



Aronia Rate Optimization 2017

Purpose

Evaluate the efficacy and return on investment for different Sustâne-based maintenance fertility programs for Aronia berry farmers.



Figure 1: Farmer collaborators for this project were, from left to right, Duane Baumler, Randy Petersburg, Earl Goodman, and Joel Goodman.

Methods

This study was conducted on multiple Aronia farms in Iowa and Minnesota (Table 1). Soils and cropping histories varied by farm, and average plant size differed somewhat by location on and across farms.

County	Owner	Farm No.	Planting Date	Plant Size
Winneshiek	D Baumler	1	2011	3-5 ft.
Allamakee	R Petersburg	2	2010/11	4-5 ft.
Allamakee	E Goodman	3	2010	5-6 ft.
Fillmore	J Goodman	4	2012	6-7 ft.

Table 1: Site descriptions for the multisite field trial.

On each farm, the experiment was laid out in a Latin square design with multiple blocks of five different treatments. Each block included a negative control to determine the extent to which soil fertility was limiting at each site. The three experimental treatments included either Sustâne 4-6-4 or 8-2-4. There was also a grower standard to determine how the Sustâne programs might compare in productivity, cost, and profitability of those already used by our cooperators on their farms.

Beginning in the spring of 2016, fertilizers were applied at a standard rate of 1 cup per plant (= 300

lbs./A) per application. Applications were made by hand beneath the canopy in spring (April/May) and, in some instances, again in autumn soon after harvest (August/September). Plots were monitored and weeded according to grower practice.

Yield and quality assessments were made on fruit that were hand harvested in 2017 a week or two before the main harvest period. Fresh weight and Brix values were taken within 24 hrs. of harvest. Assessments of phenolic and flavonoid contents were made on frozen berries sent to external laboratories for analysis.



Results

Growing conditions in 2017 were good at all four farms. Overall, the health of bushes and berry quality were good in all the test plots at the time of trial harvest in August. Average yields were greater than 8 lbs. per plant across the four trial farms. At Farm 1 productivity was notably lower due to yield limiting factors not related to soil fertility.

Measure	Farm 1	Farm 2	Farm 3	Farm 4	Overall
Yield (lbs./plant)	2.3	9.9	10.9	14.8	8.0
Berry density (g/20 berries)	16.4	21.3	15.4	14.1	18.7
Brix level (trial harvest)	20.2	18.8	15.1	14.8	16.5

Table 2: Summary measures for the 2017 harvest.

Berry density and Brix levels at the time of the trial harvest varied between farms, but were in the range expected for berries about to be harvested. Overall, Brix levels were marginally lower (-0.4 to -1.1 units) in berries coming from the fertilized plots, but such differences were not statistically significant ($P>0.3$). Nonetheless, yields and Brix values were negatively correlated on each farm (from -0.25 to -0.51; $P<0.10$) indicating that berries tend shrink somewhat as they ripen.

Sustâne Natural Fertilizers significantly improved aronia berry production (Table 3). Overall berry yields increased by 0.36 to 1.67 lbs. per bush depending on the type and amount of fertilizer applied. Most significantly ($P<0.10$), Sustâne 8-2-4 produced the best results, demonstrating that aronia bushes prefer fertilizers with a high N:P ratio.

Just one or two annual applications of Sustâne 8-2-4 increased berry yields by 11% or 21%, respectively ($P<0.10$). In contrast, farm-level responses to Sustâne 4-6-4 were mixed, indicating that it should only be used on farms where soil P is limiting.

Treatment	Farm 1	Farm 2	Farm 3	Farm 4	Overall
4-6-4 Sp Au	29%	-13%	-14%	8%	4%
8-2-4 Sp	31%	4%	14%	16%	11%
8-2-4 Sp Au	29%	10%	23%	40%	21%

Table 3: Harvested berry yield increases produced by Sustâne Natural Fertilizers.

Yield responses to 8-2-4 ranged from 4% to 40% depending on rate and farm location. Furthermore, increasing rates of Sustâne 8-2-4 increased yields of aronia berries on three of the four farms and, the magnitude of the crop response increased as absolute yields increased. These data indicate that greater yield increases may be achieved using even higher rates of 8-2-4.

In order to determine the optimal rate for growers, we conducted an analysis of the relative costs and benefits of using Sustâne Natural Fertilizers. In this trial, all of our cooperating growers saw a positive return on investment (ROI), receiving an average \$5 return for every \$1 spent on Sustâne 8-2-4.

Individual farms saw ROI from 2.2 to 16.3, indicating that results will vary somewhat by location and overall growing conditions.

Treatment	Farm 1	Farm 2	Farm 3	Farm 4	Overall
4-6-4 Sp Au	3.3	-6.2	-7.5	5.6	1.8
8-2-4 Sp	4.0	2.2	8.4	13.1	5.0
8-2-4 Sp Au	1.9	2.7	7.0	16.3	4.6

Table 4: Return on investment (ROI) for each Sustâne fertilizer treatment.

On average, Aronia growers can increase net returns by \$1000 per acre by using Sustâne 8-2-4. Assuming a berry price of just \$1 per pound growers, our trial growers netted \$223 to \$5497 per acre on their farm by using Sustâne 8-2-4. Across all test plots, net receipts of \$712 to \$1307 per acre depending on the amount of Sustâne 8-2-4 they applied.



The recommended program for Aronia berries is currently set at 1 cup of Sustâne 8-2-4 per plant (i.e. approximately 300 lbs. per acre) for the first two years. Starting in the crop's third year, applications should be increased to 2 cups (or 600 lbs. per acre) of Sustâne 8-2-4 per year. If irrigation is applied, rates may be increased by 25 to 50%.

For more information on this project, contact help@Sustane.com

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