



# WESTERN GROWERS CASE STUDY



**STOUT**

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**GROW** NEW TECHNOLOGY.



This case study, provided by Western Growers, analyzes real grower data on the costs and savings associated with the Stout Smart Cultivator. The data is based on a 32-week growing season and a 3-year depreciation schedule for the Stout Smart Cultivator. This case study also discusses the operational impacts of using the Stout Smart Cultivator at Triangle Farms.

**GROW** NEW TECHNOLOGY.

# THE TECHNOLOGY

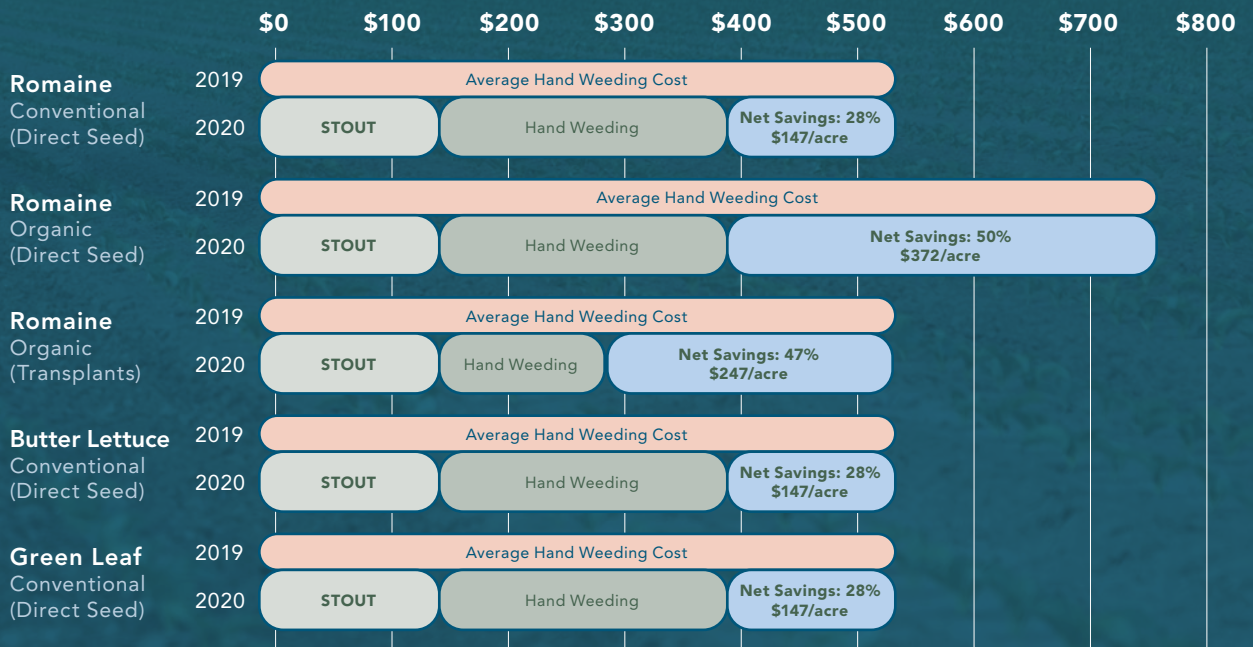


Stout Smart Cultivator is a mechanical weeding and cultivator implement powered by Machine Learning/Deep Learning (ML/DL) technologies that reduces reliance on costly and scarce manual labor. It can be used in various specialty row crops across multiple bed configurations, and it can be easily adapted on farms for increased utility.

In the first season of use

## WEEDING COSTS CUT BY 32% AFTER USING THE STOUT SMART CULTIVATOR.

Comparison of weeding costs/acre in 2019 (hand weeding only) and 2020 (Stout plus hand weeding)



After the three-year depreciation schedule, the savings associated with the Stout increase. As the cost of labor continues to rise (up 38% in 2024 since 2020\*) the value proposition continues to increase.

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Triangle Farms is a 10,000-acre conventional and organic specialty crop farm based in Salinas, Calif. It is part of the JV Smith Companies, which has a total of 40,000 acres across farms throughout California, Arizona, Colorado, New Mexico and Mexico.

### THE NEED FOR TECHNOLOGY SOLUTIONS

Faced with the challenge of labor shortages, Josh Roberts, Former President of Triangle Farms explored all available implements and machines that could help automate highly labor-intensive tasks such as weeding. For Triangle Farms, hand-weeding was done exclusively by a Farm Labor Contractor (FLC) that uses H-2A labor, which varied in cost from \$525/acre to \$750/acre depending on the crop (2019 data). [\(See details in Table 1 on page 6\).](#)

In 2019, the newly released Stout Smart Cultivator attracted Triangle Farm's attention because, unlike other innovations on the market, this implement could be purchased rather than utilized as a service. This would allow the Triangle team to customize their Stout Smart Cultivator, for optimal efficiency, in an effort to reduce operational costs.

Triangle Farms was one of the early customers of the Stout Smart Cultivator purchasing the machine in late 2019. This allowed the Triangle team to modify with the implement, customize it as required, and plan for its implementation in the 2020 season.

### ABOUT STOUT SMART CULTIVATOR

The Stout Smart Cultivator (Stout) was designed by an R&D team at Tanimura & Antle (T&A). T&A is a California-based vertically integrated grower of leafy greens and other fresh vegetables. The smart implement was developed in response to the ongoing labor shortages in the fresh produce industry. Triangle Farms received a pre-release model of the Stout Smart Cultivator in 2019. In 2020 the Stout was commercially launched to

the market, and Stout Industrial Technology Inc. was established as an independent company.

The Stout Smart Cultivator is a mechanical implement designed for weeding and soil cultivation. Equipped with machine vision, it can distinguish the target crop from surrounding weeds. Guided by the Stout machine learning model, its mechanical blades maneuver around the crop to prevent damage while cutting down weeds and other plants nearby, all while cultivating the soil.

*“Agtech innovation is key to our future because there’s a dwindling workforce that wants to do these types of jobs. The more we can automate, the more we can actually stay in business.”*

— Kristen Smith Eshaya, President, JV Smith Companies



The Smart Cultivator can be connected to any tractor via a class II hitch and PTO. It can currently be used for weeding at least 14 different specialty crops and can be configured for a variety of bed sizes (up to 84") and up to eight crop lines per bed. Models for additional crops are added through software updates that are pushed out to the machine when connected to the internet. It is important to note that the machine does not require stable cellular or a reliable internet connection for regular operations.

## LETTUCE WEEDING AND THE NUMBERS

- Triangle purchased one Stout Smart Cultivator in 2019 and put it to work on the 2,700 acres of lettuce crops in the Salinas Valley in 2020. Triangle Farms used the Stout Smart Cultivator on conventional and organic romaine, conventional butter lettuce and green leaf lettuce. The Stout was set up for a standard 6-seed line, 80" bed. Triangle modified the machine slightly to adopt some of the clamps and other tools that were standard on the ranch. The machine is designed for on-farm adaptability.
- In 2019, the single-bed Stout Smart Cultivator cost \$330,000 and deployed on 2,700 acres in the 2020 season. Triangle Farms used a three-year depreciation schedule for this machine. This breaks down to an amortized capital cost per acre of \$40.47. The fully loaded cost to operate the smart implement includes the cost of the tractor, the consumables on the smart implement, annual inspection/service from Stout, fuel, operators, and machine transportation (*See Table 2 for details page 6*). The fully-loaded total cost is \$128.14/acre.
- After the three-year depreciation period (smart implement fully amortized), the operational cost reduces to \$87.39/acre based on 2,700 acres. After the five-year depreciation period (tractor and machine fully amortized) the operational cost reduces to \$80.73/acre.
- Triangle Farms operates the smart implement with one operator per shift, running two 10-hour shifts daily. This is an average of 16 hours of operation per day, six days a week, accounting for any utilization interruptions. On average, the smart implement covers 1 acre per hour. Triangle Farms employs FLC H2A labor to operate the Stout Smart Cultivator, selecting and training the operators themselves. The training and operation process has been straightforward for these workers.
- The Stout smart implement was used for one pass in each crop cycle, performing the initial mechanical weeding and soil cultivation. While effective at reducing the initial weed population, additional manual weed removal was required later in the crop cycle. This supplementary labor incurred an additional cost of \$150 to \$250 per acre, depending on the crop. In the case of transplanted romaine, the hand-weeding requirement was the lowest. Details of the total weeding cost for each crop are detailed in *Table 3 page 7*.
- Savings were seen in all crops where the Stout Smart Cultivator was used ranging from \$146.86/acre up to \$371.86/acre (between 28 and 50%) with a total cost savings in 2020 for Triangle Farms of \$477,784 (32%). **These costs are based on the Stout Smart Cultivator being used for only 32 weeks of the year, during a single Salinas Valley growing season and while still paying down the capital costs of both the cultivator and the tractor.** Details of these savings can be seen in *Table 4 on page 7 and table 5 on page 9*.

“Your operation and planting techniques need to change to utilize the tech, or you will fall behind.”

— Matt McGuire, Chief Agricultural Officer, JV Smith Companies

## WESTERN GROWERS CASE STUDY

Table 1. Average Cost of Labor for Hand Weeding (2018/2019 Data)

CROP	STOUT ACRES	AVERAGE HAND WEEDING COST (\$/ACRE)	TOTAL AVERAGE HAND WEEDING COSTS (\$/ACRE)
6-Line Romaine (Con)(DS)	1800	\$525.00	\$945,000.00
6-Line Romaine (Organic)(DS)	250	\$750.00	\$187,500.00
6-Line Romaine (Organic)(TP)	250	\$525.00	\$131,250.00
6-Line Butter Lettuce (Con)(DS)	200	\$525.00	\$105,000.00
6-Line Green Leaf (Con)(DS)	200	\$525.00	\$105,000.00
<b>TOTALS =</b>	<b>2,700</b>		<b>\$1,473,750.00</b>

Con=Conventional DS=Direct Seed TP=Transplant

Table 2. Triangle Farms, fully loaded operational cost of the Stout Smart Cultivator

ITEM	\$/ACRE	HARD COSTS
Single Bed Smart Cultivator	\$40.74	\$330,000 (Dep Over 3 Yrs on 2,700 Acres/Year)
Tractor	\$6.67	90,000 JD 5-125 at 5yr depreciation
Consumables/Wearables	\$1.30	Approx \$3,500 Yearly
Hardware Warranty	\$0.93	\$2,500 Yearly Field Service, 100% Cost of Parts/Labor*
Yearly Inspection/Service	\$0.93	\$2,500 Yearly In-House Inspection/Tune-up
Fuel	\$21.00	4.5 gal/hr @ \$5/gal
Operators (Loaded) (2x)	\$44.58	Qty: 2 Operators @ \$22.29 ea
Operations (moving)	\$12.00	Transport Trucks, Fuel etc
<b>COST/ACRE TO RUN SMART CULTIVATOR =</b>	<b>\$128.14</b>	

\* This service is free for the first year of ownership, but added for optimal financial impact

“In farming, we have to be adaptable and responsive to changes and variabilities. Tools like Stout’s Smart Cultivator add points of flexibility in our cost structure that better allow us to respond to needs in a more dynamic way.”

— Josh Roberts, Former President, Triangle Farms, A JV Smith Company



Table 3. Total cost of Stout Smart Cultivator plus hand weeding labor per crop (2020 data)

CROP	STOUT ACRES	STOUT COST (\$/ACRE)	ADDITIONAL HAND WEEDING COST (\$/ACRE)	TOTAL COMBINED WEEDING COSTS (\$/ACRE)	TOTAL WEEDING COSTS
6-Line Romaine (Con)(DS)	1800	\$128.14	\$250.00	\$378.14	\$680,644.00
6-Line Romaine (Organic)(DS)	250	\$128.14	\$250.00	\$378.14	\$94,533.89
6-Line Romaine (Organic)(TP)	250	\$128.14	\$150.00	\$278.14	\$69,533.89
6-Line Butter Lettuce (Con)(DS)	200	\$128.14	\$250.00	\$378.14	\$75,627.11
6-Line Green Leaf (Con)(DS)	200	\$128.14	\$250.00	\$378.14	\$75,627.11
<b>TOTALS =</b>					<b>\$995,966.00</b>

Table 4. Comparison of Weeding Costs (\$/acre) in 2019 and 2020

CROP	STOUT ACRES	H2A AVERAGE HAND WEEDING COST (\$/ACRE)	TOTAL COMBINED WEEDING COSTS (\$/ACRE)	NET SAVINGS (\$/ACRE) FROM PREVIOUS YEAR USING ONLY HAND WEEDING
6-Line Romaine (Con)(DS)	1800	\$525.00	\$378.14	\$146.86
6-Line Romaine (Organic)(DS)	250	\$750.00	\$378.14	\$371.86
6-Line Romaine (Organic)(TP)	250	\$525.00	\$278.14	\$246.86
6-Line Butter Lettuce (Con)(DS)	200	\$525.00	\$378.14	\$146.86
6-Line Green Leaf (Con)(DS)	200	\$525.00	\$378.14	\$146.86

“The machine you bought is never going to get any worse than the day you bought it and I don’t see why it shouldn’t continue to operate for another 20 years with good maintenance.”

— Josh Roberts, Former President, Triangle Farms, A JV Smith Company

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### OPERATIONAL EXPERIENCE AND BENEFITS

- Since the machine is constructed with many common parts that can be sourced from local suppliers, the downtime for the Stout Smart Cultivator at Triangle Farms due to a maintenance issue has never exceeded one hour.
- Triangle Farms comprises several ranches and growing regions within the greater Salinas Valley region. The Stout Smart Cultivator was able to be easily transported from ranch to ranch with a one-ton pickup and a trailer, which optimized its use, utility and versatility. The machine sometimes needed slight adjustments for the soil conditions at each ranch. The management team and technology manager at Triangle Farms conceptually planned these accommodations. The technology manager is then responsible for overseeing the implementation and integration of new technology into the ranch operations. Additionally, they handle staff training to ensure that employees are properly equipped to operate the new technology. In practice, the implementation of the Stout Smart Cultivator at each ranch took significant time and effort to help ranch managers understand the value proposition. Triangle Farms used an internal incentive program to help adoption of the machine.
- “With Stout we could treat it like any other implement we owned and be confident that whatever we put it through, it could stand up to that”, Josh Roberts
- To adapt the irrigation system to the Stout Smart Cultivator, single-use drip tape was buried so the cultivator could operate over it without disruption. There was a small incremental cost increase associated with this activity. This was offset by savings from not having to repair multi-use drip tape. Overall this change streamlined costs associated with drip tape and saved money for Triangle Farms.
- Triangle Farms appreciates the flexibility to modify the smart implement to suit their specific requirements. For example, after 2020, they reconfigured the mechanism to work on two 40" beds with 2-seed lines for another crop. This adaptability increases the Stout’s utilization in other crops, further reducing the cost per acre.
- Adaptations to the smart implement have been undertaken with the full support of the Stout team who were available for a call whenever any challenges arose and were happy to attend on-site if required.
- Stout has continued to update their models to improve performance and expand the number of crops that the machine can be used on. In Triangle Farm’s experience, the machine operates today in the same way that it operated in 2020 and should continue to operate in a similar way for many years to come.
- “The machine you bought is never going to get any worse than the day you bought it and I don’t see why it shouldn’t continue to operate for another 20 years with good maintenance,” says Josh Roberts.

*“We can’t be afraid to test the tech. Whatever it takes, whether buy, rent, or lease, and get into it to make it work. Sharing what we learned is what’s going to help the industry and others know more going into it than we did.”*

— Matt McGuire, Chief Agricultural Officer, JV Smith Companies





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Table 5. Comparison of Total Weeding Costs in 2019 and 2020

CROP	STOUT ACRES	2019 TOTAL AVERAGE HAND WEEDING COSTS	TOTAL WEEDING COSTS USING THE STOUT SMART CULTIVATOR + H2A HAND LABOR	2020 TOTAL SAVINGS	2020 % SAVINGS
6-Line Romaine (Con)(DS)	1800	\$945,000.00	\$680,644.00	\$264,356.00	28%
6-Line Romaine (Organic)(DS)	250	\$187,500.00	\$94,533.89	\$92,966.11	50%
6-Line Romaine (Organic)(TP)	250	\$131,250.00	\$69,533.89	\$61,716.11	47%
6-Line Butter Lettuce (Con)(DS)	200	\$105,000.00	\$75,627.11	\$29,372.89	28%
6-Line Green Leaf (Con)(DS)	200	\$105,000.00	\$75,627.11	\$29,372.89	28%
<b>TOTALS =</b>		<b>\$1,473,750.00</b>	<b>\$995,966.00</b>	<b>\$477,784.00</b>	<b>32%</b>



The Stout Smart Cultivator was able to be  
**EASILY TRANSPORTED  
 FROM RANCH TO RANCH**

with a one-ton pickup and a trailer, which optimized its use, utility and versatility.


## WESTERN GROWERS CASE STUDY

### COMPARISON WITH OTHER AUTOMATED WEEDING TOOLS

- Triangle Farms was also cited in the recent Western Growers Case Study on the Carbon Robotics LaserWeeder.
- According to Josh Roberts, "The Carbon Robotics LaserWeeder and the Stout Smart Cultivator are two very different tools. The LaserWeeder has a specific purpose for weeding high-density crops, where in-row cultivation is impossible. This is its highest and best use. The Stout machine is an advanced cultivator. Every row crop needs to be cultivated and therefore with the Stout, we are saving an additional function by cultivating and weeding at the same time."

### LOOKING FORWARD

- As the cost of labor continues to rise, the value proposition of the Stout Smart Cultivator at Triangle Farms gets better every day. In Jan 2024, the H-2A Adverse Effect Wage Rate in California was \$19.75/hour, up from \$14.26/hour in 2020. This is a cost increase of 38%. [\*Reference: <https://www.mobilefarmware.com/support/wams/aewr/>]
- Since 2019, the cost of the Stout Smart Cultivator has dropped from \$330,000 to \$327,000.
- Triangle Farms continues to utilize the Stout Smart Cultivator as part of their labor and cost-saving reduction strategy and anticipates doing so for many years to come.



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Triangle Farms integrated the Stout Smart Cultivator  
with hand weeding in 2020 and noted a

**\$477,784 REDUCTION IN TOTAL COST**

compared to 2018/2019 labor expenditures.

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The Stout Smart Cultivator delivered immediate savings in year one of operation at Triangle Farms, and savings increased over time as labor costs rose and the machine's initial cost was paid down after three years. The implementation, operation and maintenance of the Stout Smart Cultivator were straightforward, though careful planning and incentives for farm operators were necessary to manage the transition. Additional benefits and savings also came from adjustments to irrigation practices required to operate the smart implement in lettuce fields.

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## Farmer Focus

This resource would not be available without the generous support of both time and resources from Josh Roberts, Former President of Triangle Farms.

Josh is instrumental in the advancement of agtech within the industry. His and his organization's willingness to provide the financial data to create a first-of-its-kind resource for all companies interested in adopting agtech is a testament to the continued support Josh gives to others.

Western Growers is grateful for his help with this project.  
It wouldn't have been possible without him.



*“This machine was built and designed to be robust.  
With regular maintenance, there's no concern for payback or ROI.”*

— Walt Duflock, Western Growers, SVP of Innovation

For more information on this study  
or future studies, please contact the  
Innovation Team at [innovation@wga.com](mailto:innovation@wga.com).

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