Investor Presentation

BETTER LIGHT MAKES BETTER FRUIT™

Opti-Harvest

Opti-Harvest is an agricultural innovation company. We develop and market climate-smart products that help growers maximize production, optimize land and labor resources and increase water use efficiency.

The company's patented Opti-Filter™ **agriculture technology** and **precision farming (Opti-View™) platforms** enable commercial growers of high value specialty crops to better utilize sunlight - our most fundamental, renewable and free natural resource.

65+ field trials with leading California growers over **6** years.

Investment Highlights

Opti-Harvest

Opportunity

- Agriculture is entering a new era marked by scarcer resources, greater demand and higher price and supply volatility.
- Sunlight is a resource no one has yet maximized.
- Multiple product applications, each with large addressable global markets.
- ROI in labor costs, water savings, increased yield.

Technology

- Patented Opti-Filter™ technology maximizes the most beneficial qualities of sunlight to increase production and accelerate plant growth.
- Next generation platform at the nexus of IOT, AI and AgTech.
- Expansive patent portfolio covering both software and hardware, with broad claims for both domestic and international grants.

Industry Partners/Potential and Current Customers

- Partners, potential and current customer include major growers, nurseries, institutional farmland owners, and farm management firms.
- Significant revenue growth projected with customer adoption.

Growth

- Building marketplace momentum with strong interdisciplinary team.
- Ramping commercialization for Opti-Filter™ products in California and other US states in 2023, followed by international expansion in 2024 and beyond.
- Expanding into new crops, products & applications to amplify growth.
- Implementing innovative finance & lease model.
- Developing Opti-View™, a multi-vendor precision agriculture platform.

# Industry Challenge & Solution

Opti-Harvest

The Need:

Farmers and producers are tasked with sustaining a global population with food production that will need to increase by 50% or more by 2050. Increasing outputs (yield, revenues) and lowering inputs (labor costs, resources) are age-old challenges for farmers, now magnified by resource scarcity and climate change.

The Solution:

Plants use various parts of the light spectrum. The Opti-Filter™ photo-selective technology turns sunlight into red enriched scattered light, maximizing the sun's most productive rays and filtering out those that inhibit growth and production.


FULL SPECTRUM LIGHT COLLECTION

RED-ENRICHED LIGHT DISPERSION
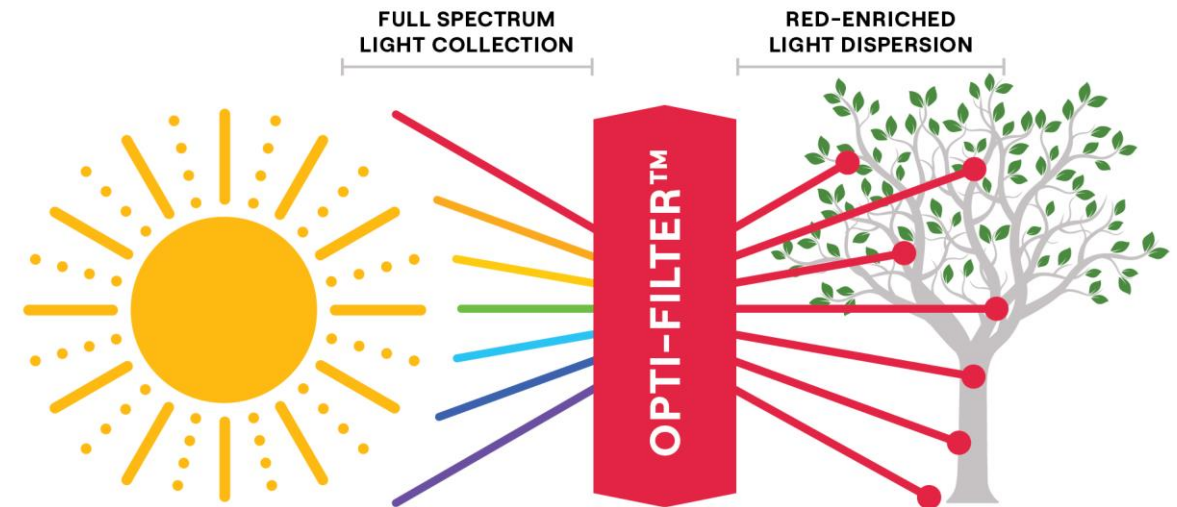
OPTI-FILTER™

How Our Technology Works

- Opti-Filter™ photo-selective technology is integrated into product lines designed to further enhance benefits by providing microclimate environment + significant reductions in labor costs and other related expenses associated with conventional farming practices.

- Science + design = multiple benefits: increased production, accelerated growth, increased water use efficiency, labor cost savings and ROI.

"For the panels and replanting units – there is really no competition out there." - William Peacock, Tulare County UCCE Viticulture Consultant and Researcher (Emeritus)

"I don't want to call it an instant vine, but they have a vine that is well on its way to having the permanent parts in place, the structure that's going to be enhanced by diameter growth, that day. And that's remarkable. That's fast. That's cost savings right there." – Rhonda J. Smith, Viticulture Farm Advisor, UCCE Sonoma County (Emeritus)

OPTI-FILTER™
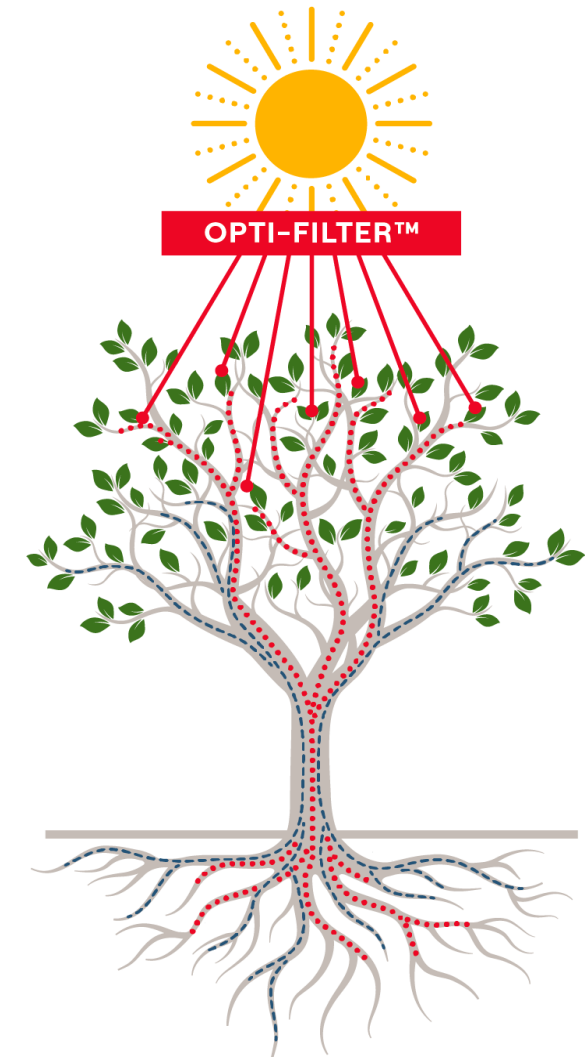
Opti-Harvest's Unique Approach

Agriculture Technology (AgTech) uses a variety of innovative, non-traditional tools to improve farming outcomes. Opti-Harvest is an expansion stage AgTech company, having conducted 65+ trials in numerous high value crops over 5+ years, shipped beta products to customers and now on the cusp of broad commercialization.

Opti-Harvest's Unique Approach:

- **Top down versus bottom-up approach**: Harnesses the most productive spectrum of sunlight versus soil enhancement (i.e. fertilizer/biologics) or water irrigation systems.

- **Maximizing existing resources**: Optimizes the sun, increases land and water resource utilization.

- **Plug and play model**: Cost effective, versatile product line easily integrates into existing farming operations and adapts to multiple crops and climate environments.

- **Affordable alternative**: Opti-Filter™ products are durable, modular, low maintenance and made from recyclable HDPE. Made in the U.S.A.

BRINGING THE GREENHOUSE OUTDOORS

Taking established science currently used for indoor cultivation and applying it for outdoor cultivation in totally novel and highly beneficial ways.

Opti-Harvest

Opti-Filter™'s optimized light environment is detected by the crop canopy and conveyed to the root system as positive signals to thrive - producing more active, efficient, productive and healthy crops with
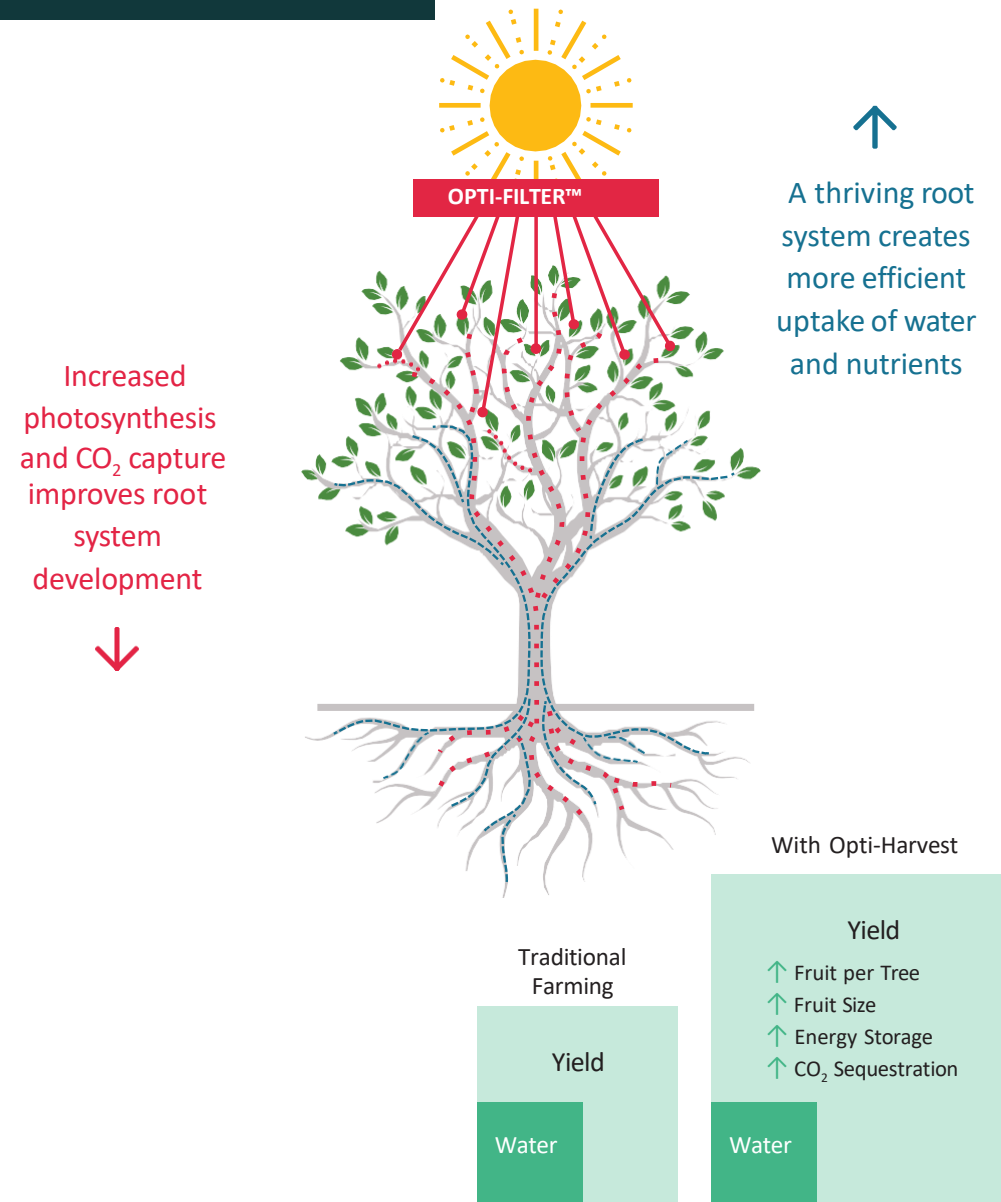
+50% mitigation of plant daily water stress*

- Better developed and more active root system
  - Increased carbohydrate storage to be used in the following year
  - More efficient uptake of water and nutrients from the soil

- More active and viable canopy producing more fruit per tree and increased fruit size –with the same irrigation:
- Increased photosynthetic uptake of CO_2 from the atmosphere

Over 5 years of consistent research results demonstrate, regardless of type of Opti-Unit crop, cultivar, age, geographical location:

- Increased production with same irrigation in mature orchards and vineyards
- Accelerated growth with same irrigation in newly planted trees and vines

- Reduced daily water stress detected by trunk sensors (Phytech dendrometers)
- Better developed and more active root system with 30% higher root density in table grape replacement vines with Opti-Gro units*

*measured with ground penetrating radar (GPR)

OPTI-FILTER™

A thriving root system creates more efficient uptake of water and nutrients

Increased photosynthesis and CO_2 capture improves root system development

With Opti-Harvest

Yield

↑ Fruit per Tree
↑ Fruit Size
↑ Energy Storage
↑ CO_2 Sequestration

Traditional Farming

Yield

Water

Water

Proven Performance

65+ field trials executed over 6 years

Our family of products was developed and tested in collaboration with some of the country's largest commercial farms.

65 field trials conducted with leading growers in California's Central Valley, Salinas Valley and the Sonoma regions.

Opti-Harvest leverages an interdisciplinary team with decades of experience in plant physiology, horticulture, optical physics and field practice.
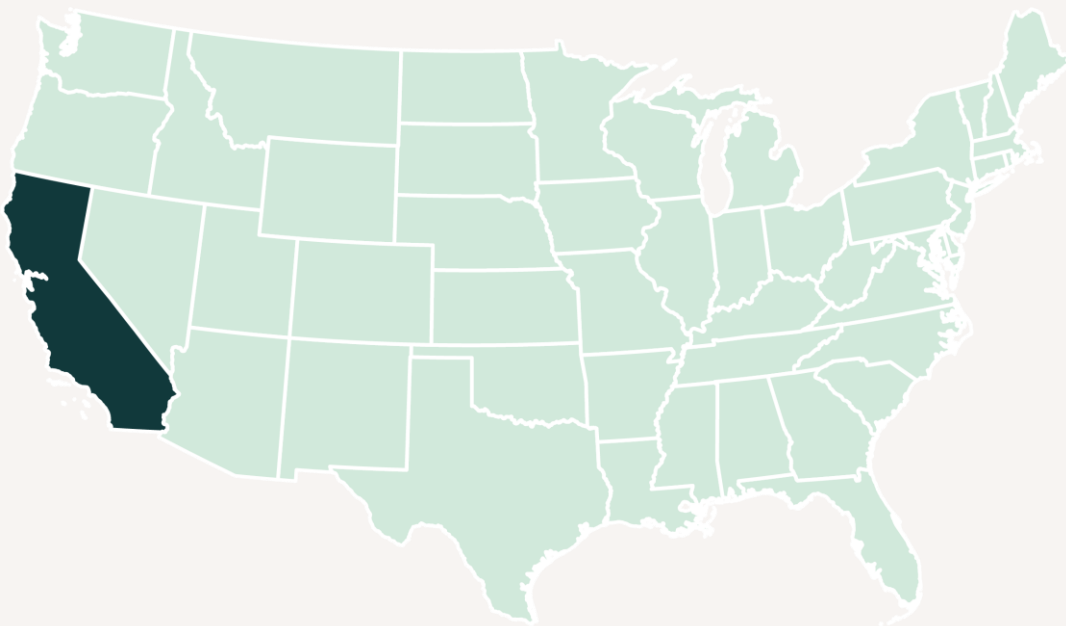
Developed by scientists, designed for farmers

Our Initial Target is California

Opti-Harvest

THE LARGEST OPPORTUNITIES FIRST:

- Almonds
- Citrus
- Pistachio
- Grapes

$1.6 BIL

- Based on current prices and crop densities shown below
- Opti-Filter™ products for selected crops shown below only
- Does NOT include potentially large markets for consumer product (Chroma-Gro™), Opti-View™ AI/IoT technology, or Cannabis market

Commodity	California MIL $	US Trees (Million)
Almonds	$750	148
Citrus	$484	137
Pistachio	$200	40
Grapes	$179	
All		1122
Table Only		140K Acres
Total	**$1,613**	

California Market Size based on USDA Gross Receipts vs Entire US
Cash receipts by state, commodity ranking and share of U.S. total, 2020 Nominal (current dollars)
Data from: USDA/ERS Farm Income and Wealth Statistics
https://data.ers.usda.gov/reports.aspx?ID=17843

Opti-Harvest Pricing and Assumptions
Opti-Skylight™ @ $55 per tree
Opti-Panels™ @ $10,000 per acre
Opti-Gro™ NuPlant and Replant Units
   1 unit per vine @ $17
Assumes 10-year life of product
Does not include Opti-Shields™

Family of Products

Opti-Harvest

ACCELERATING GROWTH

Opti-Gro™
Newly planted and replanted vines

Opti-Shield™
Newly planted orchards

IMPROVING PRODUCTION

Opti-Skylight™
Citrus, pistachio, cherry and other tree crops

Opti-Panel™
Wine and table grapes and other trellis crops

CONSUMER MARKET

ChromaGro™
Grow more, faster and better

AGRICULTURAL INTELLIGENCE™
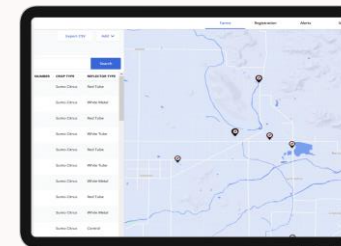
Opti-View™
Precision farming technology

Opti-Harvest

Opti-Gro™

Individual plant growth chambers deliver tailored light, microclimate and natural vine training.

Vines with Opti-Gro™

- **5x more likely to survive** winter frost dieback

- Reach time to full production **1-3 years faster**

- **20-300% increase** in trunk diameter

- **200-300% increase** in fruitfulness

- **2x faster** growth

- **50%** less water stress

Opti-Shield™

Individual shields provide a tailored photo-selective light environment and protected microclimate.

Fruit & Nut Crops with Opti-Shield™

- **1-2 years faster** to full production

- **200% acceleration** in canopy growth within the first year

- **50% increase** in foliage density

- **70% reduction** in pest infestation

- **50-100%** increased fruit count in first production year

- **50%** less water stress

Opti-Harvest

Opti-Skylight™

Solar funnels penetrate the canopy of mature fruit and nut trees, bringing red-enriched light where it's needed.

Trees with Opti-Skylight™

- **20-40% increase in yield**
- **Less fruit drop** and non-marketable waste
- **50% less water stress** during Summer-Autumn

Opti-Panel™

Revolutionary light, canopy and fruit management system that provides a photo- selective light environment, rain protection and self training for table grapes and other trellised fruit crops.

Trellised Crops with Opti-Panel™

- **Reduced labor costs** associated with pruning, canopy management, training
- **Protection** from rain, frost, heat and wind, sunburns
- **Reduced fruit lost** to rot and post harvest decay (Botrytis, Aspergillus Niger, Pencillium, etc.)
- **20-40% increase** in crop value

ChromaGro™

Opti-Harvest

ChromaGro™, our first consumer product, is poised to capitalize on the vast home garden sector. ChromaGro™ delivers Opti-Filter™ technology to amateur gardeners, allowing them to grow more, faster and better right in their own backyard, terrace or patio. Tested direct-to-market on television and online (http://www.chromagro.com/), with plans to relaunch and target major garden supply and big box stores (Costco, Lowes, Home Depot).

The global lawn & gardening consumables market size is anticipated to reach approximately $26.0 billion by 2027. *Grandview Research*

Smart Farming with Opti-View™

Opti-Harvest

According to the International Food Policy Research Institute, data-driven techniques can increase farm productivity by as much as 67% by 2050. This type of increase will be essential for growers to meet expected demand caused by worldwide population growth and other environmental factors.

Our unique **Agricultural Intelligence™** technology collects critical data from a variety of sensors and industry partners and provides predictive analytics and recommendations enabling growers to incorporate powerful data into their decision-making process.

Hardware and software to view environmental data

Visualization tools to provide access to real-time data

Yield management and resource optimization

Exceptionally Strong Intellectual Property Portfolio and Strategy

Opti-Harvest

- Expansive patent portfolio covering core photo-selective (Opti-Filter™) technology as well as hardware, software and precision Ag (Agriculture Intelligence™) applications. Broad claims allowed for both domestic and international grants.
- Significant trade secrets developed beyond the patents.

- Sophisticated manufacturing expertise developed by multiple vendors.
- Numerous trademarks for key products and approaches.
- Patent work performed by Wilson Sonsini, a firm widely recognized for expertise in IP strategy.

2013 *(expires 2034)*

Patent Family 1: broad coverage of core light-harvesting and canopy technology, with 2 US granted patents, 7 granted/allowed patents worldwide, additional applications pending

2018 *(expires 2039)*

Patent Family 3: IoT services and AI algorithms for yield optimization; 5 patents pending worldwide

2020 *(expires 2041)*

Patent Family 5: Advanced AI concepts; International (PCT) patent pending

2017 *(expires 2038)*

**Patent Family 2:** Opti-Gro™ and Opti-Shield™ technologies; 12 patents pending worldwide

2019 *(expires 2040)*

Patent Family 4: Opti-Panel™s; International (PCT) patent pending

Major Sumo Citrus Grower Case Study

Opti-Harvest

Life of Opti-Skylight™ (years)	Annual One Time	Life of Unit
Agreed upon average Fruit Count per tree Range 200-250 (See Note 1)	225	10-12
Agreed upon average increase in marketable premium quality fruit using Opti-Skylight™	20%	
Annual amounts		
Additional fruit per tree	45	
Current market price per piece (assumes constant price)	$0.80	
Value of additional fruit	$36.00	
Savings from reduced pruning	-$5.00	
Added cost for propping	$5.00	
Misc. maint (water spray to clean funnel during drought years and movements due to wind)	$1.00	
Total annual costs	**$1.00**	**$8.00**
One-time costs		
Purchase price (as early adopter)	$42.50	
Install Cost per tree (See Note 2)	$3.60	
Total one-time costs	**$46.10**	

ROI	
Value of additional fruit over the life of the unit	$360.00-$432.00
Total cost of Opti-Skylight™ and maintenance over life of unit	$56.10 - $58.10
Breakeven time (years)	1.3
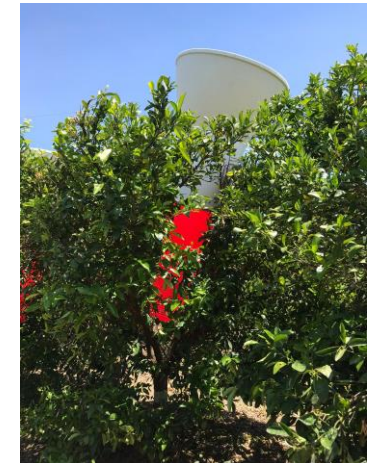
Note 1 - Fruit Count Range
At 200 pieces per tree, 20% added value is $32 per yr, and breakeven is 1.7 years. At 250 pieces per tree, 20% added value is $40 per yr, and breakeven at 1.4 years.
Note 2 - Installation Cost
2 People: (1 on hydraulic 'Genie' + 1 on the ground) can install 12 trees per hour = 6 trees per person @ $21.45 per hour (either hired contractor or employee) both fully loaded with workman's comp, etc. = $3.60 per tree total install cost.

Partners and Customers

OPTI-GRO™ (for wine grapes)

Growers

Jackson FAMILY WINES *
TRINCHERO Family Estates **
Constellation Brands
AV AUSTRALIAN VINTAGE LTD *
E&J. Gallo Winery
Groth *
Parrish **
BRAVANTE VINEYARDS *
SCHEID VINEYARDS
UNION GROVE Farm *

OPTI-GRO™ AND OPTI-PANELS™ (for table grapes)

Growers

Columbine Vineyards
Grapery *
ANTHONY VINEYARDS
dayka+hackett WORLDWIDE PRODUCE SOURCE **
FamilyTreeFarms The Most Flavorful Fruit in the World *
RICHARD Bagdasarian WE'RE THE PICK OF THE BUNCH
ROYAL MADERA VINEYARDS *
PAICINES RANCH *

OPTI-SHIELDS™ AND OPTI-SKYLIGHTS™

Growers

Olam **
MULHOLLAND CITRUS Sunkist **
Foley *
AC Foods **
yurosek FARMS **
Sefton Farms **
Warmerdam Packing LP **

ALL PRODUCTS

Growers

SUN PACIFIC * & **
AgIS Capital
WN Citrus *
nuveen A TIAA Company **
CAPS CAPITAL AGRICULTURAL PROPERTY SERVICES **
HMC FARMS *
FowlerPacking **
KLIEWER PACKING **

Nurseries (grapes)

Wonderful nurseries
SUNRIDGE NURSERIES * & **
novavine **

Vineyard Management Companies

BEVILL
MONTEREY PACIFIC

* Current customer   ** Current partner

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Strong Interdisciplinary Team

Opti-Harvest

Geoff R. Andersen
Chief Executive Officer

- 30+ years' experience in corporate development, entrepreneurship, technology and non-profit
- Led the internal dealer technology strategy, and for-profit business with John Deere
- Directed the global equipment partnering strategy for John Deere
- Led the John Deere Global Citizenship strategy creation and execution, developing new markets, and partnering with NGOs including the United Nations, Bill & Melinda Gates Foundation, USAID and AGRA

Steve Handy, CPA
Chief Financial Officer

- 25 years' experience in private and public company financial stewardship and accounting
- Senior Financial Advisor to multiple publicly traded companies for strategy, financial reporting, M&A and investor relations
- CFO of Tix Corp., an event ticketing service
- CFO of SM&A, an on-demand solutions and staffing agency.

Yosepha Shahak, Ph.D.
Chief Science Officer

- 50 years' experience in academic research and development in plant physiology, photosynthesis, bioenergetics and horticulture sciences
- Renowned authority in plant-light interaction and related applications in agriculture
- Inventor of photoselective netting, a patented agro-technology
- Chief scientist of the Regional Agricultural R&D Centers in Israel (Emeritus)

Nick Booth, Ph.D.
Chief Technical Officer

- 20+ years' experience in optical science, optical design and system manufacture
- Inventor of numerous optical imaging, sensing and opto-mechanical systems
- Designed and built space flight hardware for NASA + numerous pre-clinical medical devices utilizing photon-tissue interactions for diagnosis
- Developed and characterized wavefront correcting thin films for corrective lens applications

Jodd Readick
Chief Technical Officer, Precision Ag, & IOT

- 30 years' cross industry experience in IT, telecom and technology product innovation
- CTO of IoT carrier offering international services
- Co-founded several innovative telecom firms
- Due diligence expertise: M&A, consulting: Samsung, ATT, Wells Fargo, Citicorp, Arthur Anderson

Jeremy Basich
*Vice President of Sales & Distribution*

- 25 years' experience in Ag: Big Box Retail, Product Launch, Margin Enhancement and Supply Chain.
- GLG & Coleman Group council member early 20 publications surrounding specialty crops such as cocoa, grapes, rice and avocados
- Co-Founder of SCOWT Sourcing, a private food brokerage company
- Almond Industry Consultant

Strong Interdisciplinary Team

Opti-Harvest

Jonathan Destler

Founder & Corporate Development Director

- 25 years' experience in capital markets, corporate finance and corporate communications
- Co-Founder of financial communications firm Financial Profiles, Inc.
- Senior executive at global communications leader InterPublic Group
- Founding investor of revolutionary plastics recycling company, Loop Industries, Inc.
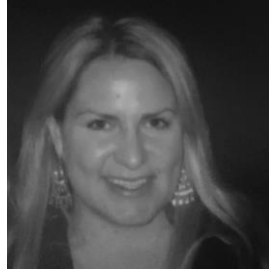
Kelly Fargo

Marketing Director

- 20+ years' experience in growth strategy development, funnel building, brand management, social responsibility and public relations
- Established affinity marketing and advertising partnerships, brand collaborations with industry leaders, and cause-driven community campaigns.
- Planned and presented at education events for more than 100 industry stakeholders.
- Certified in Digital Marketing Strategy.

Kwame Acheampong, Ph.D.

Director of R&D and Field Operations

- 15+ years' experience in research in plant physiology, genetics, and genomics
- Discovered a novel pathway of cytokinin regulation in roots
- Pioneered the use of ATAC-seq for genomic studies in rice
- Characterized the mechanism of phytohormone signaling and responses in several plants

Advisory Board

Opti-Harvest

Mike Conaway

- Served eight terms in the U.S. House of Representatives, representing 29 counties in Texas' 11th Congressional District
- Served as Chairman of both the House Agriculture Committee and the House Ethics Committee
- Appointed to the Board of Visitors of the U.S. Military Academy at West Point serving from 2012 to his retirement from Congress in 2021
- Worked with George W. Bush as the chief financial officer for Bush Exploration

Joseph Turchyn

- Senior strategy advisor and accomplished relationship builder with over 40 years' experience in management, finance and business strategy
- Experience in business development and partnering, using a strategic and tactical approach to developing successful business models
- Extensive experience in the information technology, data analytics/software as a service (SaaS) and communications networking areas and all aspects of the renewable energy and sustainability sectors

Hazel Wetzstein, Ph.D.

- Dr. Hazel Wetzstein is Professor Emerita and former Department Head of the Horticulture and Landscape Architecture Department at Purdue University
- Published 120 referred journal articles and book chapters, over 123 proceedings and abstracts, and has presented 66 invited papers and seminars, and made 159 scientific presentations
- Presented invited papers and hosted international scientists from 17 countries
- Coming from an immigrant Chinese family, she is the first generation in her family to graduate from college

Commercialization Timeline

Opti-Gro™

1H 2021: Commercial sales underway and gaining traction in wine and table grapes

- Customers include major growers, nurseries, & vineyard management firms
- U.S. manufacturing partners aligned with company rollout objectives

Opti-Shield™

1H 2022: Commercial sales underway, gaining traction with citrus, pistachio, almond and other tree crops

- Customers will include major growers, farm management firms, nurseries and institutional farmland owners
- U.S. manufacturing partners aligned with company rollout objectives

Opti-Skylight™

1H 2023: Commercial sales launch will target citrus, pistachio, almond and other tree crops

- Customers will include major growers, farm management firms, nurseries and institutional farmland owners
- U.S. manufacturing partners aligned with company rollout objectives

ChromaGro™

1H 2021: Tested direct market television/online campaign

- DR campaign launch marks first phase of consumer rollout
- Plans to relaunch and target Costco, Lowes and Home Depot for 2023-24 season

Opti-Panel™

1H 2022: Commercial sales underway targeting table grape, citrus and other tree crops grown on trellis system

- Customers will include major growers, farm management firms, nurseries and institutional farmland owners
- U.S. manufacturing partners aligned with company rollout objectives

AI ROLLOUT

Opti-View™

2H 2023: IOT Gen 1 custom hardware / software / dashboard complete

- 400 nodes now being deployed to 8 sites
- Prototype yield prediction algorithm

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Use of Proceeds

Opti-Harvest

- **Sales and marketing**
  - Building team to manage and rapidly scale direct sales and distribution
  - Create powerful digital and traditional marketing programs to drive sales and promote brand awareness and education of our key stakeholders
  - Improve distribution infrastructure
- **R&D to support commercialization** of our products
- **R&D to support launch of Opti-View™** our precision Ag Platform

- Approximately $2.0 million - $3.0 million for sales and marketing, R&D for field trial activities supporting product and R&D related to Opti-View™ Precision Ag and IoT product lines
- Up to $4.0 million to repay the outstanding principal and interest accrued on Senior Convertible Promissory Notes
- Remainder for general corporate purposes, including working capital and operating expenses

Growth Strategy

- Three-Phased Approach
  - *Phase 1*
    - Sales and marketing: commercialization of Opti-Filter™ products throughout California to existing and new partners
      - Commercial growers, nurseries, farm management firms, institutional farmland owners
    - Implementing financing / leasing model: market validation of pricing for monthly payment model.
    - Scale manufacturing capacity and explore transition to in-house production
    - Expanding into new crops, products and application(s)
  - *Phase 2* – Expansion into new geographies: key states (OR, WA, TX, FL) and throughout USA, Canada, and international markets such as Mexico, Chile, Peru Brazil, EU
    - Explore licensing and partnership opportunities
  - *Phase 3* – Opti-View™ launch: Precision agriculture solutions will help growers optimize water and labor costs while increasing high quality yield

Agriculture for the 21st Century

Opti-Harvest

- Unique, Proven Technology Provides Solution to Critical Need in Ag

- Large TAM – U.S. alone over $20B

- Major Industry Partners, Potential and Current Customers

- Significant Revenue Growth Projected with Customer Adoption

- High Margin Agricultural Intelligence™ (AI) Platform Launching 2023

OPTI-HARVEST

Thank You

Geoff Anderson

Ganderson@opti-harvest.com

OPTI-HARVEST.COM

Research Summaries

Data and Experimental Trials

Water-Use Efficiency

Research Summary:
2019-2021 R&D

Opti-Harvest

- Opti-Filter Technology improving tree/vine water-use-efficiency is supported by the following research results of the past 4 years:
  - More production for the same irrigation in mature orchards and vineyards
  - Accelerated growth for the same irrigation in newly planted trees and vines
  - Reduced daily water stress detected by trunk sensors (Phytech dendrometers)
  - Consistent results obtained regardless of the type of Opti–unit, crop age, cultivar, geographical location, etc.
  - Preliminary results indicative of better developed and more active root system with Opti-units:
    - Root excavation show 30-40% larger root system in ChromaGro treated tomato plants.
    - Ground penetrating radar (GPR) indicating 30% higher root density in Opti-Gro treated table grape vines.

OPTI-FILTER™
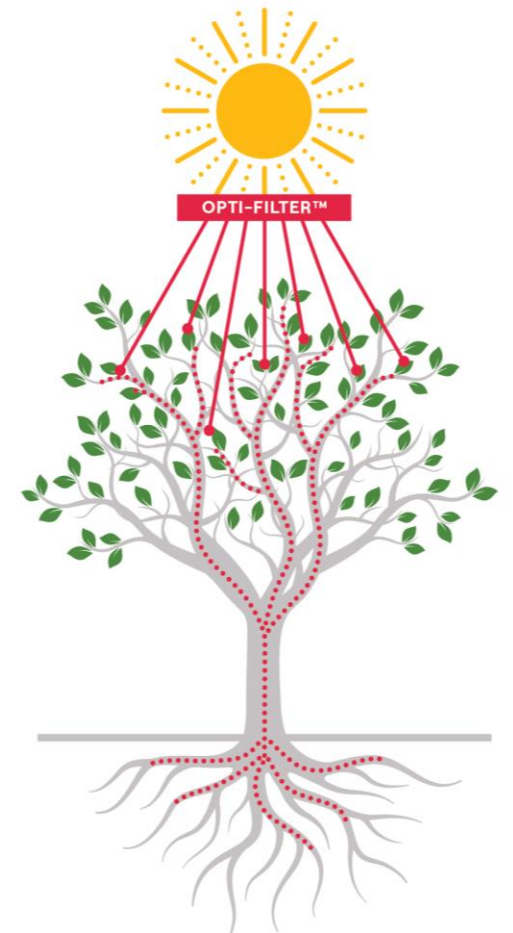
Water-Use Efficiency

Research Summary:

Maximal Daily Shrinkage
(MDS, measure by Phytech)

Smaller MDS values are indicative of lesser water stress, and better tree-water-status during hotter months.

Opti-Harvest

Opti-Gro
Replanted Grape vines

Opti-Shield
Young Citrus mandarin Trees

Opti-Skylight
Mature Citrus Mandarin
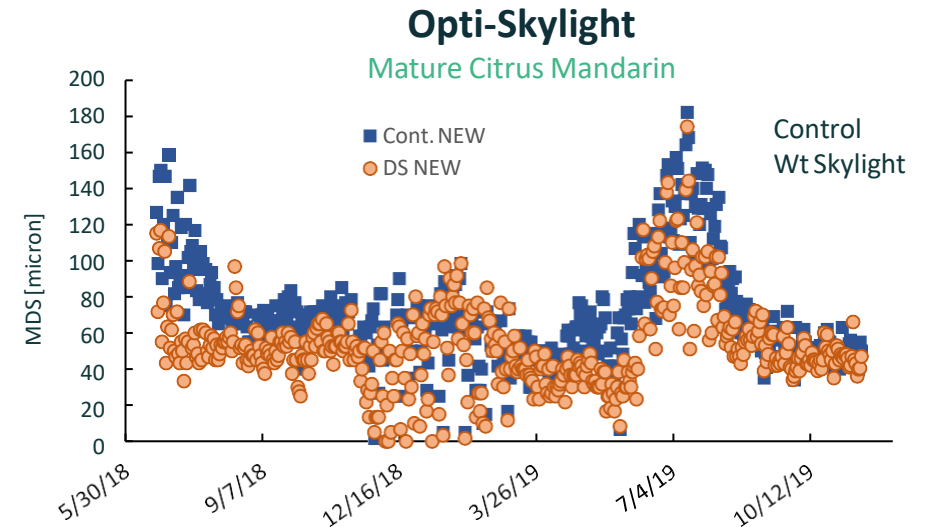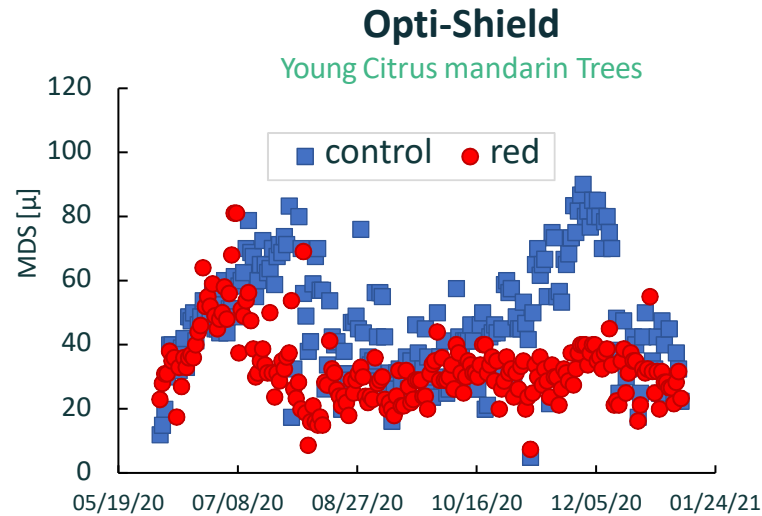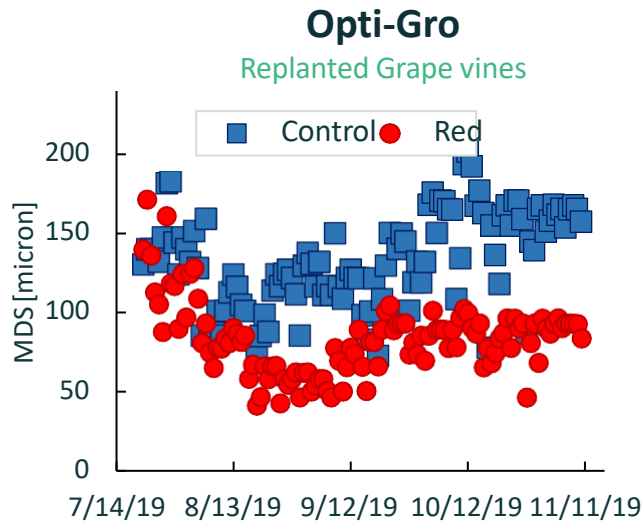
Research Summary: Root Parameters

- This is a preliminary test-case.
- All root parameters were larger in ChromaGro plants relative to control: Root diameter 35% wider; Stalk 30% wider; Root weight 41% heavier; Dug hole 15% deeper.
- Fine roots were visually more intensive in ChromaGro plants.
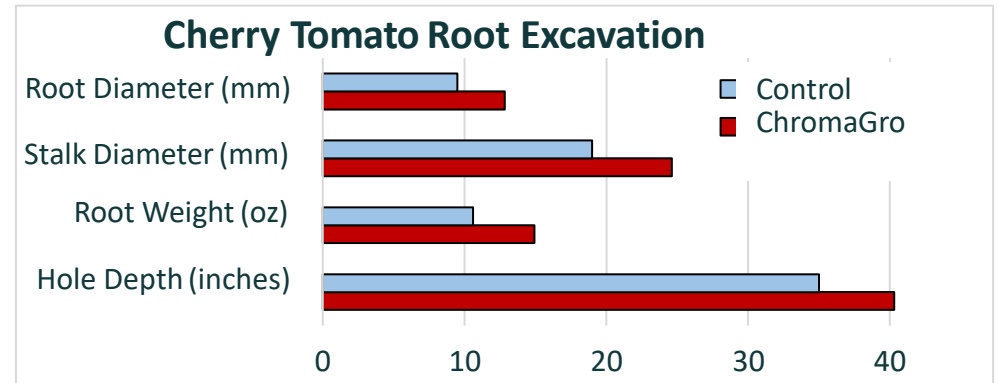
Control

ChromaGro

Cherry Tomato Root Excavation

Opti-Gro

Research Results:

Cool Climate Wine Grape Trials

Fully randomized field trials, each composed of 20+ replicates per treatment performed in wine grapes
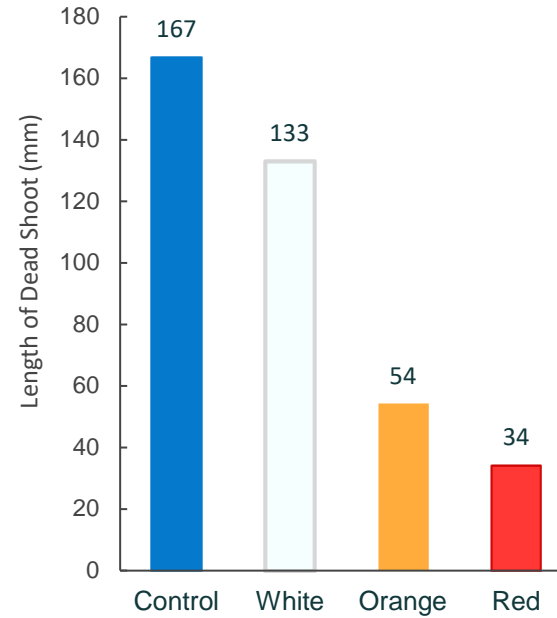
Opti-Harvest

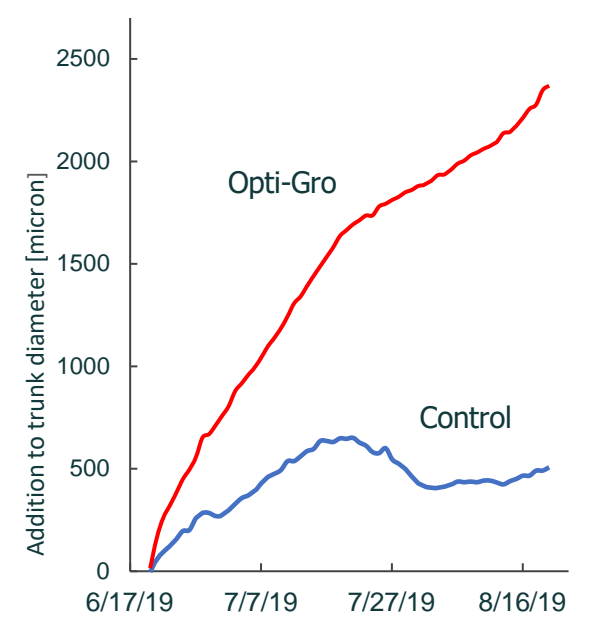**Monterey: 2018 Primary Shoot Growth**
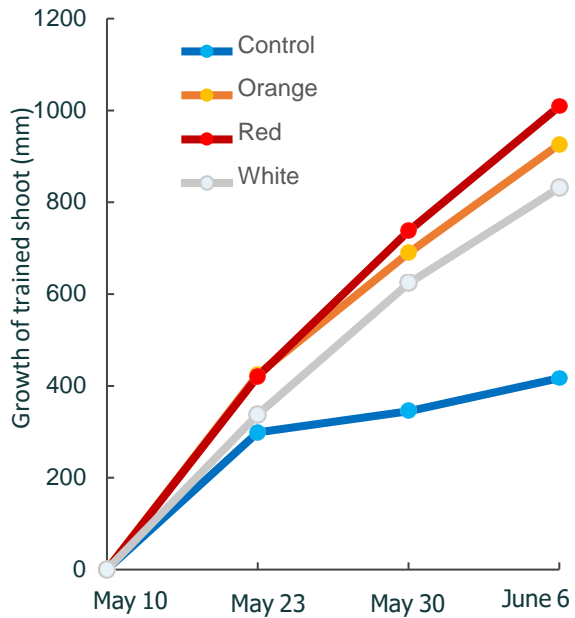
Monterey: Lateral Shoot Length Sep 5, 2018
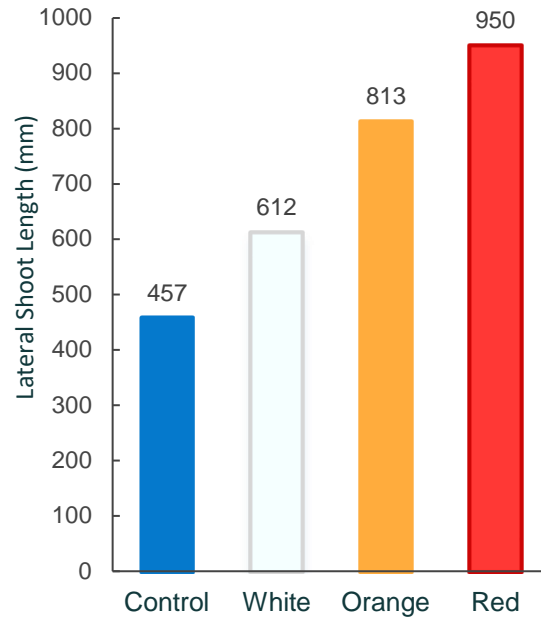
Sonoma: Frost Dieback, 2018-2019 The Lesser the Better

Monterey: Addition to Vine Trunk Diameter June 20th - Aug 20th, 2019

Opti-Gro

Research Results:

Cool Climate Wine Grape Trials

Fully randomized field trials, each composed of 20+ replicates per treatment performed in wine grapes

Opti-Harvest

Monterey 2019-2020: Year-after impacts

Site	Treatment[a]	Trunk Diameter (mm)[b]	New Shoot Growth (cm)[c]	Topped Cordons (%)[d]
New vine planting Sebastopol Model	Control	12.4 a	18.8 a	3 a
	Red Opti-Gro	13.6 b	27.5 b	28 b
	Significance[e]	***	***	***

[a]Pinot noir vines were planted in Sep 2018. Red-polymer units were installed on Apr 10, 2019 and removed on Dec 17, 2019.
[b]Trunk diameter was measured at 15 cm above ground using a hand-held caliper on July 10, 2020.
[c]Average length of shoots emerging from cordons
[d]Cordon canes were topped at 75 cm, which is half-way between each two adjacent vines along the row.
[e]Different letters are indicating significant difference within each parameter at 10% (*), 5% (**), or 1% (***) confidence.

Sonoma 2019-2020: Year-after impacts

Site[a]	Treatment[b]	Trunk Diameter (mm)[c]	Cordon-cane Length (cm)[c]	Total Shoot Growth (cm)[c]	Crop Potential (clusters/vine)[d]
(A) New vine planting Geyserville Trial	Control	13.4 a	73.2 a	57.2 a	Not measured
	Red Opti-Gro	15.3 b	86.0 b	70.2 b	Not measured
	Significance[e]	**	*	*	
(B) New vine planting Geyserville Model	Control	10.6 a	72.0 a	58.2 a	Not measured
	Red Opti-Gro	14.9 b	83.5 b	72.5 b	Not measured
	Significance[e]	***	*	**	
(C) Replant vines Healdsburg Model	Control	3.5 a	11.7 a	65.0 a	0
	Red Opti-Gro	7.0 b	41.5 b	135.0 b	3
	Significance[e]	***	*	**	*

[a](A) and (B): Cabernet Sauvignon vines planted in July 2018. (C) Chardonnay replacement vines (Replants) planted in July 2018.
[b]Red-polymer units were installed on 24 May 2019 (A&B) and 23 May 23, 2019 (C), and removed in Dec 2019 (A&B) and 22 Aug 2019 (C).
[c]Trunk diameter at 15 cm above ground, length of cordon-cane, and total length of shoots emerging from the cordon-cane were measured on 22 May 2020.
[d]Flower clusters per vine were counted on 22 May 2020 (C).
[e]Different letters indicate significant difference within each trial and each parameter at 10% (*), 5% (**), or 1% (***) confidence.

Opti-Gro

Research Results:

Cool Climate Wine Grape Trials

Fully randomized field trials, each composed of 20+ replicates per treatment performed in wine grapes

Opti-Harvest

| Grower / Cultivar	Location / Year / Prototypes	Results
Constellation Brands Pinot Noir	Soledad, CA 2018-2019 Colored-metal	▪ All Opti-Gro Units accelerated growth of both primary and secondary (lateral) shoot development. ▪ Photoselective effect: red units consistently outperformed orange and white units ▪ Red units doubled first-year's fruitfulness (after unit removal).
Gallo Vineyards Chardonnay	Sebastopol, CA 2018-2019 Colored-metal	▪ Opti-Gro Units stimulate shoot lignification (woodiness) resulting in less frost-dieback during winter. ▪ Photoselective effect: red units consistently outperformed orange and white units.
Constellation Brands Pinot Noir	Soledad, CA 2019-2020 Red-polymer	▪ Accelerated shoot growth and larger leaf area. ▪ Trunk diameter continues growing throughout the season, extending into Autumn, unlike control vines. ▪ Double the trunk diameter growth (X4 folds added trunk cross-section area) during first season.
Duff Bevill Vineyards Management Cabernet Sauvignon (Newplants) & Chardonnay (Replants)	Geyserville & Healdsburg, CA 2019-2020 Red-polymer	▪ Accelerated shoot growth and larger leaf area in first treated year. ▪ Year-after accelerated shoot growth and larger leaf area (4-6 months after unit removal). ▪ Fruit production already in 2nd year (3 clusters/vine), while zero fruit in common practice control.
Trinchero Family Estates Cabernet Sauvignon	Paso Robles, CA 2021 Red-polymer	▪ Trial recently installed in a frost-sensitive location. No results yet.

Opti-Gro

Research Results:

Replanted Table Grape Vines in Hot Climate

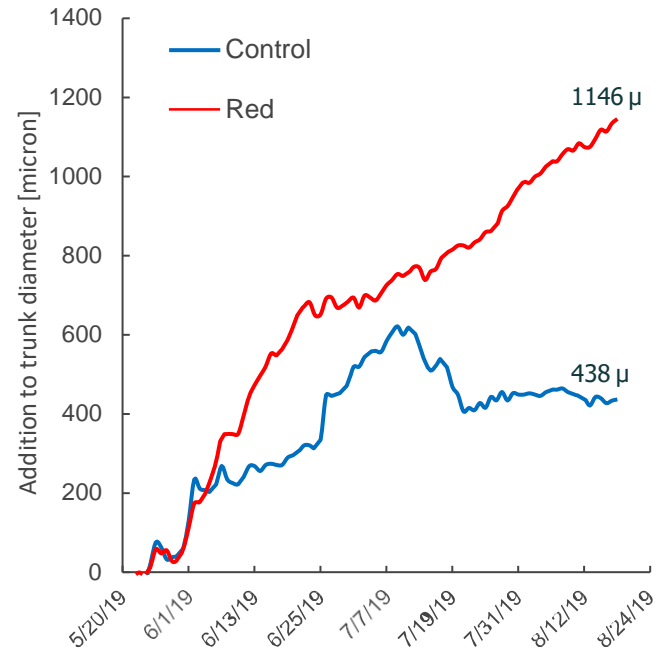Fully randomized field trials, each composed of 20+ replicates per treatment
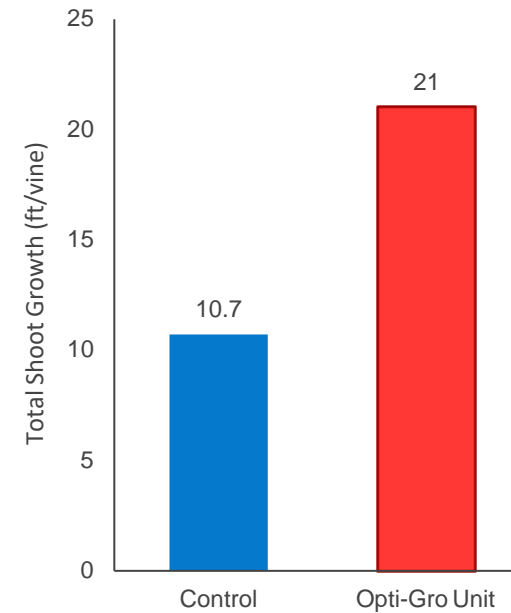
Opti-Harvest

Woodlake, CA Replant 2019, (Thompson Seedless):
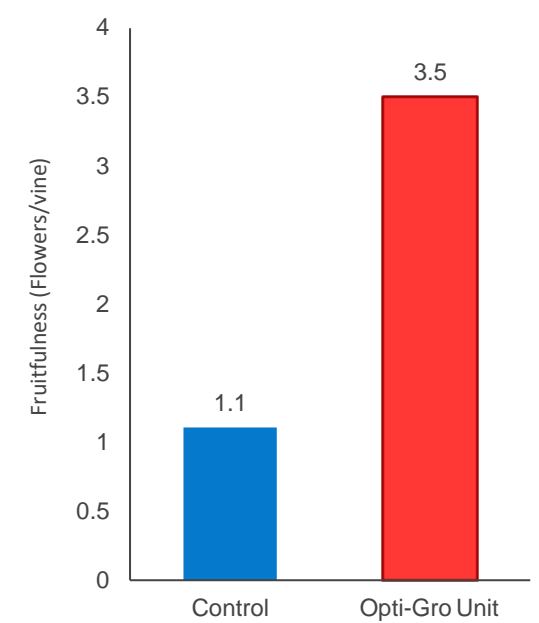**Trunk Diameter 3 months after installation: The Redder The Better**
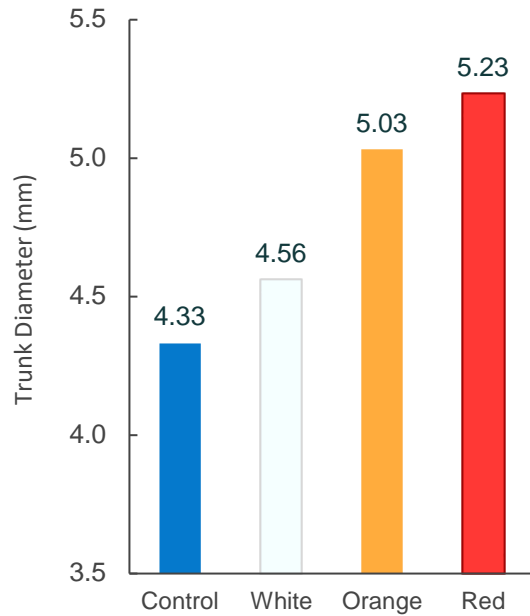
Arvin, CA Replant (Autumn Royal): Addition to Trunk Diameter May 21st - Aug 18th, 2019

Woodlake, CA Replants: 2nd Year Shoot Growth

Woodlake, CA Replants: 2nd Year Fruitfulness

Opti-Gro

Research Results:
Replanted Table Grape Vines in Hot Climate

Fully randomized field trials, each
composed of 20+ replicates per treatment

Opti-Harvest

Woodlake Thompson Raisin Replant new trial 2020: Trunk Diameter measured on Jan 26, 2021.

Site	Treatment Width/Height	Trunk Diameter (mm)	%	Calc. Area Cross-section (mm²)	%
Woodlake 2020 Replants	Control	5.3 a	100	22.0 a	100
	Opti-Gro 14" / 7'	8.1 b	153	51.5 b	234
	Opti-Gro 10" / 7'	8.1 b	153	51.5 b	234

Dinuba Ivory Table-grape Replant trial 2020: Units installed on May 15, 2020. Trunk Diameter measured on Dec 2020.

Site	Treatment Width/Height	Trunk Diameter (mm)	%	Main Shoot Length (cm)	%
Dinuba 2020 Replants	Control	7.7 a	100	230 a	100
	Opti-Gro 10" / 7'	10.2 b	132	360 b	157

Different letters indicate significant difference within each parameter at 5% confidence.

RESEARCH SUMMARIES

Opti-Gro

Research Results:

Replanted Table Grape Vines in Hot Climate

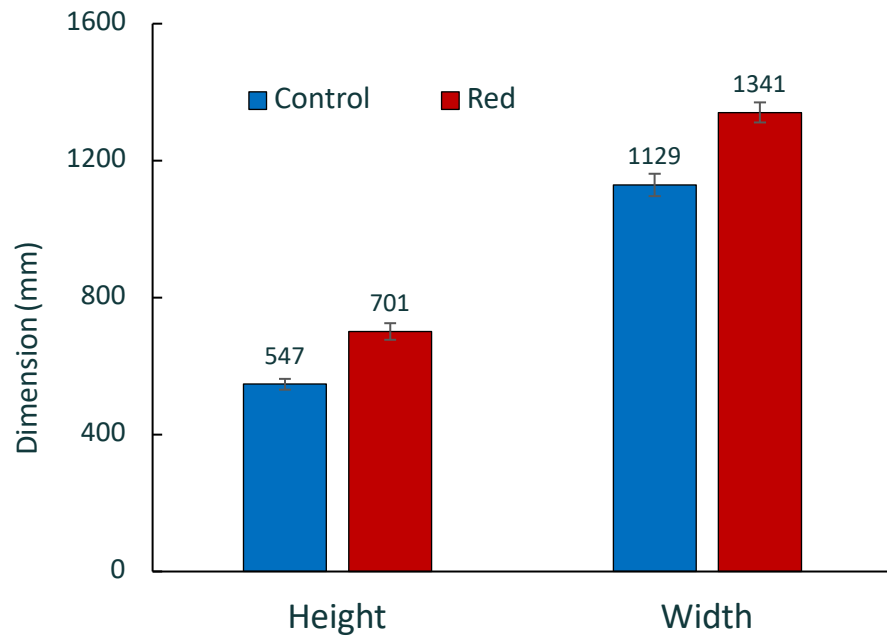Fully randomized field trials, each
composed of 20+ replicates per treatment

Opti-Harvest

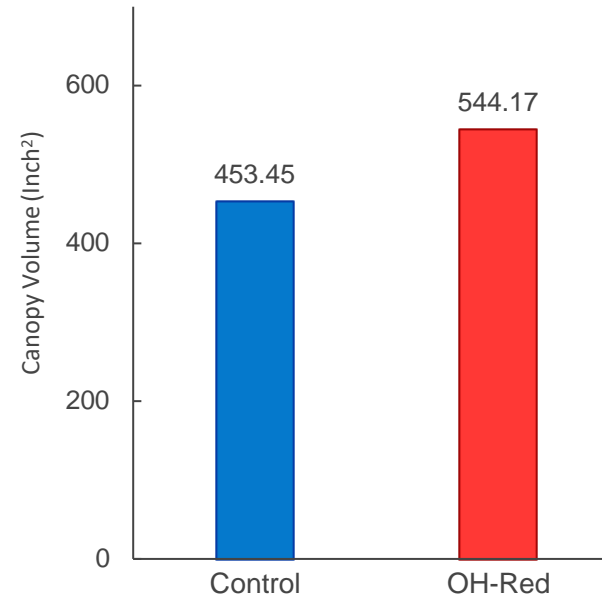| Grower / Cultivar	Location / Year / Prototypes	Results
Peacock Farms Thompson Seedless Raisin Replants	Woodlake, CA 2018 Colored-metal	▪ Replant growth accelerated by all units. ▪ Photo-selective effects: Red units consistently performed best.
Columbine (AG Capital) Autumn Royal Table Grape Replants	Arvin, CA 2019 Red-polymer	▪ Opti-Gro replant vines continue growing throughout the season; control vines stop growing due to excessive shading. ▪ Over 300% trunk diameter growth by end of 1st season.
Peacock Farms Thompson Seedless Raisin Replants	Woodlake, CA 2019-2021 Red-polymer	▪ Accelerated vine growth. ▪ Fruitfulness after first Opti-Gro year enhanced 300% relative to control replants. ▪ Labor saving self-training.
Rocca Farm (Sun Maid) Thompson Seedless Raisin Replants	Madera, CA 2019 Red-polymer	▪ Accelerated vine establishment and maturation. ▪ Labor saving self-training.
Isaak Vineyard Ivory Table Grape Replants	Dinuba, CA, 2020	▪ Accelerated vine establishment and maturation. ▪ Labor saving self-training.
Fowler Packing Tipson Table Grape New plants	Fowler, CA 2021 Red-polymer	▪ A new trial; initial growth acceleration observed within first 4 weeks.

Opti-Shield

Research Results:

Newly Planted Orchards

Fully randomized field trials, each composed of 20+ replicates per treatment

Opti-Harvest

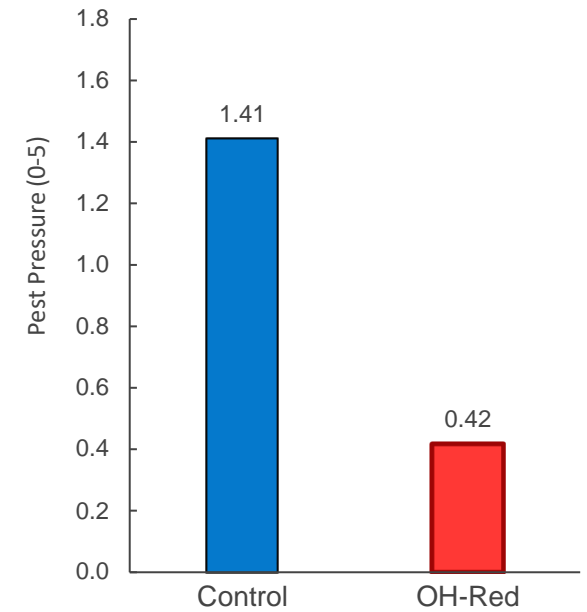

Sumo Shields: Canopy Growth between Dec 2018 to Oct 2020

Control Red

Height: 547, 701
Width: 1129, 1341

Sumo Replant Canopy Volume 3 months after OH Installation

Control: 453.45
OH-Red: 544.17

MG Sumo Replant Pest Pressure 2019

Control: 1.41
OH-Red: 0.42

Opti-Shield

Research Results:

Newly Planted Orchards

Fully randomized field trials, each composed of 20+ replicates per treatment

Opti-Harvest

| Grower / Cultivar	Location / Year / Prototypes	Results
Suntreat (Ag Capital) Sumo mandarin	Redbanks, CA 2019-2021 Colored-metal	▪ Opti-Shields accelerated canopy growth by 200% relative to common practice within first year. ▪ Foliage density enhanced by 50% relative to control. ▪ 2nd year impacts furthermore dramatic, interpreted by enhanced long-term energy storage in trunk and root system. ▪ 1st fruit production increased by 54% and 97% by red and orange Shields, relative to control.
Kahira / almonds Setton Farms / Pistachio Olam / Pistachio Yurosek Farms /Lemon & Mandarin	Fresno, CA 2020-2021 Polymer Terra Bella, CA 2020-2021 Polymer Bakersfield, CA 2020-2021 Polymer Famoso Hills, CA 2020-2021 Polymer	▪ Colored Eco-board Shields accelerating growth in all sites. ▪ Spring 2021 (2nd season with Shields) show even more dramatic impacts, interpreted by enhanced long-term energy storage in trunk and root system.
Mike George Sumo Replants	Lindsay, CA 2019-2020 Red-plastic Prototype	▪ Canopy volume increased by 20% within first 3 months. ▪ Pest infestation in the OH-trees was reduced by 70% (!) ▪ Long-term impacts on tree growth two years after removal of units.

Opti-Panel

Research Results:
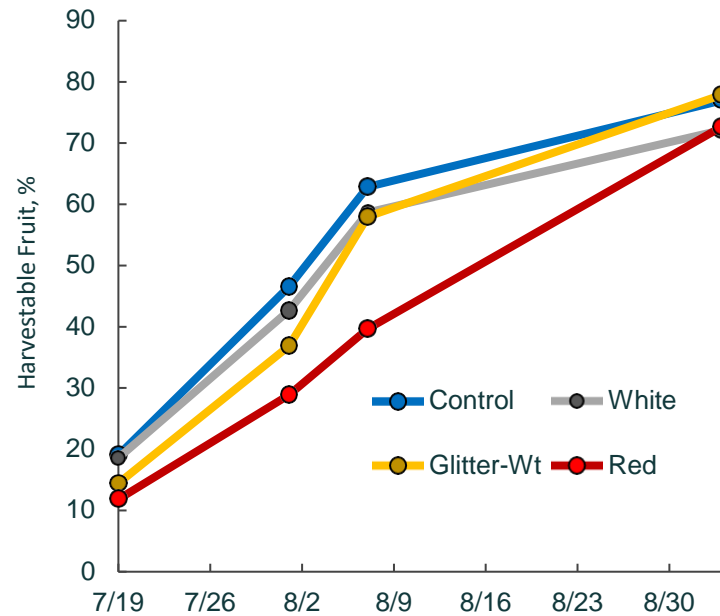
Product Development

Opti-Panel design evolved from individual metal units and color coated metal panel proof-of-concept prototypes into a revolutionary multi purpose trellis system
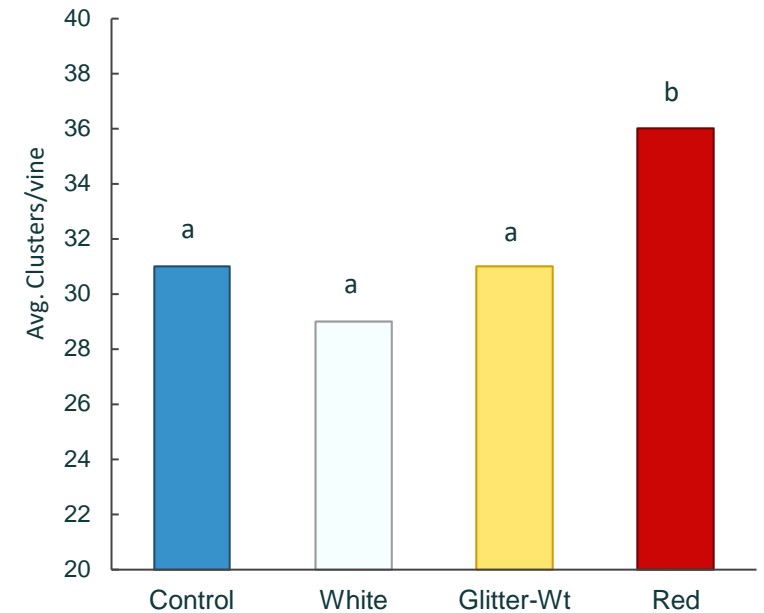
Opti-Harvest

Arvin, CA - Flame Seedless 2018: Harvested Fruit
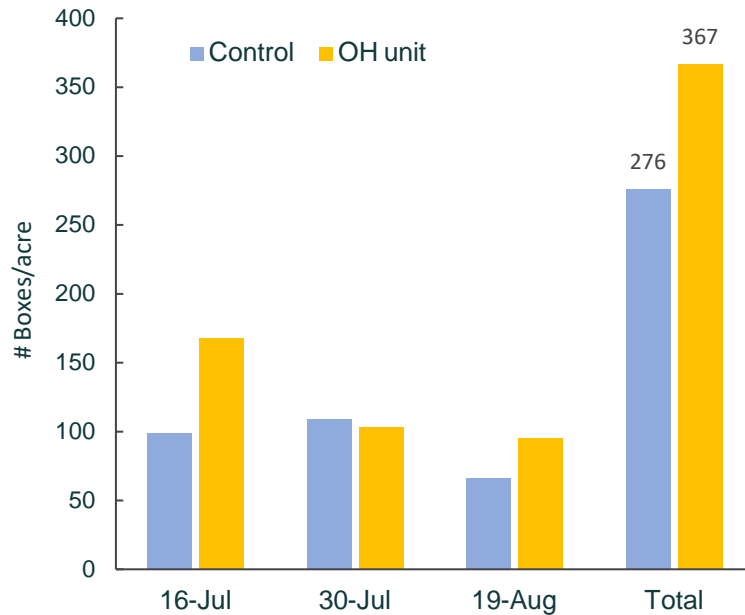
Arvin, CA - Krissy Red Seedless 2019: % Harvestable Fruit

Arvin, CA - Krissy Red Seedless: Year-after Fruitfulness Determined mid-Apr 2020

Opti-Panel

Research Results:

Product Development

Fully randomized field trials, each composed of 20+ replicates per treatment

Opti-Harvest

Grower / Cultivar	Location / Year / Prototypes	Results
Dayka Hackett Flame Seedless Table Grape	Reedley, CA 2017-2018 Shiny-metal units	▪ 40% increase in crop value from Opti-Harvest treated vines ▪ Grapes ripened earlier in the season ▪ Berry size, width and length all increased relative to control
Columbine (Ag Capital) Krissy Table Grape	Arvin, CA 2019 Colored-metal panels	▪ Panels trained the vines, keeping the center open, well illuminated, protected from strong winds; allowed better fruit accessibility for picking. ▪ Photo-selective effects: (i) Red panels delayed maturation (berry sugar and color); 　▪ Red panels enhance fruitfulness in the following year (measured in Apr 2020); 　▪ However, limited light transmittance by the metal units masked some of the expected photo-selective impacts.
Anthony Vineyards Flame Seedless Table Grape	Arvin, CA 2019 Colored-metal panels	▪ Same structural effects as in the Krissy ▪ Photo-selective effects masked by higher sensitivity of this cultivar to shading by the metal panels

Opti-Panel

Research Summary:
2020-2021 R&D & Commercial Prototypes

Opti-Harvest

- Opti-Panel commercial prototypes currently tested in table grapes, trellised peach and trellised mandarin citrus.

- Three spectral compositions tested for crop-specific targets.

- Common targets: Improved production and quality, advancing or delaying maturation, preventing sunburns, vine training, reducing labor, and providing rain protection.

- High interest by growers led to extending 2020 R&D and testing commercial-scale applications in addition to the scientific trials. 2020 targets were mostly achieved.

- 2021 activity is focused on establishing the results for a 2nd year and on technical improvements (panel durability, mechanized installation, etc.)
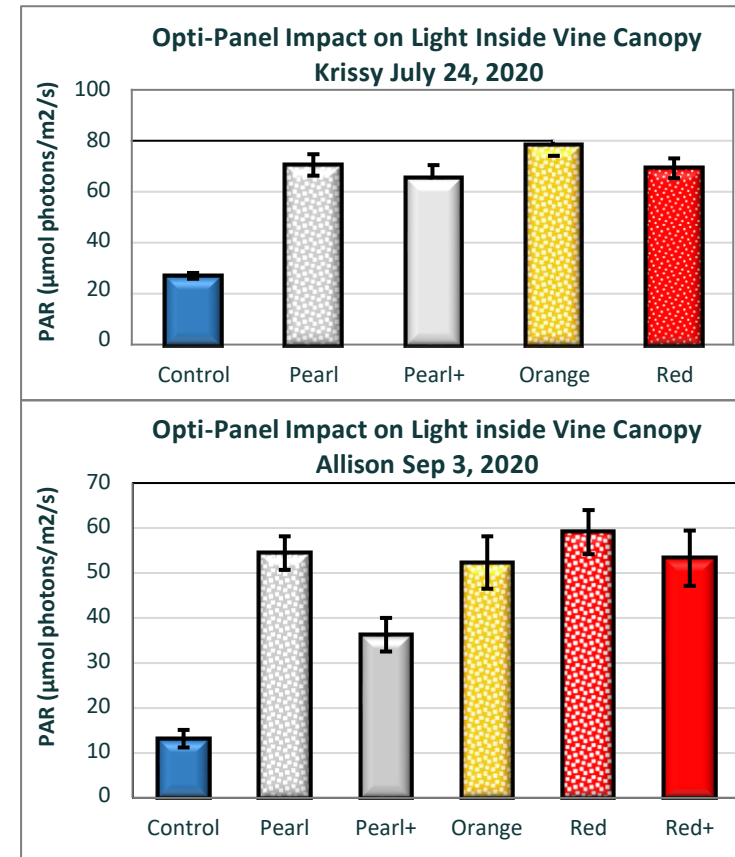
Opti-Panel

Research Summary:
2020-2021 Light R&D

Opti-Harvest

- All experimental Opti-Panels enhanced light penetration into the canopy fruiting zone by up to **X5** relative to control.

- The rain protection strips (marked by +) reduce light intensity relative to fully perforated Panels but still deliver 3-4 times more sunlight than control.

- The Opti-Panels improve the light environment inside the canopy by:

  - Keeping the center-trellis open thus enabling maximal interception of sunlight.

  - Transforming direct light into diffuse light which penetrates most efficiently throughout the foliage.

  - Spectrally filtering light for best physiological responses and fruit production.

Opti-Panel Impact on Light Inside Vine Canopy Krissy July 24, 2020

Opti-Panel Impact on Light inside Vine Canopy Allison Sep 3, 2020

Photosynthetically active radiation (PAR) was measured around the fruiting zone of table grapes by a photon flux meter in a horizontal sensor position towards south. (+) indicates non-perforated strip for rain-protection.

Opti-Panel

Research Summary:
2020 R&D & Commercial Prototypes

Opti-Harvest

Grower / Cultivar	Location / Year	Results/Objectives
Kliewer Ivory & Krissy Table Grapes	Parlier, CA – 2020-2021	▪ Preventing ambering in green cultivars ▪ Panels increased year-after budbreak in both cultivars; Flower count highest under Red Panel.
CAPS Allison Table Grapes	Reedley, CA – 2020-2021	▪ Rain protection
Columbine (Ag Capital) Krissy Table Grapes	Arvin, CA - 2020	▪ Mechanical pruning
Bagdasarian Jack Salutte & Autumn Crisp Table Grapes	Coachella Valley - 2020	▪ Early production ▪ Promoting red coloration ▪ Preventing sunburn and ambering
Sun Pacific Grapes Scarlotta, Autumn Crips, Autumn King, Adora	San Joaquin Valley 2020-2021	▪ Rain protection; Wind protection ▪ Training; Labor saving ▪ Uniform production
Fowler Packing Grapes Allison & Sweet Globe	Fowler, CA 2021	▪ Rain protection; Wind protection ▪ Training; Reducing defoliating; Labor saving ▪ Uniform production ▪ Protection of fruit from heat damage recently observed
Yakligian Tango Peach (trellised)	Sanger, CA 2020-2021	▪ Red Panels outperformed Pearl Panels, with 17% increase in harvested fruit in 1st ▪ year relative to control. ▪ Preliminary indications for Red-Panel advancing fruit maturation.
Sun Pacific Citrus Shiranui Mandarin (trellised)	Ducor and Lindsay, CA 2020-2021 Woodlake, CA 2021	▪ Shortening time-to-production ▪ Increasing production and quality ▪ Protecting from sunburns

Opti-Skylight

Research Results:

Better Light makes Better Fruit

Field trials were each composed of 15-30 replicates/treatment, fully randomized. Reduced center-canopy pruning was applied in most trials. Results common to most trials: OH-trees suffer 50% less water stress during Summer-Autumn (monitored by Phytech).

Opti-Harvest

Sumo Mandarin Harvests (Griffith Farms, Woodlake): consistent increase of fruit yield by Opti-Skylights

Trial Installed March 2018	Treatment	Jan2019 Year 1 kg/tree	Jan2019 Year 1 #/tree	Jan2020 Year 2 kg/tree	Jan2020 Year 2 #/tree	Jan2021 Year 3 kg/tree	Jan2021 Year 3 #/tree
	Control	92	364	41	128	69.2	206.8
	White-metal	98	400	48	143	85.8	303.8
	Opti/Control	**+6%**	**+10%**	**+17%**	**+12%**	**+24%**	**+47%**

Trial Installed March 2020	Treatment	Jan2019 kg/tree	Jan2019 #/tree	Jan2020 kg/tree	Jan2020 #/tree	Jan2021 Year 1 kg/tree	Jan2021 Year 1 #/tree
	Control					78.5	251.3
	Red-polymer					88.8	305.7
	Opti/Control					**+13%**	**+22%**

Opti-Skylight

Research Results:

Better Light makes Better Fruit

Field trials were each composed of 15-30 replicates/treatment, fully randomized. Reduced center-canopy pruning was applied in most trials. Results common to most trials: OH-trees suffer 50% less water stress during Summer-Autumn (monitored by Phytech).

Opti-Harvest

Tango Mandarin Harvests (Mulholland Citrus, Orange Cove) –Opti increase in Marketable fruit sizes

Trial Installed March 2018	Treatment	Jan2019 Year 1 kg/tree	Jan2019 Year 1 #/tree	Feb2020 Year 2 kg/tree	Feb2020 Year 2 #/tree	Feb2021 Year 3 kg/tree	Feb2021 Year 3 #/tree
	Control	NM	641	62.2	1070	38.5	505
	White-metal	NM	781	65.4	1113	55.5	732
	Opti/Control		**+22%**	**+4%**	**+4%**	**+44%**	**+45%**

Notes: (i) Marketable sizes are 1-7.
(ii)In the 2nd trial year, which was an extreme on-year with about 1800 fruit/tree, the Opti-units increased the largest fruit sizes by 15%, but it was masked by the overall too heavy fruit load.
(iii)In the 3rd year the 44% increase in #fruit/tree did not cause any reduction in fruit size. Unlike citrus text-book foreknowledge.
(iv) NM = not measured.
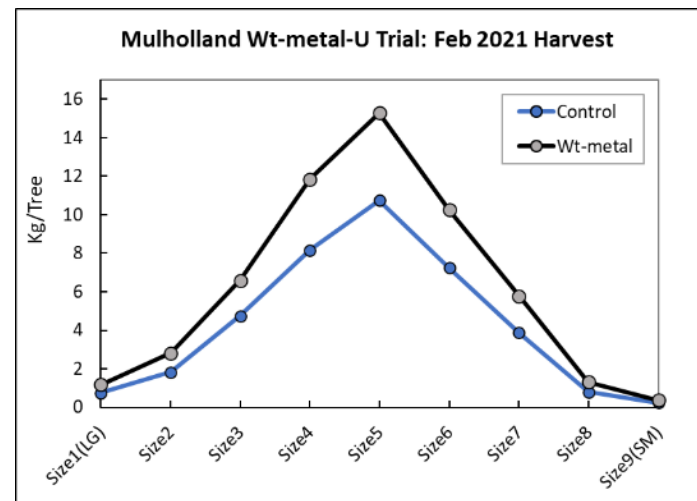
Mulholland Wt-metal-U Trial: Feb 2021 Harvest
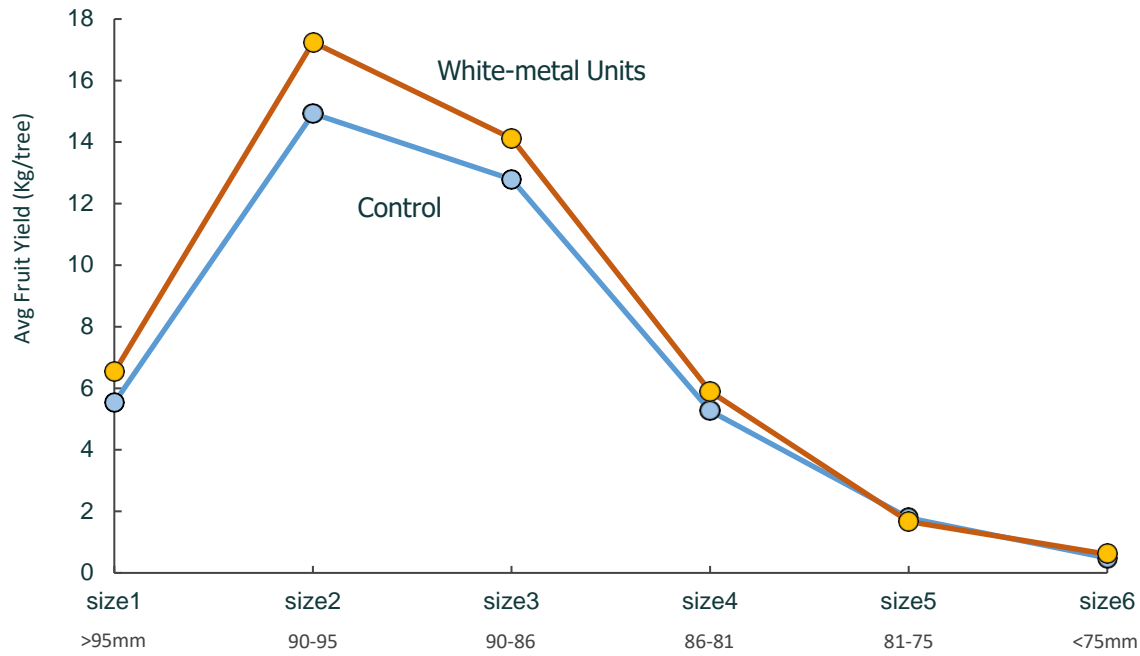
Opti-Skylight

Research Results:

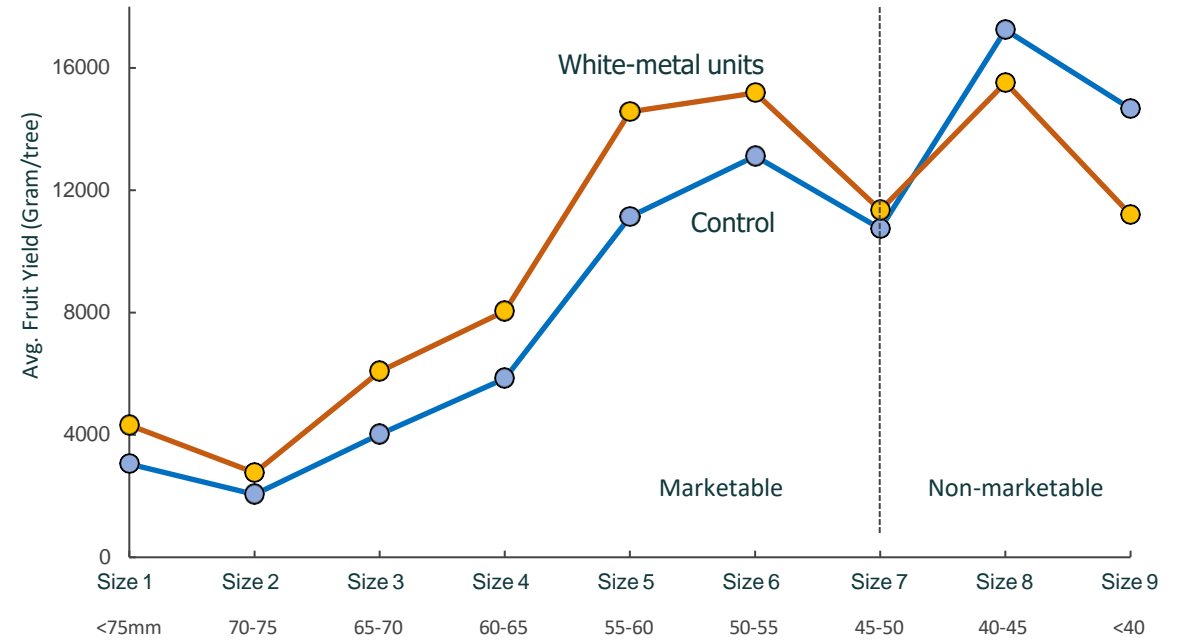Better Light makes Better Fruit

Field trials were each composed of 15-30 replicates/treatment, fully randomized. Reduced center-canopy pruning was applied in most trials. Results common to most trials: OH-trees suffer 50% less water stress during Summer-Autumn (monitored by Phytech).

Opti-Harvest

Sumo Mandarin Harvest Feb 2020: Size Distribution

Mulholland Tango Mandarin Feb 2020: Size Distribution

Opti-Skylight

Research Summary:

Tailored Light Dispersion

Field trials were each composed of 15-30 replicates/treatment, fully randomized. Reduced center-canopy pruning was applied in most trials. Results common to most trials: OH-trees suffer 50% less water stress during Summer-Autumn (monitored by Phytech).

Opti-Harvest

Grower / Cultivar	Location / Year / Prototypes	Results
Suntreat Sumo Mandarin	Woodlake - 2017-19 Shiny units	• 1st season: 21% more total fruit; 44% more large fruit. • 2nd season: too heavy fruit load in Opti-treated trees (~20% above control) caused branch breaking
Suntreat Sumo Mandarin	Woodlake - 2018-2021 White-metal; Polymer	• 1st season: 6% more fruit/tree • 2nd season: 13% more large fr/tree; added fruit value ~6000 $/acre • 3rd season: 47% more marketable fruit; Added value ~$12,000/acre
Mulholland Tango Mandarin	Orange Cove - 2019-2021 White-metal; Polymer	• 1st season result: 22% more marketable fruit size; Less non-marketable waste • 3rd season: 44% more marketable fruit.
Sun Pacific Tango Mandarin	Ivanhoe, CA 2021 Polymer	• New trial
Yurosek Pistachio	Delano - 2018 -2020 Shiny- & White-metal	• 24% increase in nut-yield in trial year 1 (an off-year); 16% increase in year 2 (an on-year) equivalent to added nut value of $2,800; 34% increase in edible nut yield in year 3 (an off-year) and 9% increase in nut quality, with added $1300/acre.
Wonderful Farms Pistachio	Lost Hills – 2019-2020 Shiny- & White-metal	• First (off-year) and 2nd (on-year) trial years: 11% -16% increase in nut yield • Nut quality increased by 8%. • Added nut value $2,600/acre • Indication for advancing nut maturation by OH units
Kezirian Pistachio	Kerman 2020-2021 Polymer	• First year (on-year): 8% increase in edible yield; equivalent to $1700/acre added nut value.
Westchester Pistachio	Lost Hills 2021	• New trial
Warmerdam Rainier Cherry	Hanford - 2019 Shiny and White-metal	• 15% increase in fruit yield

Opti-Skylight

Research Summary:
2020-2021 R&D

Opti-Harvest

- Commercial prototype units currently tested in Sumo and Tango mandarins, and pistachio.

- Based on prior experience, and for adjusting to crop-specific targets, both Pearl and Red down-tubes are tested in new trials.

- Target results common to all crops: enhanced production and fruit quality; better water-use-efficiency.

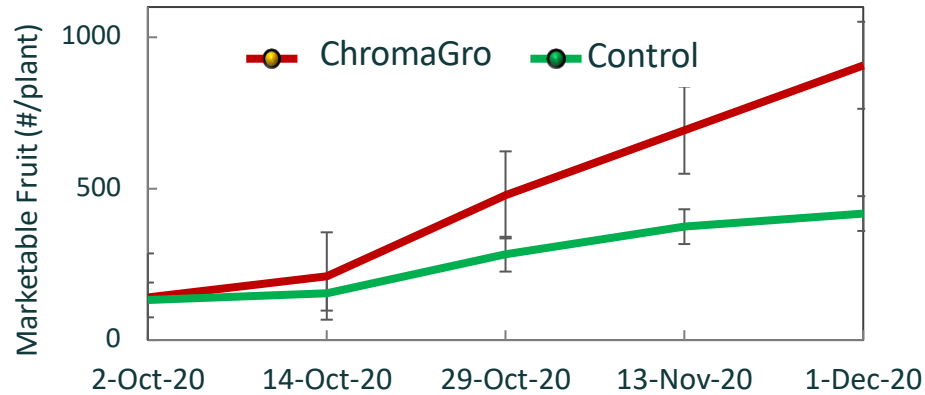- 2021 preliminary results indicative of both increased production and improved water-use-efficiency.

ChromaGro

Research Summary:

2020 R&D in Vegetables

Rolinda Experimental Farm. Seven replicates averaged per treatment per crop

Opti-Harvest

Cherry Tomato Cumulative Fruit Yield

Beans: Foliage & Frost Damage Dec 10, 2020