees was moderate (24.3-26.0 tons), which was probably caused by winter damage to fruit buds. In all treatments, mean fruit weight was above 200 g (7 oz.), considered the minimum for extra grade for this variety. Fruit weight was not significantly changed by foliar sprays of Metalosate Calcium and Metalosate Potassium (Table 1). Apple color of the control trees was moderate (blushing <50% of fruit skin surface) (Table 1). Sprays of Metalosate Calcium plus Metalosate Potassium improved apple color, whereas application of calcium alone did not affect this parameter (Table 1), indication that Metalosate Potassium was the factor in the color change. Soluble solids concentration was influenced by the Metalosate Calcium plus Metalosate Potassium treatment. Fruit firmness at harvest did not differ between the studied treatments (Table 1). Among the physiological disorders, only bitter pit occurred in

the experiment. The incidence of bitter pit was observed only on apple fruits from the control plots. Apples sprayed with Metalosate Calcium and Metalosate Potassium were not affected by bitter pit.

Leaf calcium concentration increased as the growing season progressed. Calcium levels in fruits from the treated plots increased as compared to the control plot fruits.

Fruit firmness after storage was not affected by sprays of Metalosate Calcium and Metalosate Potassium (Table 2). However, fruits sprayed with Metalosate Calcium plus Metalosate Potassium had higher soluble solids concentrations than those of the control plots (Table 2).

After storage, only bitter pit was observed. Apples sprayed with Metalosate Calcium were less sensitive to bitter pit than the control apples (Table 2). This fact confirms many study results in that calcium compound sprays lowered the incidence of bitter pit. Simultaneously, in this experiment, sprays of Metalosate Calcium plus Metalosate Potassium had no effect on the occurrence of bitter pit. This indicates that the influence of Metalosate Calcium on bitter pit was reduced by application of Metalosate Potassium. This is not a surprise because a high level of potassium in apple flesh tissues may increase sensibility to bitter pit.

SUMMARY

- i. Four sprays of Metalosate Potassium during the last 6 weeks before 'Jonagold' apple harvest improved color and soluble solids

- concentration in fruits at harvest and after storage.
- ii. Six sprays of Metalosate Calcium applied from the beginning of flowering to 59 days after petal fall increased calcium concentrations in leaf and fruit tissues and reduced the incidence of bitter pit after storage.
 - iii. Sprays of Metalosate Calcium plus Metalosate Potassium had no effect on fruit sensitivity to bitter pit at harvest.
 - iv. Sprays of Metalosate Calcium and Metalosate Potassium did not affect mean fruit weight, fruit firmness at harvest and after harvest, and diseases during storage.
 - v. In potassium-sufficient 'Jonagold' apple orchards, sprays of Metalosate Potassium before harvest may be recommended for improvement in fruit appearance and taste.
 - vi. Sprays of Metalosate Calcium applied in the first 8 weeks after flowering can be recommended for improvement of 'Jonagold' apple storability.
- These results confirm that Metalosate Calcium is effective at reducing bitter pit. Also, they confirm that Metalosate Potassium is effective at increasing soluble solids content as well as improving fruit color. For more information on this trial or how the Metalosate products can benefit you, please contact your local Albion Plant Nutrition representative. [↗](#)

Table 1. Effect of Foliar Sprays of Metalosate® Calcium and Metalosate® Potassium on Yield and 'Jonagold' Apple Quality at Harvest

Treatment	Yield per Tree	Mean Fruit Weight	Apple Color (1-4)*	Soluble Solids Concentration (%)	Firmness (N)	Bitterpit %
Sprays of Metalosate® Calcium	26.0 kg a (57.3 lbs.)	218 g a (8 oz)	1.5 a	13.4 a	96 a	0 a
Sprays of Metalosate® Calcium & Metalosate® Potassium	24.3 kg a (53.6 lbs)	218 g a (8 oz)	2.5 b	14.2 b	97 a	0 a
Control	25.0 kg a (55.1 lbs.)	219 g a (8 oz)	1.5 a	13.4 a	96 a	3.4 b

*The higher the value the better the fruit color.

Means within column with the same letter are not significantly different by Duncan's Multiple Range Test at $P \leq 0.05$.

Table 2. Effect of Foliar Sprays of Metalosate® Calcium and Metalosate® Potassium on 'Jonagold' Apple Storability

Treatment	Firmness (N)	Soluble Solids Concentration (%)	Bitterpit (%)	Rotten Fruits (%)
Sprays of Metalosate® Calcium	5.7 a	13.2 a	1.9 a	1.9 a
Sprays of Metalosate® Calcium & Metalosate® Potassium	5.5 a	14.1 b	6.8 b	1.3 a
Control	5.6 a	13.3 a	7.5 b	1.5 a

Means within column with the same letter are not significantly different by Duncan's Multiple Range Test at $P \leq 0.05$.

