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Webinar for Tomatoes NZ · Juliane Braun, Delphy

Thrips control in greenhouse vegetables

Why thrips are so hard to beat

1 Behaviour

Hide in flowers, growing points and folded leaves – where sprays hardly reach

2 Speed

Warm greenhouse: a new generation in about 2–3 weeks

3 Shelter

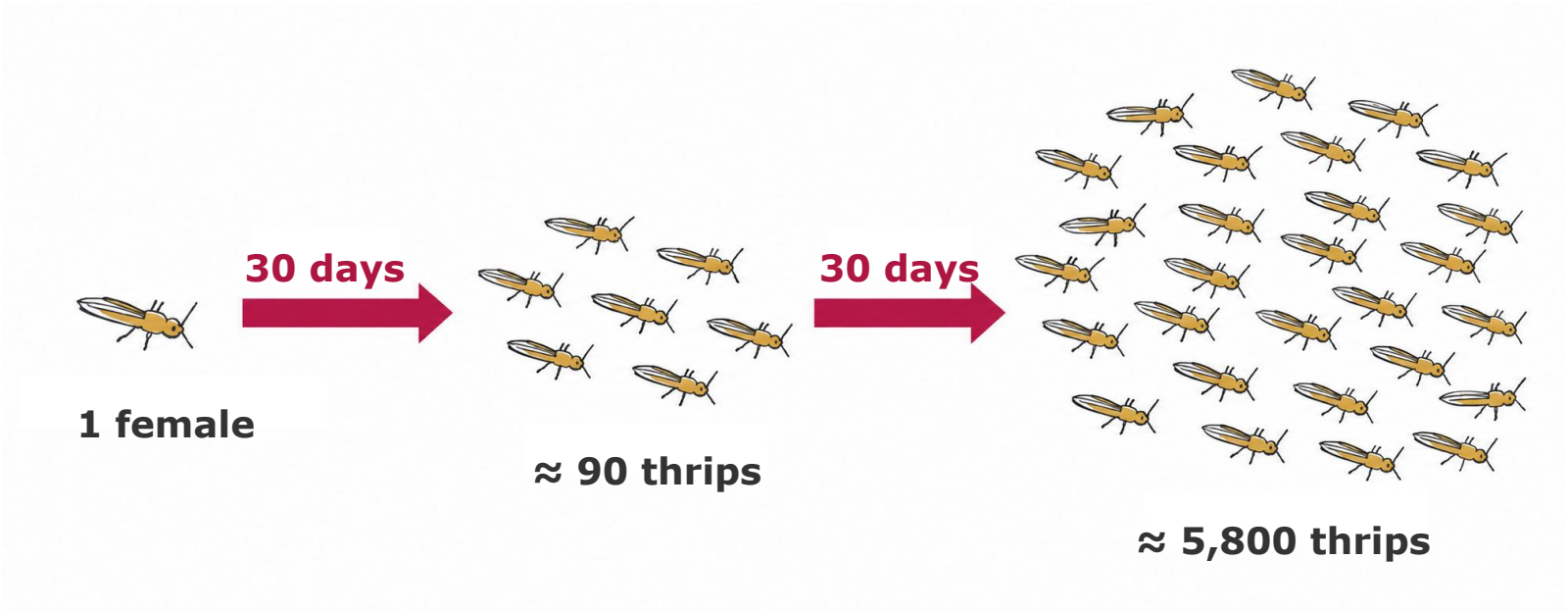
Eggs inside the plant tissue, pupae in soil and debris – out of spray reach

4 Resistance

Few actives, used again and again – resistance builds up fast

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One female – 5,800 thrips



Every thrips you remove early saves you thousands later

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Three species – one problem



Western flower thrips
Frankliniella occidentalis

Flowers and leaves · highly resistant · TSWV vector



Flower thrips
Frankliniella intonsa

Mostly in flowers · females dark, males light · strong in spring · TSWV vector



Onion thrips
Thrips tabaci

More on leaves than in flowers · strong in spring · TSWV vector

Photos: M. Ulitzka, thrips-id.com

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Thrips parvispinus

- It is highly polyphagous, more than 100 plant species are reported (sweet pepper/chilli, eggplant, cucumber, tomato, papaya, ornamentals and several fruit crops).



Female adult, 1 mm



Male adult, 0,6 mm

Good to know: highly cold-sensitive, cannot survive more then 24 hours without leaf tissue, no currently considered a TSWV vector

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Damage

Secondary problems: Feeding wounds can be entry points for *Cladosporium*

Females found in flowers



Heavy feeding injury



Growing points and young leaves



Males are often on leaf underside



Confusion: broad-mite-like distortion

References: https://www.e-nema.de/

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Lifecycle – Thrips parvispinus

- Females lay eggs—up to 15 eggs during their lifetime
- Eggs are inserting into leaves, petioles, bracts, petals, developing fruits.
- **eggs do not hatch at 12 °C**
- pupation happens in soil at an average depth of about 2.5 cm.
- **Larvae mostly found on leaves**
- **Adults on leaves and female adults also in flowers**

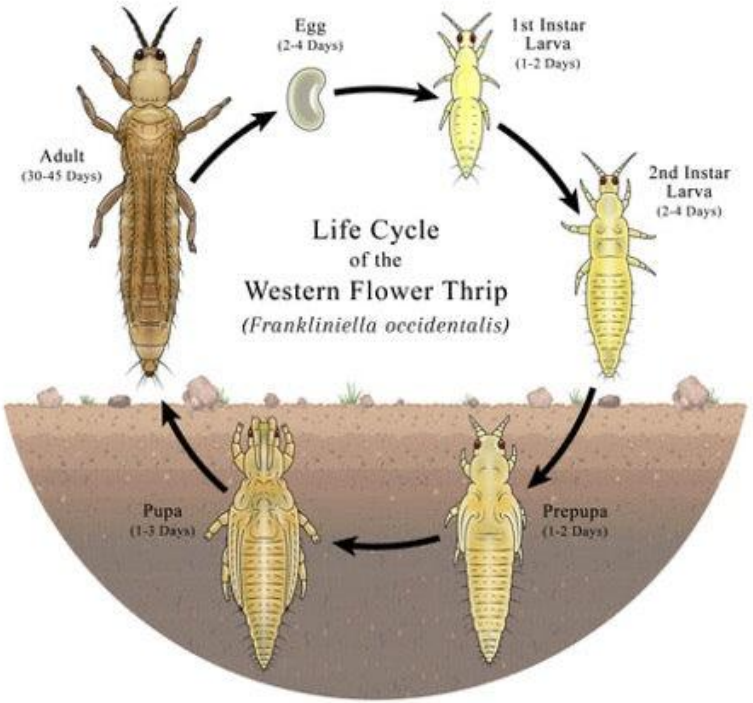
- can develop and reproduce between **17°C and 32°C**
- **Complete lifecycle in 15–17 days** (27 ± 1 °C, 65% ± 5%)
- over 20 generations/year, various life stages can overlap
- cause serious damage in a short period of time

- **It`s highly cold-sensitive:** exposure to 5, 10 and 15°C raises mortality significantly, with 100% mortality after 5 days at 5°C
- It tolerates short exposures to around 10°C well
- **cannot survive more than 24 h without leaf tissue**

- **No currently considered a TSWV vector**

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Where sprays hit – and miss



✗ **Eggs**
Inside plant tissue – not reached

✓ **Larvae**
On leaves and in flowers – main target

~ **Prepupae & pupae**
In soil and debris – only hygiene helps

~ **Adults**
Fly and hide – partly reached

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When the adults are flying?

Weak flyers, wind dispersal (leaf to leaf or to the next plant)

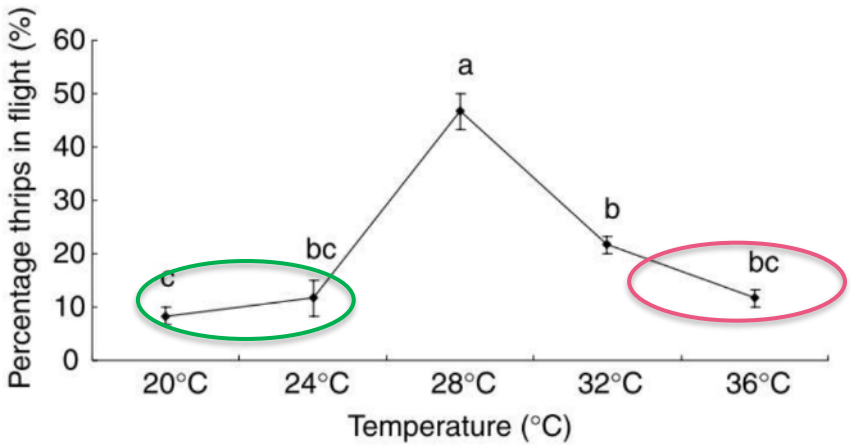


Fig. 6 The effect of temperature on the flight activity of *Frankliniella occidentalis* under 70% RH, 4 000 lux conditions. The percentage of thrips in flight is expressed as a ratio of flying thrips out of the total number (20 thrips = 100%). Each point represents the mean ± SE ($n = 3$). Data with different letters are significantly different by ANOVA and Tukey's test ($P \leq 0.05$).

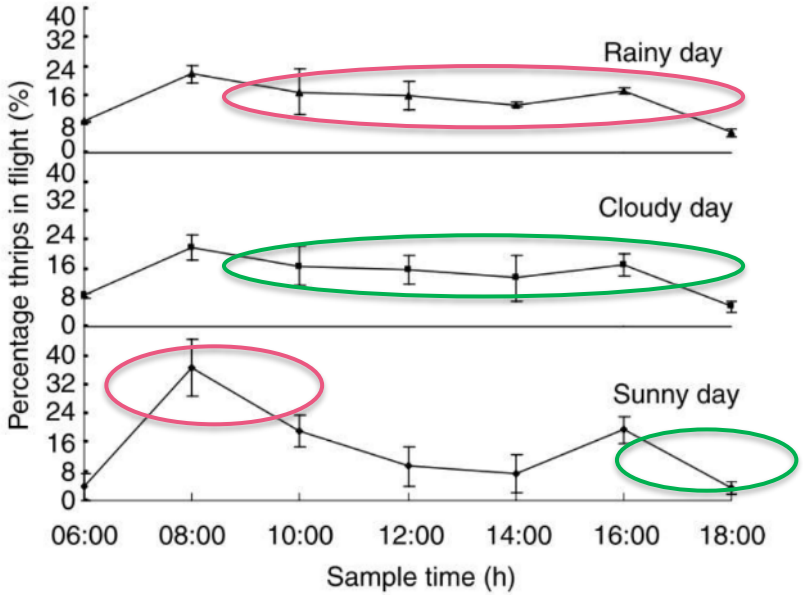


Fig. 2 Effect of weather on the flight activity of *Frankliniella occidentalis*. Each point represents the mean ± SE ($n = 3$) of the percentage of thrips in flight relative to the total thrips counted on all cards on each day.

Reference: Liang et al. 2010

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The strategy on one page

Chemistry alone won't solve your problem

1	2	3	4	5
End clean	**Start clean**	**Monitor & trap**	**Spray right & rotate**	**Insect nets**
Crop change: nothing alive leaves the old crop	Clean plants, clean floor, no weeds	Weekly scouting, mass trapping	Coverage, timing, one group per generation	Keep them out

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End clean – start clean

End clean – at crop change

1 Last effective spray before removal – crop, floor, structure

2 Remove all plants, leaves, fruit, weeds – closed containers

3 Clean or replace floor plastic – pupae sit in debris

4 Keep the house empty, closed and warm – until traps stay empty

5 Clean & disinfect structure, gutters, irrigation (TSWV, diseases)

Start clean

1 Inspect young plants, remove any plants that looks abnormal straight away

2 Ask for the propagator's spray record

3 Quarantine new plants where possible

4 Floor fully covered, no weeds inside and around

5 Traps up before planting

6 Start first spray 5 days after planting, …

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End clean

- Effective sanitation involves both 1) cleaning and 2) disinfection, in that order.
- Cleaning: physically removing of organic matter, visible soiling from surfaces
- Disinfection: Virkon S 1%, Jet 5 2%, Menno Florades 2%
- Irrigation system: hydrogen peroxide-based products (Huwa-San), 1% nitric acid
- No ornamental plants in the greenhouse or offices – they can be host plants



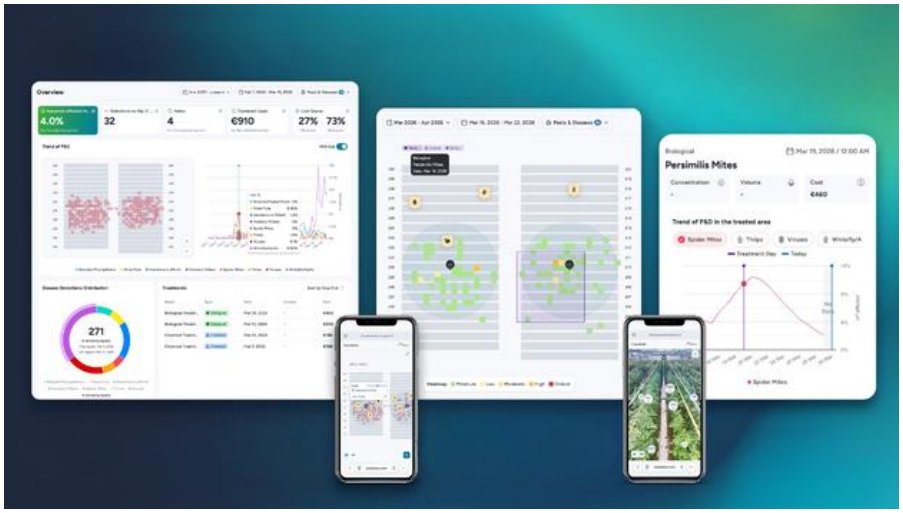




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Monitor and mass-trap

- Scout weekly with a 10–30× hand lens, (autonomous) scouting systems
- Check growing points, young and folded leaves, leaf undersides – not just flowers
- Count ~25 traps per ha every week
- traps = early warning, plants = decision



800–1,000

yellow sticky traps per ha for mass trapping



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Spray right

- Start first spray 5 days after planting, then 10 days and 15 days after planting
- Whole crop, every path – extra care at the greenhouse foot
- 6–8 bar, new nozzles at crop start, enough water volume
- Rainwater; spray solution pH 5.5–6
- Repeat after 5–7 days to hit newly hatched larvae

- sugar as attractant for thrips (Attracker 100-200 ml/100l; Biosweet; white/brown sugar 0,24 g/100 ml) → combination of sucrose, dextrose and fructose is the best option
- wetting agent for better distribution over the plant
- adding oil (test crop safety first) acts as an adhesive and helps the plants to absorb the active ingredient.

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Your toolbox by mode of action

IRAC	Active (product)	Note
5	spinosad (Entrust), spinetoram (Sparta)	Strongest – one block only, used off-label
6	abamectin (Avid; also in Tripsol, Solvigo)	Larvae + adults
28	cyantraniliprole (Benevia, Exirel)	Used off-label
4A/4C	imidacloprid (Confidor), thiamethoxam (in Solvigo), sulfoxaflor (Transform)	Weaker on thrips – count as one group, kills beneficials for weeks
15	lufenuron (Match)	Growth regulator – larvae only
23	spirotetramat (Movento)	Little effect on thrips
2B	fipronil (Recoil)	Possible resistance – reserve
3A	deltamethrin (Ballistic), acrinathrin (in Tripsol)	High resistance; kills beneficials for weeks – reserve
UN-group	neem, saponins (PS1), organosilicate (Silmax), potassium soap, Beauveria	Hotspots, between blocks; test crop safety

Off-label use: MRL default 0.1 mg/kg. Always check label, MRL and WHP per crop.

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Rotate by generation

Weeks after planting →



• = *spray. Example of the logic – not a spray recommendation. Check registration, MRL and WHP per crop.*

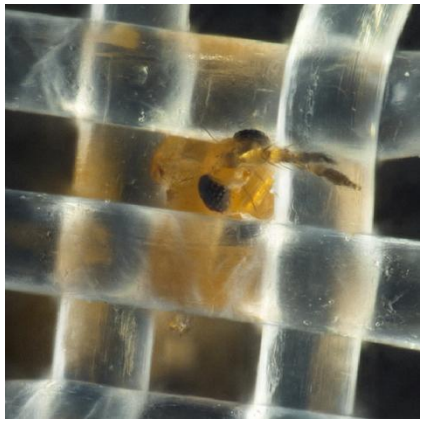
1. One group for one generation (2–3 weeks, ~2 sprays), then switch
2. Hidden repeats: spinosad + spinetoram = one group · Avid, Tripsol, Solvigo = one group
3. Green products on hotspots and between blocks

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Insect screens

Example	Mesh Size	Suitable Pest
0.69 x 0.8 mm	25 Mesh	Drosophila, other small flies
0.40 x 0.77 mm	40 Mesh	Leafminers, whiteflies,aphids
0.28 x 0.78 mm	50 Mesh	Whiteflies, aphids, thrips (partly)
0.15 x 0.45 mm	75 Mesh	thrips





Effect on
- Airflow ↓
- Temperature ↑
- Relative humidity ↑
- Plant growth

References: www.ludvigsvensson.com, https://de.eyouagro.com

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Biological Control

- Predators
  - *Neoseiulus cucumeris, Transeius montdorensis, Amblyseius swirskii* and *Amblydromalus limonicus* are the best choice
  - Use additional food (pollen 500 g/ha, Ephestia eggs 40-100 g/ha or 60 g/row, Artemia 500 g/ha)
  - Slow-releasing sachet: 1 sachet /3-4 plants
  - Lose material: *A. limonicus* 2x 40/m^2, *T. montdorensis/A. swirskii* 50, 75 oder 125 /m^2 (depends of crop, climate, pest pressure), N. cucumeris
  - From flowering onwards: *Orius laevigatus* 2-4/m^2
  - additional help: lacewing larvae 1-3/m^2, *Macrolophus pygmaeus*, predatory thrips *Franklinothrips vespiformis*

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Biological Control

- For foliar application:
  - nematodes *Heterorhabditis b.*, *Steinernema carpocapsae/feltiae* (reduced adult emergence, by up to about 50%)
- For soil application:
  - soil dwelling predatory mites (*Stratiolaelaps scimitus* 150-200/m^2)
  - Predatory beetle *Atheta coriaria*
- Entomophatogenic fungi:
  - *Beauveria bassiana*, *Lecanicillium lecanii* and *Metarhizium anisopliae* reduced populations by about 50–67% compared with untreated plants
  - Foliage application is possible
  - Moisture on leaves is nessecary

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Getting ready for 2027

Active	Predatory mites	Pirate bugs
azadirachtin	harmless	moderate
cyantraniliprole	moderate	harmless
sulfoxaflor	harmless	harmful · 1 wk
spinosad	harmful	moderate
spinetoram	harmful	very harmful · <1 wk
abamectin	very harmful · 2 wk	very harmful · 1–6 wk
imidacloprid	very harmful · 2 wk	very harmful · 4–6 wk
deltamethrin	very harmful · 8–12 wk	very harmful · 8–12 wk

Possibly from 2027:
A. limonicus, Orius laevigatus, N. cucumeris

1. **Shift now to softer products**
2. **Plan a clean window before the first release**
3. **Keep traps and hygiene – they work with beneficials, too**

Mortality: harmless 0–25 % · moderate 26–50 % · harmful 51–75 % · very harmful 76–100 %;
wk = persistence. Source: TNZ Residue Booklet 2026, compatibility charts (mites, pirate bugs)

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TSWV – Tomato spotted wilt virus

- Only the two larval instars of thrips can acquire the virus
- Thrips can transmit it during their second larval stage and as adults
- Adults are the most important for plant-to-plant spread
- there is no transmission of the virus from adult to egg
- Host plants include tomato, sweet pepper, aubergine, lettuce, endive, many ornamental crops, perennials and weeds

- Removing infected plants immediately (plastic bag)
- Removing weeds in the greenhouse, keep vegetation around the greenhouse short
- Strict farm hygiene
- Resistant cultivars?!

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TSWV – Tomato spotted wilt virus

- **Early signs:** mild vein yellowing at the growing point, followed by interveinal or whole-leaf chlorosis
- **Young leaves:** may become puckered between veins, with chlorotic or necrotic rings and spots
- **Necrotic streaks** on petioles and stems may turn black
- **Growth** is often strongly reduced and growing points sometimes die
- **Fruits:** green, red, purple or brown rings, occasionally sunken; slightly sunken concentric rings of the fruit's own colour may also occur



Incubation period: 3-10 days (time thrips can pass the virus)

Max infectivity: until 22-30 days (after virus ingestion)

Sucking time for transmission: 15 minutes is necessary

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Take-home messages

1. **Chemistry alone won’t solve your problem**
2. **End clean, start clean – the cheapest spray is the one you don't need**
3. **Trap and scout weekly – flowers, growing points, leaf undersides**
4. **One generation – one mode of action**
5. **Prepare now for beneficials in 2027**

Your turn

What are your questions – and what have you already tried?

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