



Case Study

Apple Storage Quality



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This case study looks at the improvement in storage index at an apple orchard in Washington State after using AEA's nutrition management program.

Key Achievements:

- **135 points total improvement** in storage index across 35 blocks in the first year, an average of 3.75 points per block.
- **Tripling** the number of blocks in the top tier
- **After 4 years**, elevating fruit storage quality from this orchard from the worst in the entire company to the top 1%.



Background

The client is a large fruit farmer in Washington State, with thousands of acres under management, spread across a number of ranches. Each ranch is independently managed. The ranch where this case study took place is 1000 acres, and was one of the company's worst in terms of fruit quality and storability when they started working with AEA. It is situated on poor, sandy soil, and is sited near a river, where there is little difference between day and night temperatures, so the fruit has trouble coloring. The manager approached AEA to see if we could help solve their fruit quality and storability problems.

AEA's Solution

We started the orchard on our full program of nutrition and biology, including soil primers, fertigation, and foliar sprays informed by sap analysis. We also recommended major changes to the orchard's annual soil amendment program.

With the particular goal of improving fruit storability, we aimed to increase calcium and decrease nitrogen in the finished fruit, while moderating potassium and magnesium. To that end, we made special efforts to:

- get as much calcium as possible into the fruitlets around the time of bloom
- provide adequate boron to improve calcium translocation
- limit nitrogen applications
- supply adequate micronutrients to process available nitrogen
- delay potassium applications until later in the season

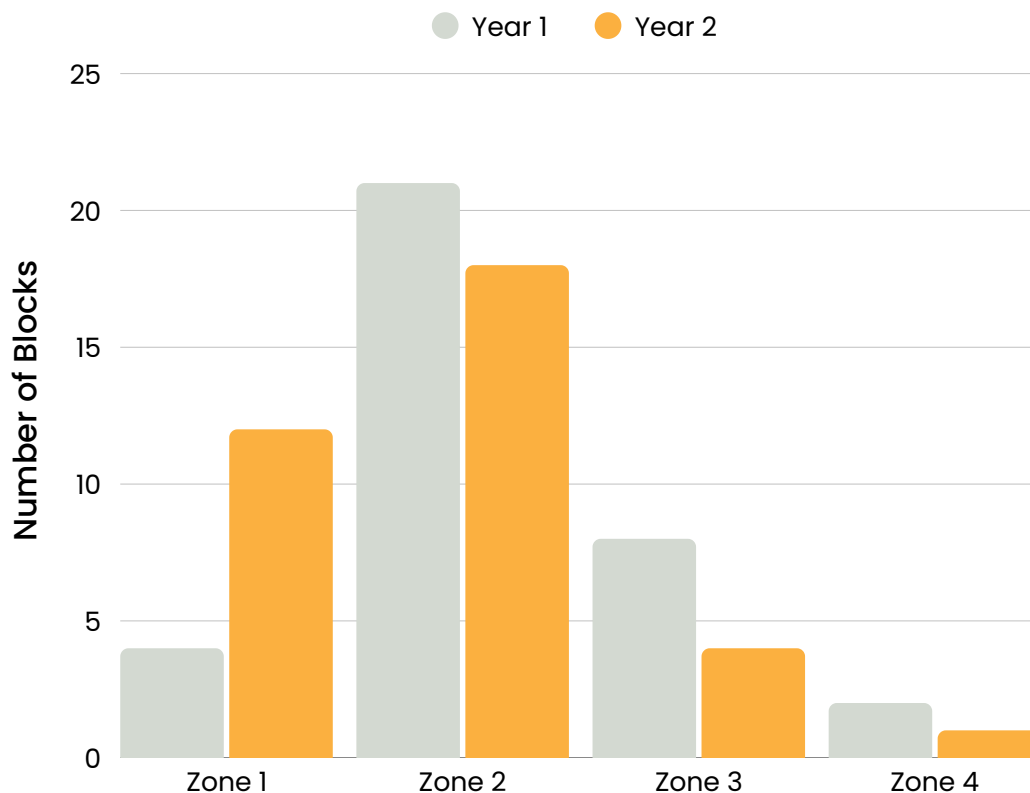


Results

The orchard measures the storage index of fruit from each block. Their analysis is performed by Brookside Labs, and is based on nutrient ratios in the finished fruit: Nitrogen to Calcium, and Magnesium+Potassium to Calcium. A lower storage index number indicates better storage quality.

Storage index is divided into 4 zones:

- Zone 1 (the best) is less than 23.
- Zone 2 is between 23 and 35.
- Zone 3 is between 35 and 45.
- Zone 4 (the worst) is greater than 45.
 - Apples in Zone 4 would demonstrate visible problems: skin disorders like bitter pit, green spot, lenticel blotch pit, lenticel breakdown, or even cracking. They might be thrown on the ground by pickers. At best they would be juiced.



The results show:

- 135 points total improvement in storage index across 35 blocks in one year, an average of 3.75 point per block
- We tripled the number of blocks in quality Zone 1
- The number of blocks in problem Zones 3 and 4 were each cut in half
- 2 blocks leaped from Zone 4 into Zone 1.

Results

Block	Variety	2020 Storage Index	2021 Storage Index	Amount Improved	N/Ca	Mg+K/Ca
1	Gala	20	15.35	4.7	3.0	12.4
2	Gala	19	20.48	-1.5	3.9	16.6
3	Firestorm Honey	43	36.56	6.4	6.3	29.6
4	Honeycrisp	40	30.22	9.8	7.1	24.9
5	Firestorm Honey	29	30.01	-1.0	5.1	25.2
6	Firestorm Honey	22	23.94	-1.9	6.1	19.4
7	Lady Alice	32	30.97	1.0	7.4	23.5
8	Fuji	30	31.73	-1.7	8.7	22.7
9	Honeycrisp	32	26.24	5.8	7.0	19.8
10	Honeycrisp	31	28.02	3.0	8.1	20.9
11	Fuji	24	31.06	-7.1	8.9	21.6
12	Honeycrisp	37	47.2	-10.2	8.8	38.5
13	Granny Smith	24	19.02	5.0	2.6	14.9
14	Granny Smith	50	18.06	31.9	2.4	14.2
15	Early Fuji	28	13.62	14.4	2.6	10.6
16	Lady Alice	25	30.21	-5.2	5.4	24.8
17	Gala	25	17.78	7.2	2.7	13.7
18	Firestorm Honey	36	36.5	-0.5	7.6	29.0
19	Early Fuji	27	15.16	11.8	2.2	12.4
20	Granny Smith	33	24.31	8.7	4.1	18.9
21	Granny Smith	30	30.77	-0.8	5.2	23.9
22	Granny Smith	36	21.57	14.4	3.4	16.5
23	Granny Smith	28	14.07	13.9	3.0	11.0
24	Cosmic Crisp	57	22.8	34.2	4.3	15.5
25	Granny Smith	40	17.36	22.6	3.5	13.1
26	Cosmic Crisp	30	30.48	-0.5	7.4	22.9
27	Fuji	25	25.37	-0.4	8.2	17.2
28	Fuji	28	43.32	-15.3	14.1	29.2
29	Fuji	29	26.36	2.6	4.2	22.2
30	Fuji	41	28.68	12.3	5.8	20.3
31	Fuji	42	42.84	-0.8	10.0	32.1
32	Pink Lady	18	15.15	2.9	3.5	10.7
33	Envy	30	30.94	-0.9	5.4	24.3
34	Envy	24	33.49	-9.5	10.1	23.4
35	Envy	26	34.01	-8.0	7.7	25.4
Total Improvement:				135.2		

Certain varieties—like Honeycrisp, Firestorm Honeycrisp, Cosmic Crisp, and Envy—are notoriously difficult to manage calcium and potassium. Those varieties generally took more than a year to improve.

Key:

Zone 1 (best): less than 23

Zone 2 : 23 to 35

Zone 3 : 35 and 45

Zone 4 (worst): greater than 45



Conclusion

The grower was very pleased with the results of this trial, and committed their entire orchard to AEA management, with a focus on addressing nutrient imbalances.

Their dedication was worth it: After four years on the AEA program, the storage quality of fruit from this orchard had gone from being the worst in the entire company to being in the top 1%.

Storability pays off: instead of juicing or dumping poor-quality apples, the orchard is now able to keep them in storage into the spring and summer, maximizing their profitability. They stopped wasting money on soil amendments that were actually worsening their quality problems, and devoted their per-acre budget to solutions that worked.

About Advancing Eco Agriculture

Advancing Eco Agriculture (AEA) helps farmers succeed by empowering them to grow crops that are more productive, resilient and profitable. We provide data-based agronomic consultation and a range of powerful liquid mineral nutrition and biological products.

AEA is dedicated to a whole-systems approach to revitalizing soil and plant health, looking beyond symptoms by diagnosing root causes and providing treatments. This approach, informed by more than 18 years of data and on-farm experience, increases yields and crop performance, reduces or eliminates the need for pesticides and fertilizers, and generates immediate economic returns for farmers.



(800) 495-6603

hello@advancingecoag.com

advancingecoag.com

