NewLeaf symbiotics

New Bioinsecticide and Biofungicide with PPFM Microbial Technology

IR-4 Industry Technology Session
– February 20, 2025

NewLeaf Symbiotics: EPA Registered Products

TS201 ™ – Bioinsecticide

Methylorubrum extorquens strain NLS0042

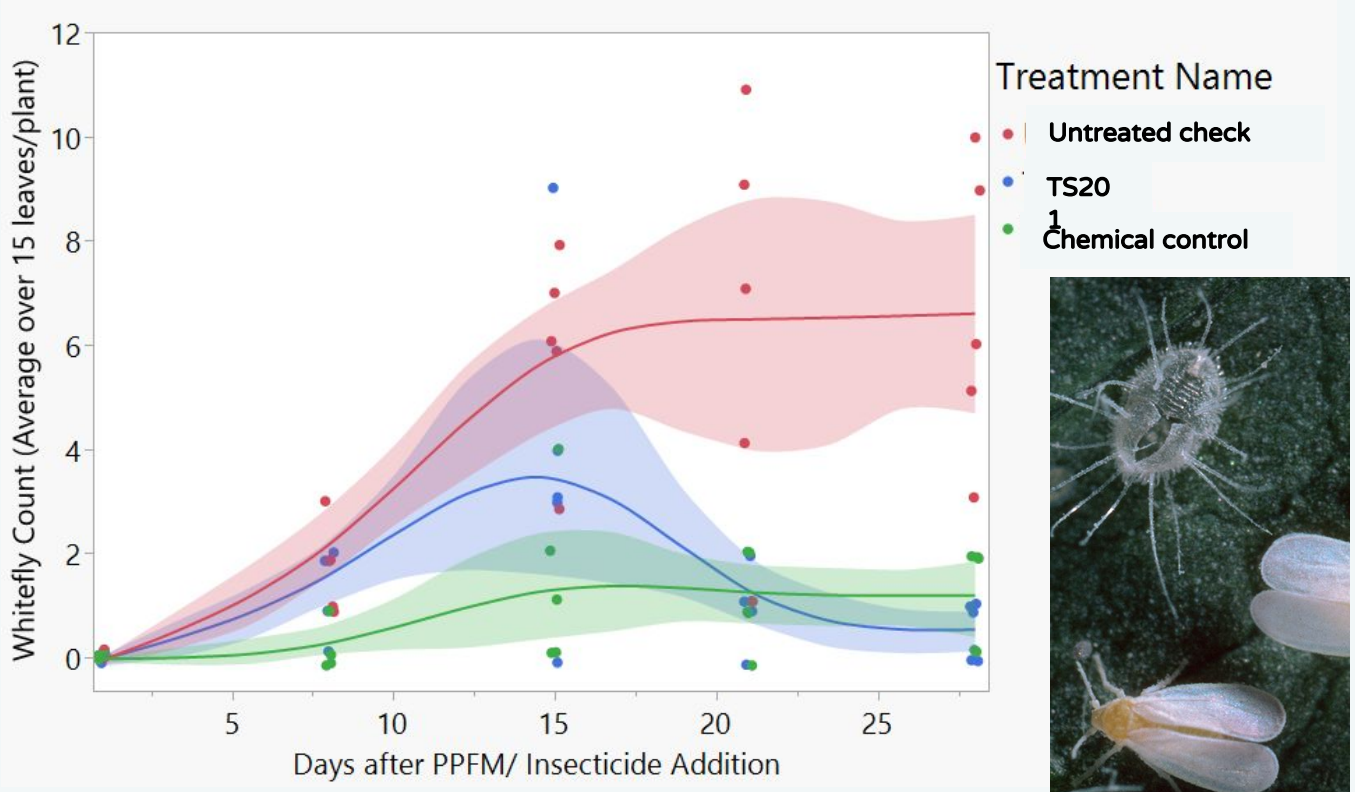
- Available as a planter box treatment on corn for corn rootworm in 2025 with four partners: Meristem Crop Performance, AMVAC, NewFields Ag and AgroTech
- Mode of action: Induced Systemic Resistance (ISR)
- 2025 focus: Field work to support label expansion

TS601 ™ – Biofungicide

Methylorubrum populi strain NLS0089

- Launch planned for 2026
- Mode of action: ISR
- 2025 focus: Field work on a wide range of pathosystems to support product positioning

TS201 Reduces Whitefly on Tomato



Treatment	Plant vigor	Whitefly counts*	Means separation
UTC	7	117.7	a
Chemical control	8	22.5	b
TS201	8	43.1	b

ANOVA p = 0.0001, α=0.05, *reported value for white fly counts: AUC = area under the curve

Trial Type	Greenhouse
# reps	5
Application	Foliar drench
Location	Oregon City, OR
Environment	Insect pressure through trap crop
Assessment	Microscope counts of whiteflies on 15 leaves per plant at each timepoint, n = 900 leaves total

Conclusions

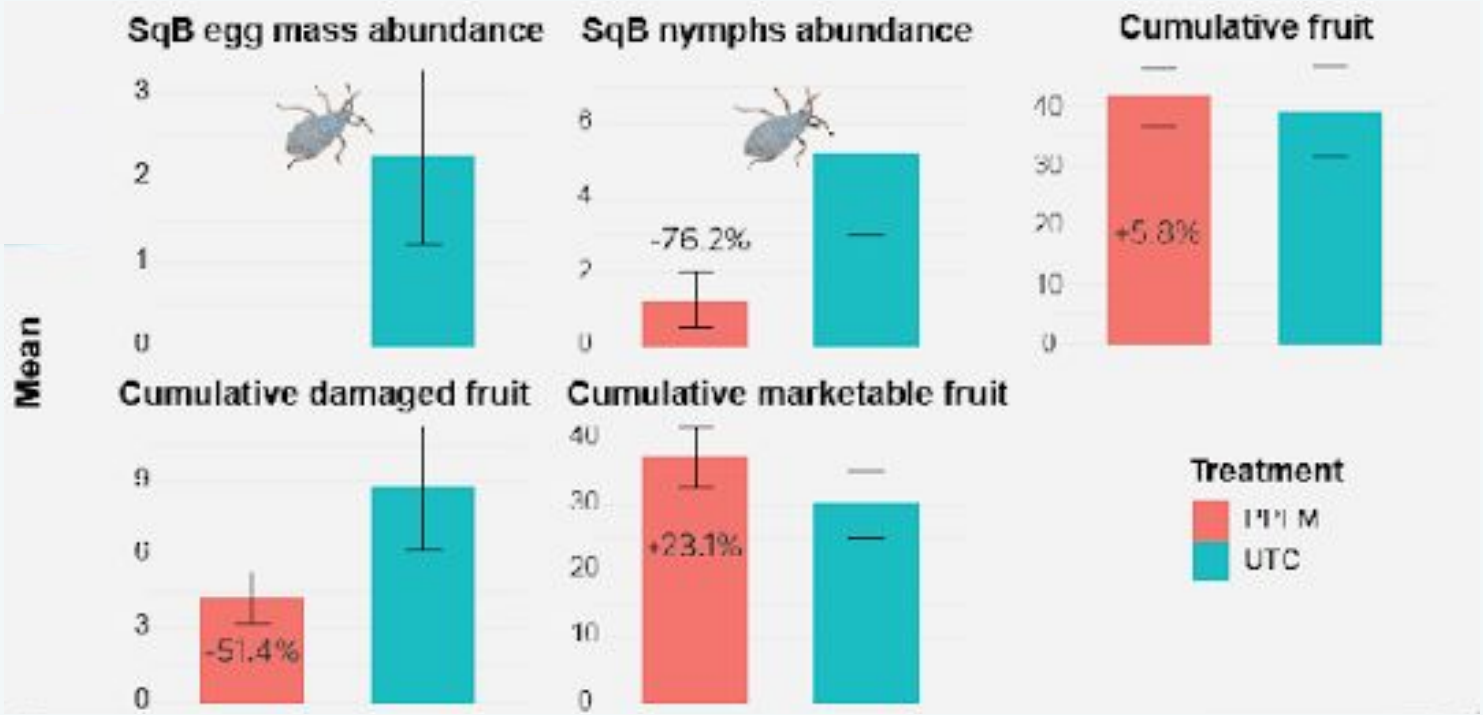
- TS201 shows a statistically significant reduction in adult whitefly presence on tomato with a single application at planting, on par with synthetic chemical control
- TS201 shows a statistically significant increase in plant vigor on a visual rating scale, again on par with synthetic chemical control

TS201 Reduces Squash Bugs on Squash

Aigner, B, Phillips, A, Jack, A, Kuhar, T (2024) Pretty (dead?) in pink: Testing a novel pink pigmented facultative methylotroph as a bioinsecticide. Poster at Entomological Society of America meeting

Anasa tristis

Trial Type	Field
# reps	4
Application	Foliar drench
Location	Whitethorne, VA
Environment	Environmental insect pressure
Assessment	Egg counts, juvenile counts, cumulative fruit, damaged and marketable



Conclusions

- No egg masses observed on TS201 treated plants, research team remarked that this is highly unusual "clean as a whistle"
- Fewer nymphs observed
- Moderate trend in increased fruit, substantially fewer damaged fruit and higher marketable fruit
- This pest has 2-3 generations per season

TS201 Reduces Root Knot Nematode (RKN) in Tomato

Trial Type	Greenhouse
# reps	10
Application	Drench at seeding
Location	Auburn, AL
Environment	Inoculated nematode pressure

Conclusions

- TS201 shows a trend towards reduction in the number of root knot nematodes per g root tissue and a positive trend in root biomass in tomato

> 70% better | > 10% better | neutral
> 50% better | > 5% better | worse

Treatment	Nematode	RKN (# per g root)	vs. UTC + RKN control (%)	Root Biomass (g)	vs. UTC + RKN control (%)
UTC	None	**0.0****	-100%	16.5	10%
UTC	RKN	26.7		15.1	
TS201		19.6	-27%	15.5	+3%
Commercial Bioinsecticide		31.4	+18%	**11.0***	-27%

* Statistically significant at p<0.10, ** statistically significant at p <0.05 compared to UTC + RKN control treatment

TS601 Significantly Reduced Disease in All Specialty and Row Crop Greenhouse Assays

Decrease in disease with application of TS601 compared to control			
	Disease Severity		
Crop	Mid-Assay Rating (%)	Final Rating (%)	AUDPC (%)
Tomatoes/ *Pythium aphanidermatum*	41**	38**	49**
Tomatoes/ *Fusarium oxysporum*	50	59**	79**
Cucumbers/ *Rhizoctonia solani*	57**	61**	59**
Cucumbers/ *Phytophthora capsici*	35	55**	50**
Lettuce/ *Sclerotinia*	79	70**	65
Strawberries/ *Botrytis*	90**	58**	74**
Potatoes/ *Phytophthora infestans* [1]	60*	49*	48*
Cotton/ *Pythium sp.*	53**	72**	70**
Cotton/ *Fusarium*	47**	59**	54**
Soybean/ *Sclerotinia*	48**	51**	55**
Soybean/ *Rhizoctonia solani*	51**	48**	64**
Average	61	54	61

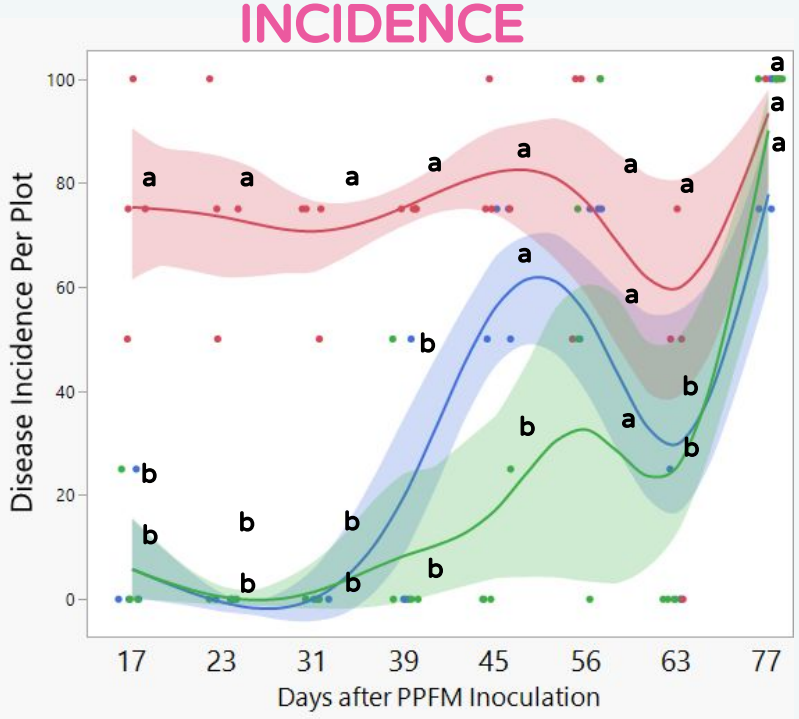
TS601 disease reduction vs. control

- > 70% better
- > 50% better
- > 25% better
- neutral
- worse

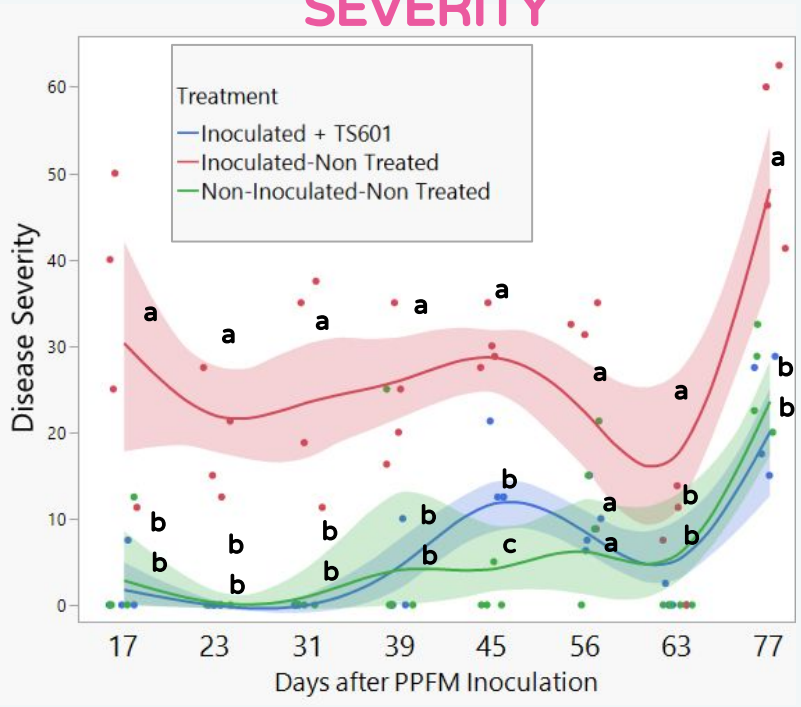
Asterix indicates a statistically significant reduction, LSD * $p < 0.10$, ** $p < 0.05$
All data from inoculated greenhouse assays except for [1] treated in field, detached leaf assay
AUDPC = Area Under the Disease Progress Curve

TS601 Delays Incidence and Significantly Reduces Botrytis Severity on Strawberries

INCIDENCE



SEVERITY

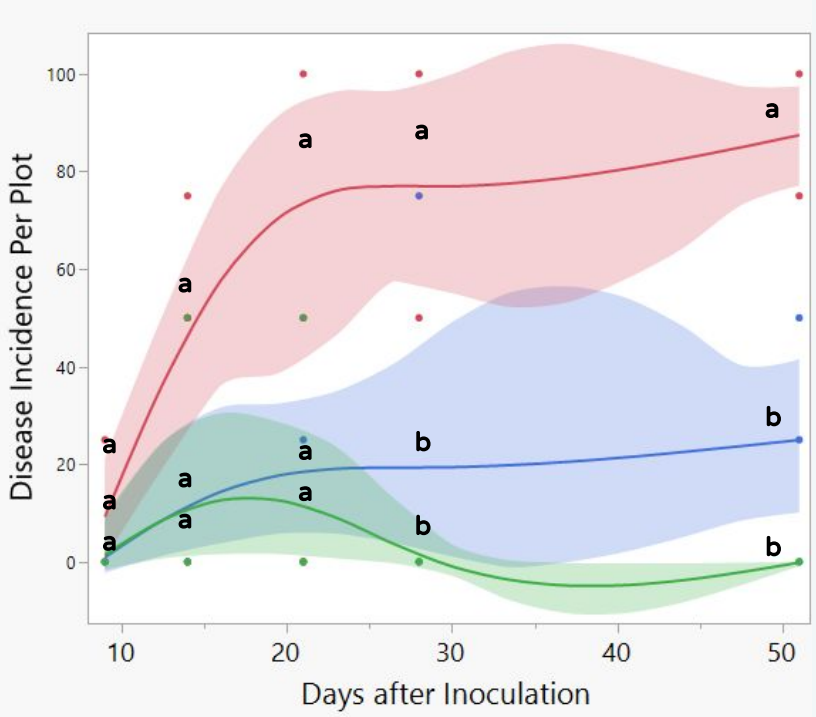


Treatment	AUDPC	% diff from inoculated control
Non-Inoculated Control	5.78 b	-77.7%
Inoculated Control	25.9 a	N/A
Inoculum + TS601	6.61 b	-74.5%

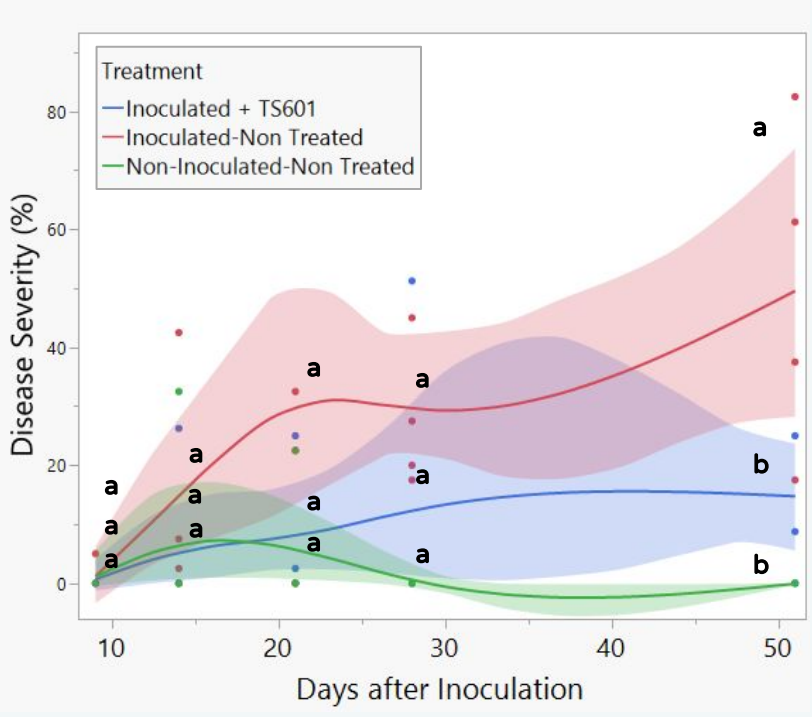
75% reduction in AUDPC

TS601 Reduces Incidence and Significantly Reduces Sclerotinia Severity on Lettuce

INCIDENCE



SEVERITY



Treatment	AUDPC	% diff from inoculated control
Non-Inoculated Control	2.23 a	-92.4%
Inoculated Control	29.37 a	N/A
Inoculum + TS601	10.19 a	-65.3%

65% reduction in AUDPC

2025 Field Work with TS201 Bioinsecticide and TS601 Biofungicide

NewLeaf's internal research focus:

- Field technical development in row and specialty crops
- Can multiple applications improve performance?
- Best fit within an IPM program
- Most effective combinations with other technologies, chemical and biological
  - Minimal re-entry interval (REI): 4 hrs
  - No pre-harvest interval (PHI)

Our PPFMs Affect Plant Health and Performance Through Multiple Mechanisms

PPFM MOAs

Nutrient Acquisition
More macro and micronutrient uptake

Biostimulant
Improved emergence and stand establishment.
Increased crop yield

PGR
Improved drought tolerance.
Tolerance to soil extremes.
Reduced nutrient requirements.

Nitrogen Utilization
Improved nitrogen use efficiency (i.e., more yield per unit of Nitrogen.)
Improves the performance of actual nitrogen fixers

Biocontrol
ISR induced insecticide, fungicide, nematicide