

Guarantee® Hi K Organic and Guarantee® Complex

Improve Yield and Nutrient Levels in Mandarins

Guarantee® Hi K and
Guarantee® Complex Seaweed
Extracts Increase Mandarin:

- Yield
- Fruit count
- Fruit weight
- Leaf nutrient levels

CROP

Mandarin citrus trees (cv. Golden nugget)

STUDY OBJECTIVES

- To determine if use of Ocean Organics seaweed extracts would enhance fruit count, fruit size and eventual yield.
- To evaluate whether Ocean Organics seaweed extracts would increase macro and micronutrient concentrations.
- To compare results from two Ocean Organics seaweed extracts, **Guarantee® Hi K**, approved for organic use, and **Guarantee® Complex**.

RESULTS

Results are based on the report provided by David Holden. Because the grower standard fertility program was applied to all plots, the benefits achieved by *Guarantee Hi K* and *Guarantee Complex* were completely additive to what was achieved by the grower standard program alone.

Yield

Treatment with both Ocean Organics seaweed extracts resulted in a numerically higher yield compared to the grower standard. Figure 1 and Table 1 show extrapolated final estimated yield.

Guarantee Hi K increased yield by 8% and *Guarantee Complex* increased yield by 18% compared to the control.



Key Results

Ocean Organics:
Increased mandarin
yield by **18%** with
less fruit drop

•
Increased fruit count
and weight

•
Increased
leaf nutrient levels

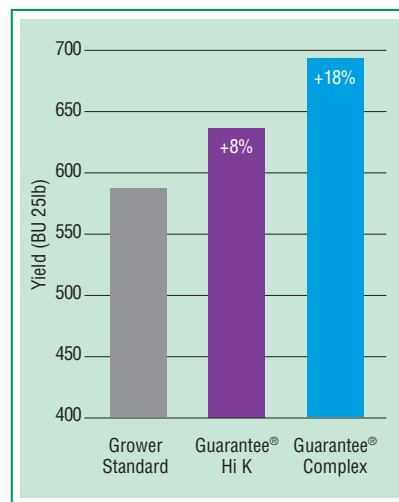


Figure 1: Average Yield Per Acre. Guarantee® Hi K increased yield by 8% and Guarantee Complex increased yield by 18% over the grower standard.

	Avg. Fruit Count per 1 Tree	Avg. Fruit Weight – 10 fruit (g)	Final Avg. Yield per Tree (lb)	Final Avg. Yield per Ac Extrapolated (BU 25lb)	% Increase in Avg. Yield Over G.S.
Grower Standard	335 a	1110 a	80.1 a	586.5 a	—
Guarantee® Hi K	343 a	1148 a	86.5 a	632.9 a	8%
Guarantee® Complex	361 a	1197 a	94.3 a	690.1 a	18%

Table 1: Average Fruit Count, Fruit Weight, and Yield Data. Guarantee® Hi K and Guarantee® Complex increased average fruit count, weight and yield over grower standard.

Report of Analysis in Percent							
Sample ID	N	S	P	K	Mg	Ca	Na
Control	2.64	0.23	0.15	1.14	0.33	3.52	0.04
Hi K	2.72	0.32	0.16	1.21	0.38	4.07	0.04
Complex	2.68	0.35	0.17	1.18	0.38	4.01	0.04

Report of Analysis in Parts Per Million						
Sample ID	Fe	Al	Mn	B	Cu	Zn
Control	241	106	88	102	6	70
Hi K	294	126	115	119	8	95
Complex	482	214	175	123	17	166

Table 2: Leaf Analysis. Guarantee® Hi K and Guarantee® Complex increased nutrient levels, especially calcium, magnesium and all micronutrients measured.

Fruit Count and Fruit Weight

Final fruit counts per tree, as well as fruit weights, were taken early in January and again in late March and averaged for the season (Table 1). Both products increased average fruit count (*Guarantee Hi K* by 2.4% and *Guarantee Complex* by 7.8%) and fruit weight (*Guarantee Hi K* by 3.4% and *Guarantee Complex* by 7.8%) compared to the grower standard.

Leaf Analysis

Fall leaf analysis data showed that *Guarantee Hi K* and *Guarantee Complex* increased macronutrient and micronutrient concentrations (Table 2) in leaves. In particular, calcium and magnesium concentrations increased with seaweed treatments. Both products increased all of the micronutrient concentrations measured. The *Guarantee Complex* treatment showed almost double the concentration of Fe, Al, Mn, Cu, and Zn over the grower standard. The leaf analysis was completed by A&L Western Agricultural Laboratories using a composite sample from all six replicates.

Fruit Drop	Mean (Per 1 Tree)
Grower Standard	2.2
Guarantee® Hi K	1.3
Guarantee® Complex	0.3

Table 3: Fruit Drop. Guarantee® Hi K and Guarantee® Complex showed numerically less drop than the grower standard (8-19-19).

Fruit Drop and Fruit Set

Fruit drop counts (post-set) were collected on August 19, 2019. Fruit dropped per tree is shown in Table 3. Both *Guarantee Hi K* and *Guarantee Complex* showed numerically less drop over the grower standard treatment.

Fruit set counts were taken in September for the east and west side of the trees based on a nine square foot counting grid. Averages per grid were computed. No significant differences were noted between treatments (data not shown).

LOCATION/SCIENTISTS

Ventura County, CA

Investigator: David Holden, Holden Research and Consulting

Study Director: Sarah Williams, Ph.D., Ocean Organics

STUDY DESIGN

This trial measured the impact of three treatment regimes on Mandarin citrus trees (cv. Golden nugget). Treatments consisted of the following:

- Grower standard program (control)
- Grower standard program with Ocean Organics *Guarantee Hi K*
- Grower standard program with Ocean Organics *Guarantee Complex*

Treatments were replicated six times and arranged in a randomized complete block design (RCBD). Plots were 20 feet wide and 12 feet long. The study was overlaid on the grower standard.

Guarantee Hi K and *Guarantee Complex* were foliar-applied at a rate of 2 qt/acre in May (fruit set) and 2 qt/acre in June (olive-size) of 2019. The mix size was 3 gallons and the spray volume was 100 gallons/acre. Statistical Analysis was performed at a 90% confidence level.

CONCLUSION

Both Ocean Organics seaweed extract products increased fruit count, fruit weight and overall yield; and decreased fruit drop. In addition, both products increased certain macronutrient concentrations in leaves, especially calcium, and all micronutrient concentrations measured.

Guarantee Complex did provide additional yield benefits. This product is mostly comprised of Ocean Organics seaweed, but contains additional complexing ingredients that appear to enhance performance in this trial.

Production numbers from this trial are similar to estimates for seven-year-old trees according to a University of California cost and production study for mandarins. Thus, this orchard can be considered a “typical” California mandarin orchard.

From the report provided by David Holden of Holden Research and Consulting: “Based on this first year data collected, production was found to be nicely improved through the use of the Ocean Organics *Guarantee Hi K* and *Guarantee Complex* - based foliar programs on these mandarin citrus fruits. Both products tested showed both fruit weight and numerical yield gains for the treated fruit over the grower standard alone.”



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