

THE SYMM PROGRAM

Field Trials & Research

The measured record behind the Symm program: yield, resilience under stress, and nutrient-use efficiency. Every figure here is traced to a trial, and every trial is labeled with what kind of trial it was.

CHEMICAL-FREE

PESTICIDE-FREE

NON-GMO

Resilience you can measure

The same Symm program, run head-to-head against four of the abiotic stresses that most often cut yield. In each pair the treated plants held vigor and root mass where the untreated check did not. Read every pair as that trial's own untreated control, grown beside Symm-treated plants under the same conditions.

HEAT STRESS

Watermelon



SYMM

CHECK

Seedlings under a 100°F to 122°F heat gradient.

DROUGHT STRESS

Soybean



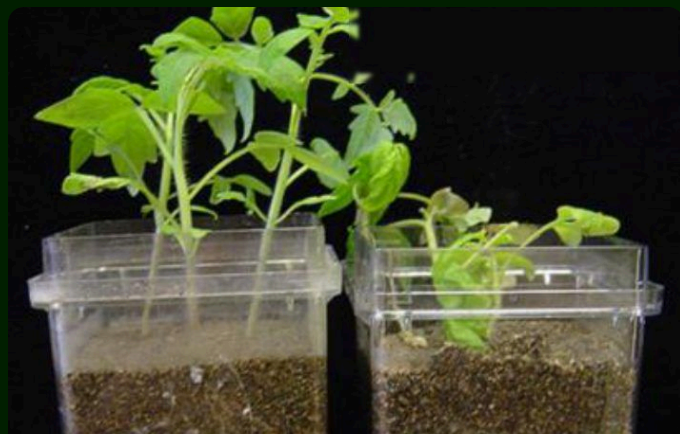
SYMM

CHECK

Three-week-old soybean after six days without water.

SALT STRESS

Tomato



SYMM

CHECK

Seedlings watered with sea-water levels of salt.

NUTRIENT STRESS

Maize



SYMM

CHECK

Eleven weeks of growth under low-nutrient stress.

These four are **controlled-environment demonstrations**, not field yield trials. They show the mechanism clearly because the stress is held constant and severe. The field results begin on the next page.

Two parts, one program

Symm is one biological program with two parts, applied together as a seed, in-furrow or foliar treatment: one for resilience, one for nutrition. In replicated trials the two parts out-yield either one used alone, which is why they are sold and applied together.

PART 1 · RESILIENCE

Resilience from within

A consortium of advanced *Trichoderma harzianum* strains that partner with the plant to raise tolerance to drought, heat and salinity, and to strengthen roots and establishment.

PART 2 · NUTRITION

Nutrient-use efficiency

A five-strain *Bacillus* consortium (*B. licheniformis*, *B. megaterium*, *B. pumilus*, *B. subtilis*, *B. amyloliquefaciens*) that unlocks soil-bound nutrients so the crop accesses more of the available nutrients.

The headline figures

5 to 10%

Typical yield gain against untreated, in a normal season. Often greater under drought, heat or salinity stress. A range, never a guarantee for a given field.

~70%

Share of side-by-side comparisons where treated out-yielded untreated. Roughly three in ten show no gain. We would rather you knew that now.

p<0.1

Statistical bar met across the replicated row-crop trial set, with the strongest results well inside conventional significance.

How to read the evidence

Not all trials are equal, and this document says which is which on every figure. That is deliberate: a number is only worth what the trial behind it was.

LABEL	WHAT IT MEANS
CRO FIELD	Replicated field trial run by an independent contract-research organization. The strongest evidence we hold.
FIELD TRIAL	Replicated trial run in open field, in-house rather than by an independent CRO.
CONTAINER	Replicated trial in pots, bins or trays. Real and measured, but not a field yield result.
ON-FARM	Grower-run, treated plot against the farmer's own untreated plot, at scale rather than in replicate.

Corn, soybean and wheat

The core of the record. Across independent contract-research trials, Symm-treated plots delivered a consistent yield gain over untreated controls, with the strongest and most significant responses in corn and wheat.

CORN · 2020

+14.2%

p=0.006

WHEAT · 2016

+11.3%

p=0.0001

SOYBEAN · 2023

+12.5%

p=0.05

CORN · 2022

+9.5%

p=0.004

THE FULL REPLICATED ROW-CROP SET

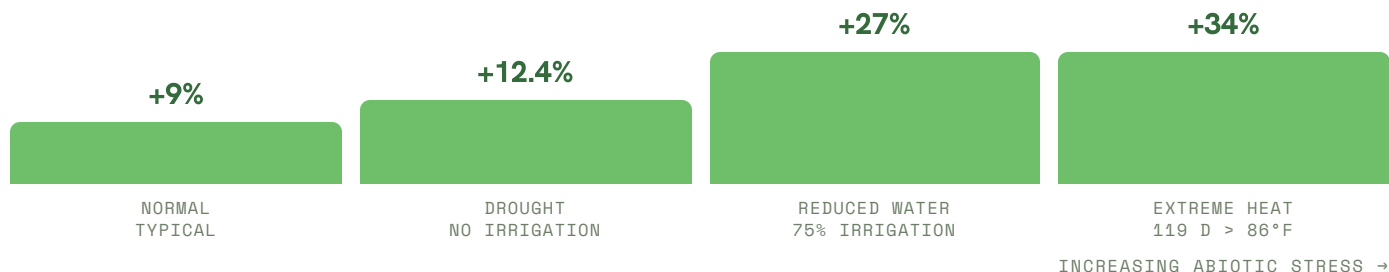
CROP	YEAR	APPLICATION	P-VALUE	YIELD VS CONTROL
Corn	2020	Seed	0.006	+14.2%
Corn	2022	Seed	0.004	+9.5%
Corn	2023	Seed	0.09	+7.8%
Corn	2018	In-furrow + foliar	0.06	+5.0%
Soybean	2023	Seed	0.05	+12.5%
Soybean	2020	Seed	0.06	+8.7%
Soybean	2021	Seed	0.08	+8.4%
Wheat	2016	Seed	0.0001	+11.3%
Wheat	2020	Seed	0.01	+9.8%
Wheat	2019	Seed + foliar	0.004	+9.0%

Wheat also gained **+1.4% grain protein** (2016) and **+8.6% straw yield**. Figures are averages of Symm-treated plots against untreated controls in the same trial.

The advantage grows under stress

Symm's clearest benefit shows up when the season turns against the grower. Part 1 helps the plant hold its yield potential through heat and drought, and across trials the advantage widens as abiotic stress rises. **This is the single most consistent finding in the record, and it is the thing to understand before reading any individual number.**

CORN YIELD GAIN VS UNTREATED CONTROL, BY STRESS LEVEL



EXTREME HEAT

+34%

Corn yield under 119 days above 86°F.
p=0.015.

DROUGHT

+12.4%

Corn yield in a no-irrigation drought
trial. p=0.06.

REDUCED WATER

+27%

Yield gain at 75% irrigation against
+17% at full irrigation, same trial.

Treated corn also ran **cooler**: in a heat trial it held lower canopy and stem temperatures than untreated plants through the hottest afternoons, a signal of better water regulation under load. Applied early, the program has the most to work with. Applied during an active stress event, it still supports yield.

If your ground never runs short of water and never gets hot, this program will do less for you, and we would rather say so. The value is concentrated in the hard years.

Specialty and vegetable crops

The same two-part program lifts germination, vigor, size and quality across a wide range of vegetable, orchard and specialty crops. These trials were run in-house rather than by an independent contract-research organization, and are labeled accordingly. They are measured results, held to a different bar than the row-crop set.



Cabbage · harvest weight
+24.8%

Control and treated rows in the **same bed**, same planting date, same irrigation. The rows are marked in the field, so the comparison is visible in the photograph rather than asserted in a caption.

FIELD TRIAL

Spinach · germination trial

+27%



CONTROL

36 OF 50

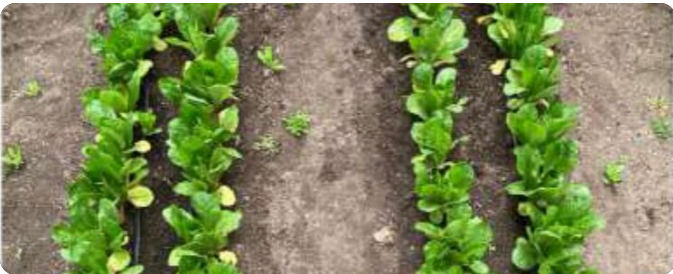


SYMM TREATED

46 OF 50

Same tray design, same sowing date, grown side by side. Viability rose from 85.7% to 95.6% after drought.

GERMINATION

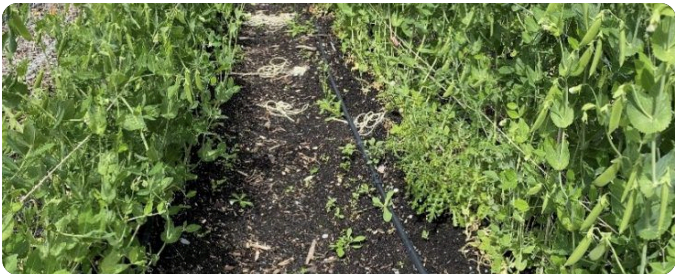


Lettuce

+14.9%

Trial rows under drip.

FIELD TRIAL



Snap peas

+34.9%

Trial rows at full canopy. Germinated 46% faster.

FIELD TRIAL

Open-field and replicated container trials, 2020 to 2025. Percentages compare Symm-treated to untreated controls within each trial. Trial type is labeled on every figure.

The full specialty record

Across fruiting vegetables, brassicas, alliums and cucurbits, Symm-treated plots out-yielded untreated controls, often by wide margins over a full season of harvest. Season-harvest figures are cumulative across the harvest window, which is why they run higher than a single-date yield comparison.

CROP	MEASURE	VS CONTROL	TRIAL TYPE
Cucumber	Season harvest, p<0.006	+148.8%	FIELD TRIAL
Kale	Season harvest weight	+111%	FIELD TRIAL
Peppers	Fruit weight / count, Cubanelle	+91% / +64%	FIELD TRIAL
Winter squash	Harvest, six varieties	+12.8 to +46.8%	FIELD TRIAL
Snap peas	Harvest weight	+34.9%	FIELD TRIAL
Garlic	Yield, bulbs +8.2% larger	+27%	FIELD TRIAL
Cabbage	Harvest weight	+24.8%	FIELD TRIAL
Lettuce	Harvest weight	+14.9%	FIELD TRIAL
Tomato	Harvest weight / per fruit	+8.4% / +5.4%	CONTAINER

GERMINATION & ESTABLISHMENT

- Sugar snap peas germinated **46% faster** than untreated seed.
- Spinach viability rose **85.7% to 95.6%** after drought; a seed trial showed **+27% germination**.
- Onion seed held one year at 35°C germinated at **50% against 0%** untreated.
- **+53.7% seedling biomass** after one week of drought.

GERMINATION Seedling-tray studies, not field yield.

Peppers · Cubanelle, weight and fruit count **+91% / +64%**



Harvest from the pepper trial, shown to illustrate the crop and the pick rather than as a treated-versus-control comparison.

FIELD TRIAL

Quality, not just quantity. In our own tasting panels, treated crops were preferred across peppers, tomatoes, garlic and basil.

Why it works

Two organisms doing two different jobs, both of them well documented in independent, peer-reviewed research that predates and is unconnected to any commercial supplier. This page is the science rather than our trial data, and it is the part a skeptical agronomist should check for themselves.

PART 2 · BACILLUS

Unlocks soil nutrients

The *Bacillus* consortium solubilizes soil-bound phosphorus, potassium and micronutrients through organic-acid pathways, making them available to the plant.

PART 2 · UPTAKE

Improves efficiency

Better nutrient-use efficiency helps the crop access more of the available nutrients. It does not replace your fertility program, and you should keep running it as normal.

PART 1 · TRICHODERMA

Deeper, stronger roots

The *Trichoderma* partnership drives root development, widening the volume of soil each plant can feed from and reach water in.

What independent testing has found

MEASURE	DIRECTION IN TREATED CROPS
Nitrogen, phosphorus, potassium and calcium uptake	Higher
Protein, fiber and dry matter	Higher
Leaf chlorophyll, as greenness	Higher
Root biomass and rooting depth	Higher

Directions rather than percentages, deliberately. These findings are consistent across the literature and our own trials, but we have not yet traced a single figure we are prepared to put a decimal point on. When we have, it will appear here with the trial behind it. **A number we cannot source is worth less than an honest direction.**

On fertilizer. Symm improves how efficiently a crop uses the nutrients available to it. It is not a fertilizer, not a replacement for one, and we make no claim that it lets you reduce your program. Growers on Symm should maintain their normal fertility program.

More crops, more yield

The same program carries well beyond grain and vegetables, into forage, fiber and specialty crops, applied as a seed treatment or a foliar spray. Across climates and crop types, the pattern holds.

CROP	MEASURE	VS CONTROL	TRIAL TYPE
Hemp	Grain / straw yield	+18.5% / +35.2%	FIELD TRIAL
Rice	Yield, stress season	+13 to +30%	CRO FIELD
Alfalfa	Forage, feed value held	+11 to +14%	CRO FIELD
Cotton	Lint value and yield	Higher, see note	CRO FIELD
Sorghum	Yield, seed treatment	+2.5 to +4.8%	CRO FIELD
Barley	Yield, six trials	+6.6% average	FIELD TRIAL
Potato	Yield across three seasons	+3.4 to +13.7%	CRO FIELD
Turf	Yield, foliar	+4.2 to +7.8%	CRO FIELD
Field peas	Yield, seed treatment	+5.6 to +6.6%	FIELD TRIAL

SEED OR FOLIAR, BOTH WORK

Symm delivered gains whether applied as a seed treatment or a foliar spray, which gives growers flexibility to fit the program to their operation and their equipment rather than the other way round.

TESTED ACROSS SEASONS

The record spans multiple years and sites per crop, so the results reflect performance through varied weather and soils rather than a single favorable season. That consistency is the strongest signal in the data.

Cotton is shown without a single headline number on purpose. It was measured across three very different environments, and the results ranged from a few percent in standard conditions to substantially more under combined heat and water stress. A single average would hide exactly the thing worth knowing.

Measured on hundreds of farms

Beyond replicated research plots, the program has been put to work on hundreds of smallholder farms through a full season of extreme drought: one plot treated, one left as the farmer's own control, side by side. This is not a replicated research trial and we do not present it as one. It is a different and complementary kind of evidence, which is what happens when the same program is run at scale by ordinary growers under hard conditions.

~300

Farms in a single season's on-farm program.

94%

Win rate: farms where treated out-yielded the farmer's own untreated plot.

35 to 45

Days of extreme drought across the season.

6

Staple crops: maize, rice, soybean, cowpea, groundnut, millet.

CROP	YIELD GAIN VS CONTROL	WIN RATE
Maize	+7 to +85%	72 to 100%
Rice	+28 to +75%	83 to 85%
Soybean	+24 to +65%	100%
Cowpea	+39 to +64%	100%

Photographs from this on-farm program are held on file and are not reproduced here. The figures above are the record; the pictures added nothing to them.

How to read this. Win rate is the share of farms where the Symm-treated plot out-yielded the farmer's own untreated plot. These are smallholder, rain-fed farms under severe drought, where baseline yields are low and the resilience benefit is largest, so percentage gains run high. **Do not read these percentages across to an irrigated commercial operation.** The signal that matters is how consistently treated beat untreated, farm after farm.

Peer-reviewed, and independent of us

Symm's two parts rest on decades of independent, peer-reviewed research into the two classes of microbes at their core, from Cornell University and other leading institutions. None of this work was commissioned by us or by our suppliers, which is precisely why it is worth citing.

Trichoderma harzianum · the resilience science

REFERENCE	WHAT IT ESTABLISHES
Harman, Howell, Viterbo, Chet & Lorito Nature Reviews Microbiology, 2004	The landmark review establishing <i>T. harzianum</i> as a partner to the plant that improves root colonization, stress tolerance and nutrient-use efficiency across both monocots and dicots.
Mastouri, Björkman & Harman Phytopathology, vol. 100, 2010	A low-cost seed treatment confers measurable tolerance to drought and heat in germinating seed and seedlings.
Mastouri, Björkman & Harman Molecular Plant-Microbe Interactions, 2012	Molecular evidence that <i>T. harzianum</i> maintains plant redox balance under water deficit, at or above the level of unstressed plants.
Harman Phytoparasitica, vol. 39, 2011	Yield gains and improved nutrient-use efficiency across crops.

Bacillus · the nutrition science

AREA	WHAT THE LITERATURE ESTABLISHES
Phosphate and micronutrient solubilization	Independent peer-reviewed work on how <i>Bacillus</i> species free soil-bound phosphorus and micronutrients for plant uptake.
Plant-growth promotion	Reviews of <i>B. subtilis</i> and <i>B. amyloliquefaciens</i> as growth promoters and biofertilizer organisms.
Stress resilience	<i>Bacillus</i> as plant probiotics supporting growth and resilience in adverse conditions.

Independent of any commercial supplier. Full citations available on request. Where our own trial data and the independent literature disagree, we will tell you.



SYMBIOTIC MICROBES

THE TAKEAWAY

Resilience you can measure

One two-part biological program, sold and applied together. A typical **5 to 10%** yield gain that widens as the season turns hard, stronger nutrient uptake and use, and measurable quality gains, across every crop we have measured and backed by independent peer-reviewed science.

5 to 10%

Typical yield gain against untreated, more under stress.

~70%

Of side-by-side comparisons out-yield untreated.

94%

Win rate across ~300 farms in a season of extreme drought.

What we have not measured. We hold no replicated trial data on tree crops or berries. If you grow those, the mechanism gives good reason to expect a benefit, but nobody has yet measured it on your crop. We would rather tell you that and put your field in the record than sell you a projection.

CHEMICAL-FREE

PESTICIDE-FREE

NON-GMO

Yield. Resilience. Efficiency.

Symm is a single two-part program, sold and applied together. Results are from replicated field trials, in-house and container trials, on-farm programs and independent peer-reviewed research, labeled throughout. Individual farm results vary with soil, season and management. Nothing here is a guarantee for a given field.

Source Technologies LLC · 149 Franklin St, Floor 4, New York, NY 10013 · symmbiotic.com · info@symmbiotic.com · (845) 393-9539
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