# Evaluation of variety tolerance and chemical control of Fusarium vine decline

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In collaboration with Ag Seeds and TS & L

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Fusarium wilt

***Fusarium falciforme***
**vine decline**

## Fusarium wilt

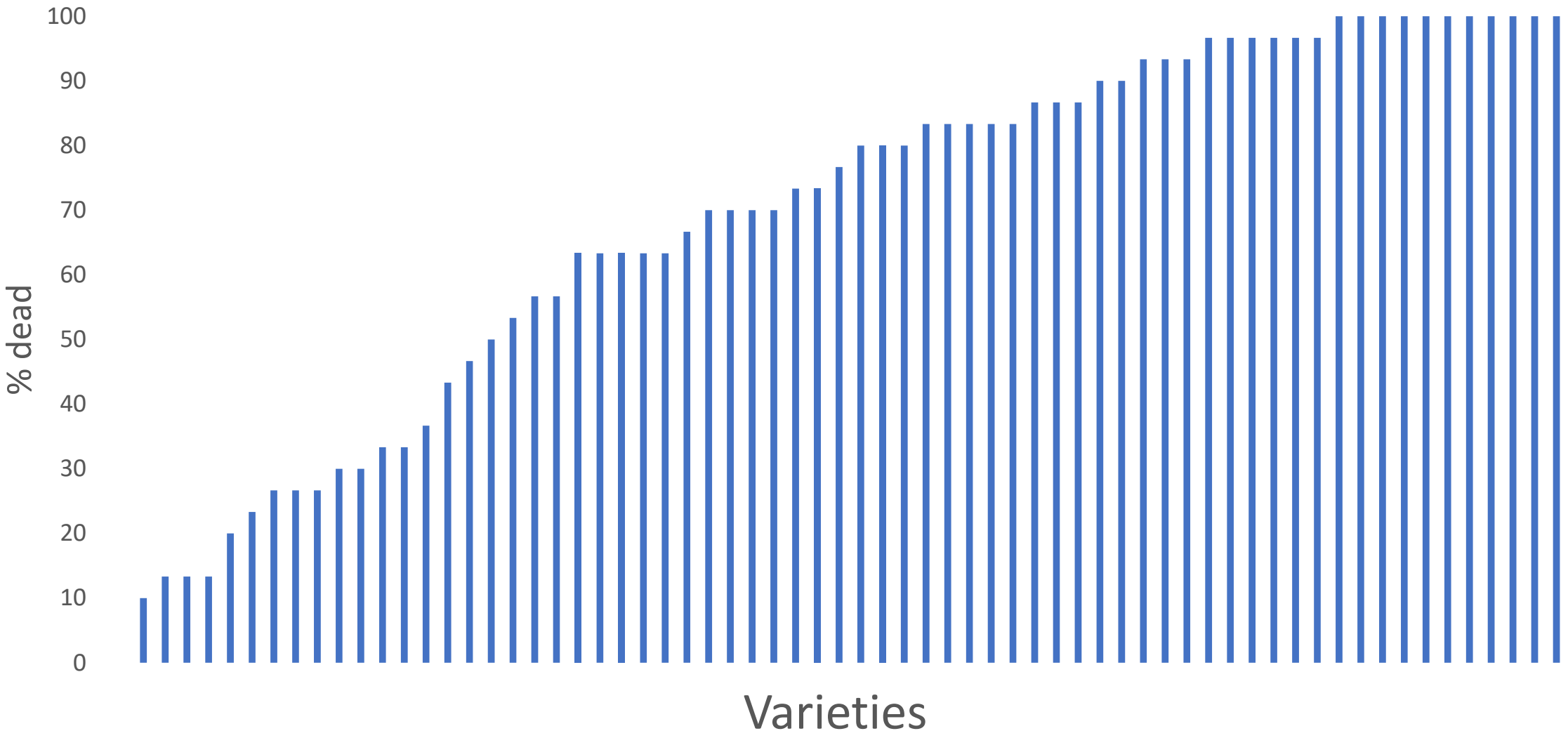
## Fusarium crown and root rot

## *Fusarium falciforme* stem rot and vine decline

Cassandra Swett


N 6428
Cassandra Swett


Cassandra Swett



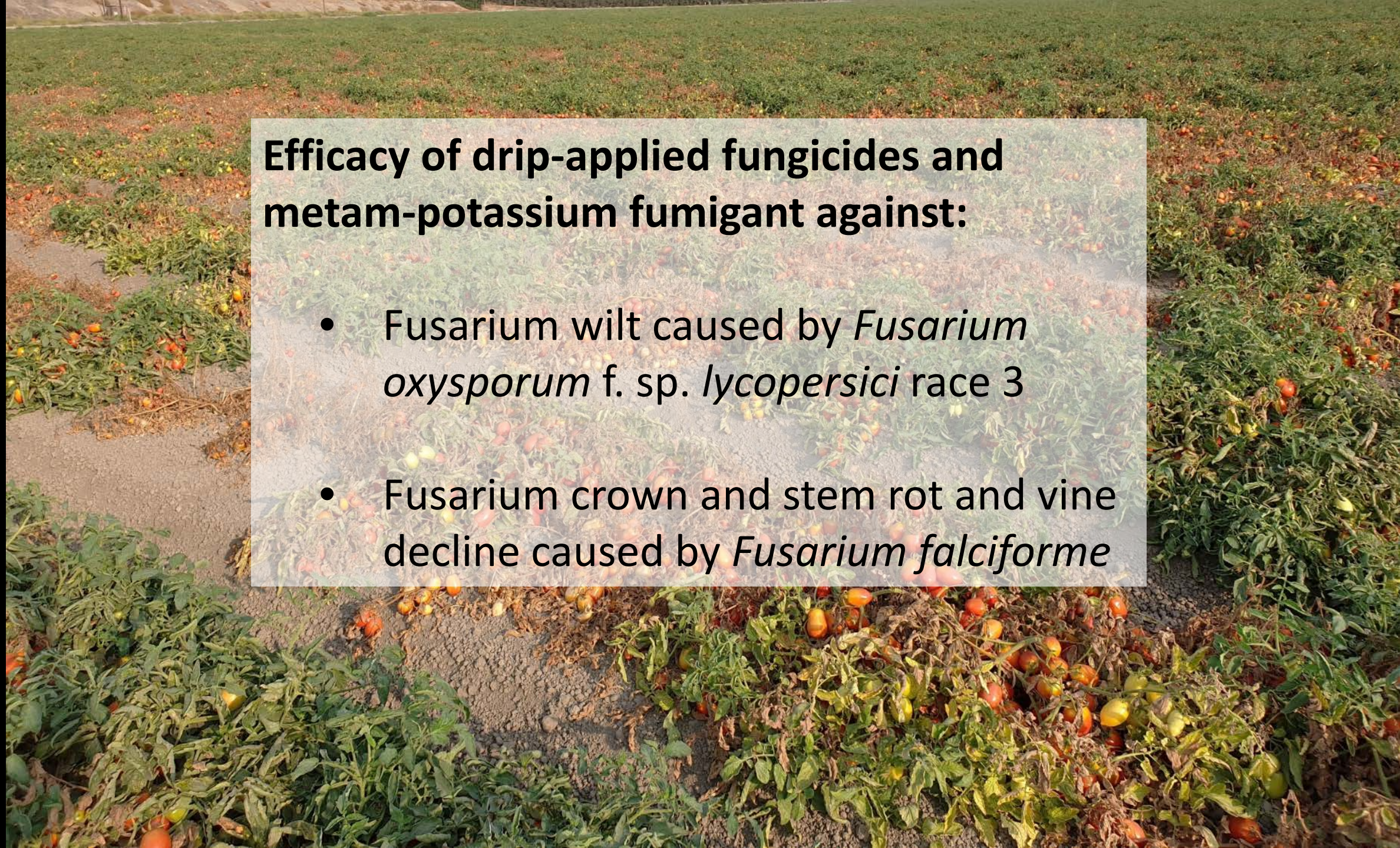

TS&L variety trial in a commercial field, Yolo County 2022

| Cultivar | # of field trials | Normalized yield[x] | Normalized fruit damage levels[y] | Fruit damage average to very low | Normalized vine decline at harvest[z] | Tendency towards vine decline |
|---|---|---|---|---|---|---|
| **HIGH PERFORMING** | | | | | | |
| H1776 | 3 | 1.26 | 0.54 | very low fruit damage | 0.96 | average tendency towards vine decline |
| SVTM9016 | 3 | 1.16 | 0.52 | very low fruit damage | 0.82 | more data needed |
| SVTM9019 | 2 | 1.15 | 0.61 | very low fruit damage | 0.54 | more data needed |
| N6428 | 7 | 1.13 | 0.65 | low fruit damage | 0.87 | less likely to decline prematurely |
| SVTM9025 | 3 | 1.13 | 0.39 | very low fruit damage | 0.95 | more data needed |
| H5608 | 4 | 1.10 | 0.77 | low fruit damage | 0.44 | more data needed |
| N6434 | 3 | 1.05 | 0.73 | low fruit damage | 0.38 | more data needed |
| HM58841 | 5 | 1.05 | 0.86 | low fruit damage | 1.04 | average tendency towards vine decline |
| **MEDIUM PERFORMING** | | | | | | |
| BQ273 | 2 | 1.04 | 1.65 | | 0.24 | more data needed |
| H1428 | 3 | 1.00 | 0.81 | low fruit damage | 0.89 | more data needed |
| HM5235 | 4 | 1.00 | 1.39 | | 0.90 | less likely to decline prematurely |
| H1996 | 2 | 0.96 | 0.57 | very low fruit damage | 1.50 | more data needed |
| BQ403 | 2 | 0.95 | 1.30 | | 1.06 | more data needed |
| H4707 | 2 | 0.90 | 0.56 | very low fruit damage | 0.95 | more data needed |
| H1662 | 2 | 0.88 | 0.43 | very low fruit damage | 0.98 | more data needed |
| **LOW PERFORMING** | | | | | | |
| HM5522 | 2 | 1.04 | 1.63 | | 1.23 | more data needed |
| HM3887 | 7 | 0.88 | 1.35 | | 1.33 | more likely to decline prematurely |
| N6416 | 2 | 0.77 | 1.30 | | 1.30 | more likely to decline prematurely |

# Top performers under *F. falciforme* pressure

- N 6428
- H 5608, H 1776
- SVTM 9016, SVTM 9019, SVTM 9025
- HM 58841, HM5235

- Trials on-going



**Efficacy of drip-applied fungicides and metam-potassium fumigant against:**

- Fusarium wilt caused by *Fusarium oxysporum* f. sp. *lycopersici* race 3
- Fusarium crown and stem rot and vine decline caused by *Fusarium falciforme*

# Study sites

2019

- UC Davis field infested with Fusarium wilt
- UC Davis field infested with Fusarium falciforme
- Yolo Co. commercial field with Fusarium falciforme
- San Joaquin Co. commercial field with both diseases

2020 & 2021

- San Joaquin Co. commercial field with both diseases

# Materials evaluated:

**Fungicides** (applied at planting and early season):

- **Miravis** (Syngenta) – pydiflumetofen (FRAC group 7)
- **Velum** (Bayer) – fluopyram (7)
- **Rhyme** (FMC) – flutriafol (3)

**Fumigant** (applied at least two weeks prior to planting):

- **K-Pam (AMVAC)** – metam potassium

# Application timings

| application timing(s) relative to transplant date | >2 weeks pre-plant | At transplanting | 2 to 4 wk | 4 to 6 wk |
|---|---|---|---|---|
| **Product (active ingredient)** | | | | |
| **Velum One (fluopyram)** | | drench | drip | drip |
| **Rhyme (flutriafol)** | | drench | drip | drip |
| **Miravis (pydiflumetofen)** | | drench | drip | drip |
| **K-Pam (metam potassium)** | drip | | | |

| | Fusarium incidence (%) | | | Marketable yield | | Fruit biomass | |
|---|---|---|---|---|---|---|---|
| Treatment | 6-Jul | 13-Aug | | (tons/acre) | | (tons/acre) | |
| K-Pam 31 gal | 1.8 | 15.8 | e | 53.5 | a | 58.7 | a |
| K-Pam 31 gal + AMV6125 at planting | 3.0 | 18.8 | de | 48.6 | ab | 56.8 | a |
| K-Pam 15.5 gal | 3.0 | 23.0 | cd | 41.2 | abc | 49.9 | ab |
| Rhyme 7 oz at 0, 4 & 6 wks | 6.0 | 23.8 | bcd | 41.1 | abc | 47.8 | ab |
| K-Pam 15.5 gal + AMV6125 at planting | 3.3 | 21.5 | cde | 40.5 | bc | 48.2 | ab |
| AMV6125 at planting | 5.8 | 34.0 | a | 36.8 | bcd | 43.2 | bc |
| Miravis 13.7 oz at 0, 2 & 4 weeks | 3.5 | 27.5 | abc | 36.8 | bcd | 44.6 | bc |
| Rhyme 7 oz at 0, 2 & 4 weeks | 6.5 | 28.5 | abc | 34.0 | cd | 40.0 | bc |
| Non-treated control | 4.3 | 30.3 | ab | 27.6 | d | 34.1 | c |
| | | | | | | | |
| Mean | 4.1 | 24.8 | | 40.0 | | 47.0 | |
| LSD | NS | 7.03 | | 12.69 | | 12.09 | |
| | | | | | | | |
| P-value | *NS* | *0.0004* | | *0.015* | | *0.008* | |
| CV % | *54.9* | *19.4* | | *21.7* | | *17.6* | |

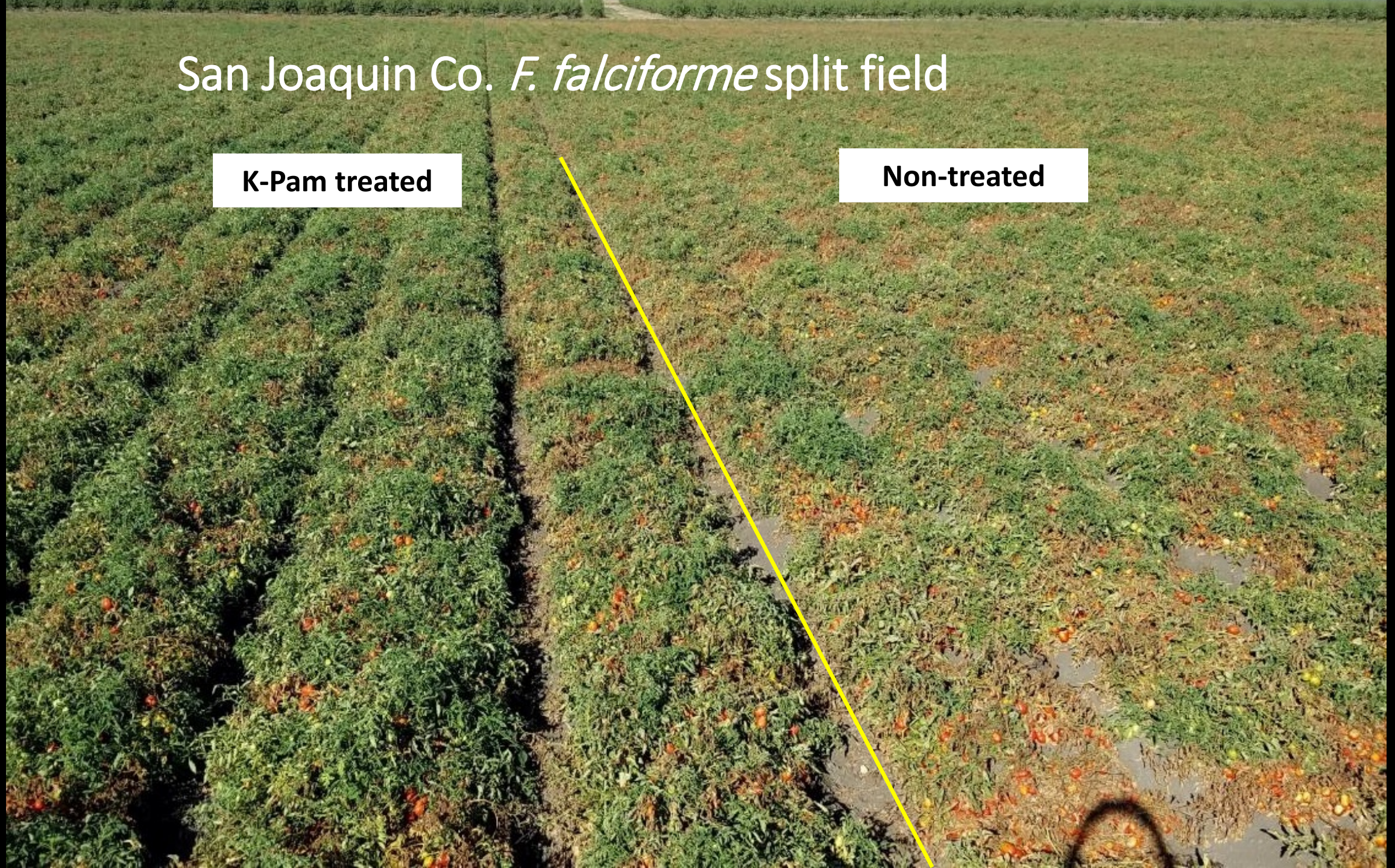
Means in the same column with the same letter are not significantly different.

San Joaquin County trial, 2021

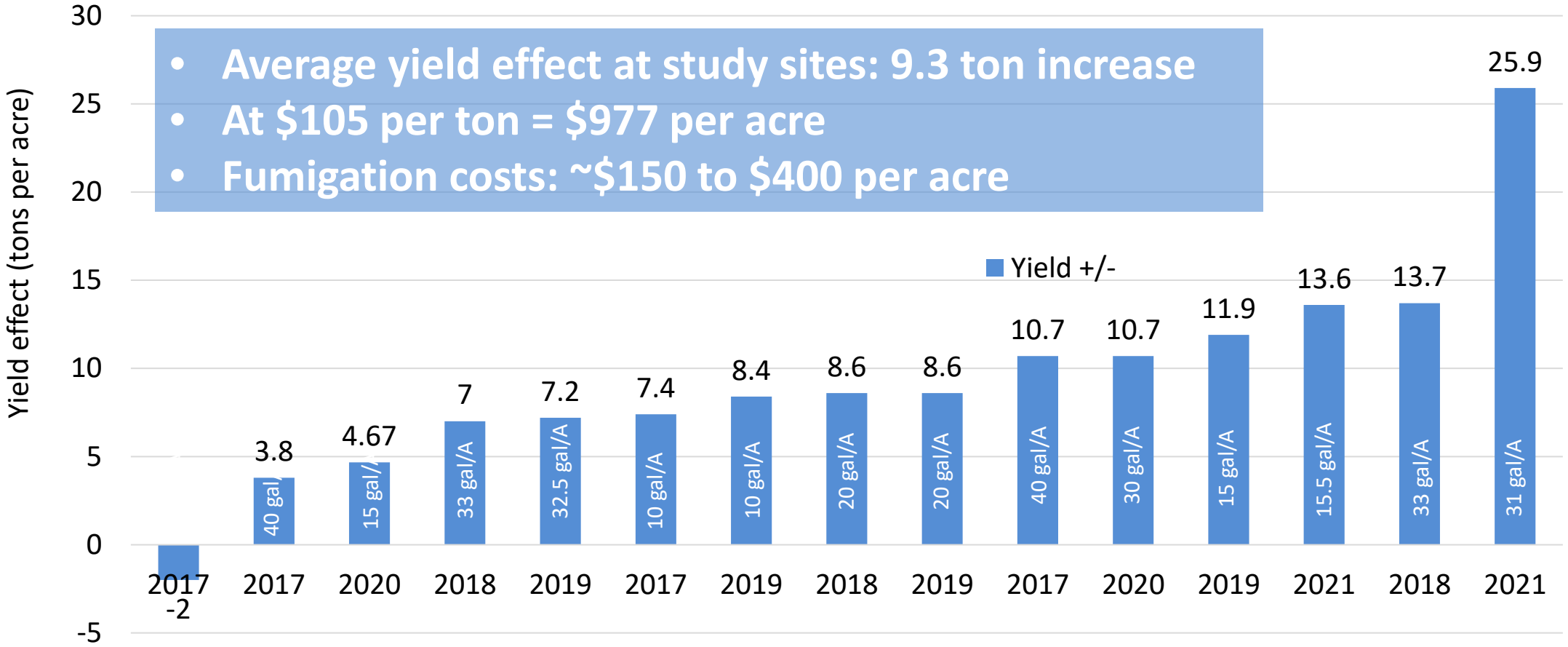
# Summary of seven field trials including fungicides and/or fumigants

| year | 2019 | 2019 | 2019 | 2019 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|
| location | UC Davis | UC Davis | Yolo Co | San Joaquin | San Joaquin | San Joaquin | San Joaquin |
| disease(s) | Fol | Ff | Ff | Fol | Ff | Fol & Ff | Fol & Ff |
| **Product** | | | | | | | |
| K-Pam ~30 gal | ++ | NT | NT | ++ | + 7.2 t/a | + | + 26 t/a |
| K-Pam ~15 gal | - | NT | + 11.9 t/a | NT | NT | + | + 13.6 t/a |
| Miravis | ++ | + | NT | ++ | NT | + | + 9.2 t/a |
| Rhyme | - | NT | NT | - | NT | + | + 10 t/a |
| Velum | - | + | NT | - | NT | - | NT |
| Disease level in non-treated control | 68% vine decline | 47% rot | 73% rot | 37% vine decline | 20% vine decline | 31% vine decline | 30% vine decline |
| Disease *P value* | P < 0.05 | NS | NS | 0.01 | not tested | 0.06 | 0.0004 |
| Yield *P value* | NS | NS | 0.01 | NS | 0.016 | NS | 0.015 |

NT = not tested " + " = weak (statistically speaking) positive effect " ++ " and green shading = statistically significant positive effect, NS = not significant


San Joaquin Co. *F. falciforme* split field
K-Pam treated
Non-treated

# Effect of metam drip fumigation on processing tomato yield in trials 2017 to 2021




2017 -2018 data from
Marja Koivunen, AMVAC

Rates are expressed as broadcast equivalents,
Yield difference is expressed in comparison to non-treated control in Tons/A

# Variety selection and chemical control

We don’t have resistance to the new Fusarium vine decline, but there are varieties that are more tolerant

Chemical control is not highly effective, but combined with other measures it can often be useful

# Acknowledgements


California Tomato Research Institute

Ag Seeds and TS & L

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Amber Vinchesi-Vahl, UCCE Colusa & Sutter/Yuba counties

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Del Carlo Farms, R & J Sanguinetti Ranch, Coit Farms, Dresick Farms

Bill Vignolo, Simplot Stockton

AMVAC, Syngenta, Bayer and FMC



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