Managing thrips in blueberries

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Gideon van Zyl

BerriesZA field days August 2023

Thrips species on blueberries

Species described (currently) present on blueberries

Reasonable to accept that more species are involved and causing damage on blueberries - Abel Moeti busy with species ID PhD

Western flower thrip (*Frankliniella occidentalis*) (Barnes et al., 2015)

Unbroken line of setae (brown to black) visible on abdomen in resting state

https://biobee.co.za/pests/western-flower-thrips/

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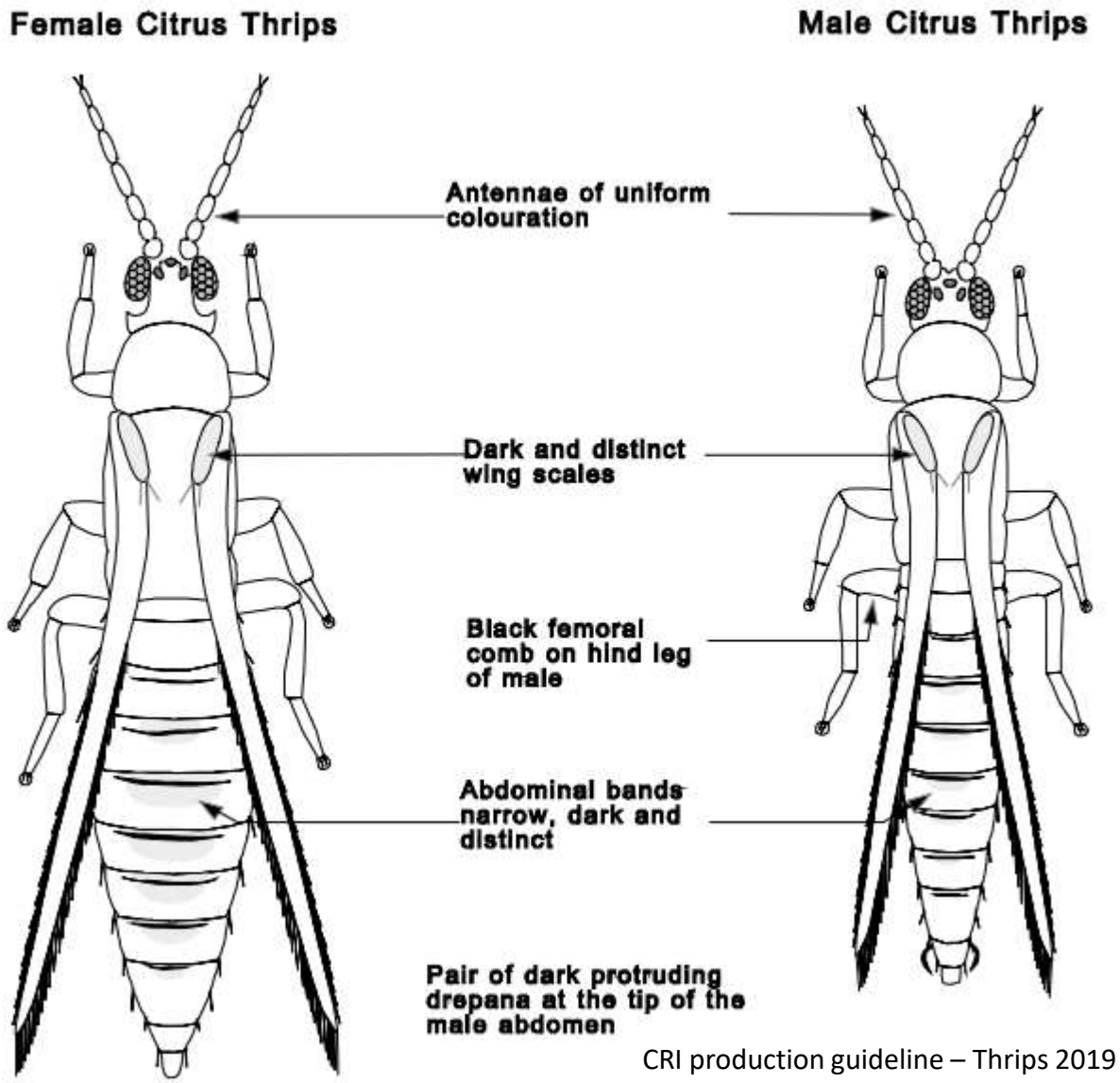
Thrips species on blueberries

Species identified but not described as a pest in SA

SA Citrus thrips (*Scirtothrips aurantii*)

TG Grout – Citrus Thrips management 2023



CRI production guideline – Thrips 2019

Thrips species on blueberries

Species identified but not described as a pest in SA

Possible pest?

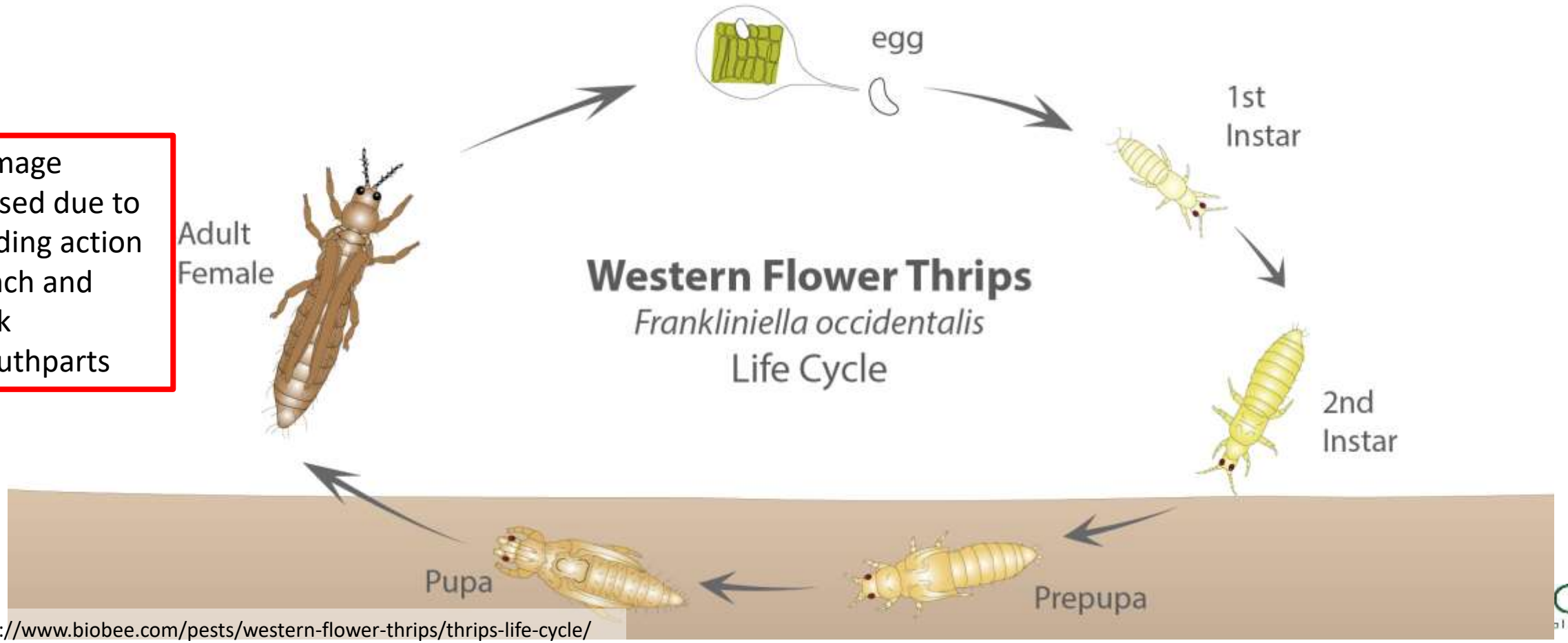
Onion thrips (Thrips tabaci)

https://encrypted-tbn1.gstatic.com/licensed-image?q=tbn:ANd9GcR7OTMWKhIzTzbquJV4k_H8uilFDvltzSIXw7g111UZf6MoYsknsYcBXPcagooKv_mK84WN576sWk6TBXE

Thrips species life cycle

Western flower thrip (*Frankliniella occidentalis*)

Damage caused due to feeding action Punch and suck mouthparts

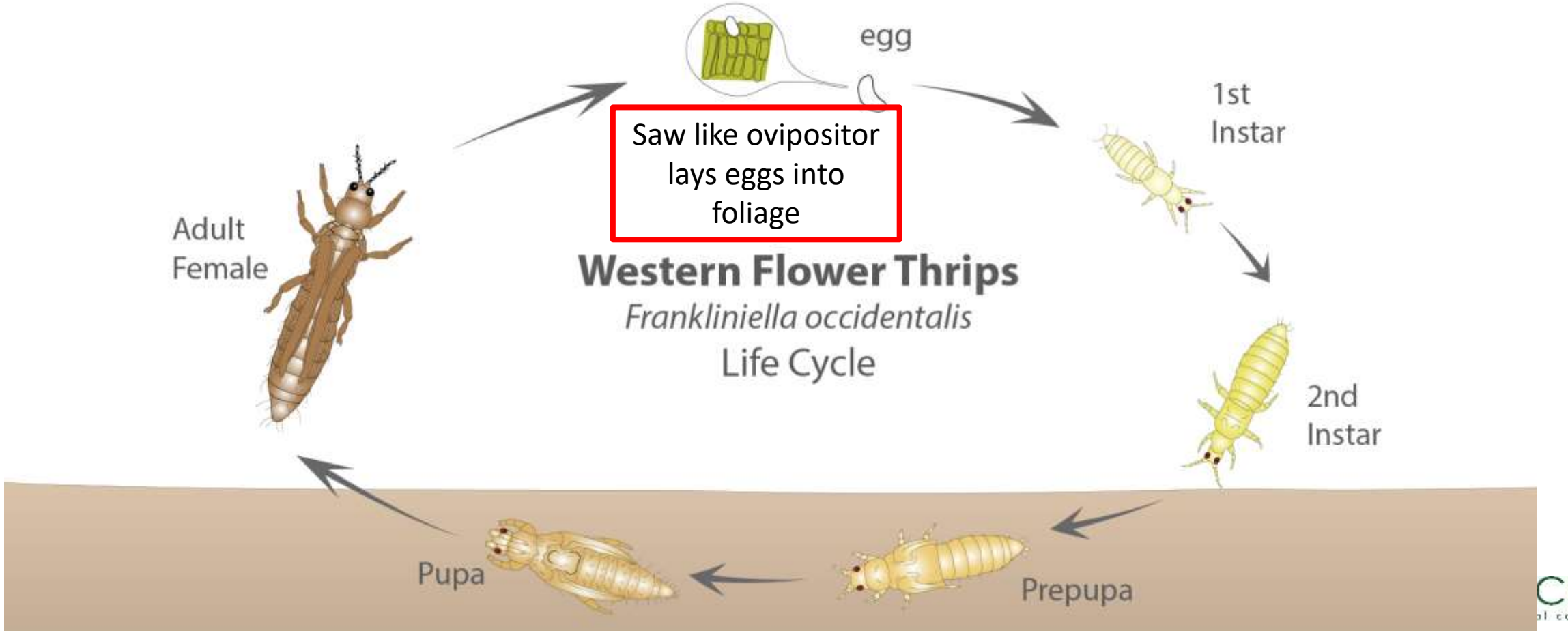


https://www.biobee.com/pests/western-flower-thrips/thrips-life-cycle/

Thrips species life cycle

Western flower thrip (*Frankliniella occidentalis*)

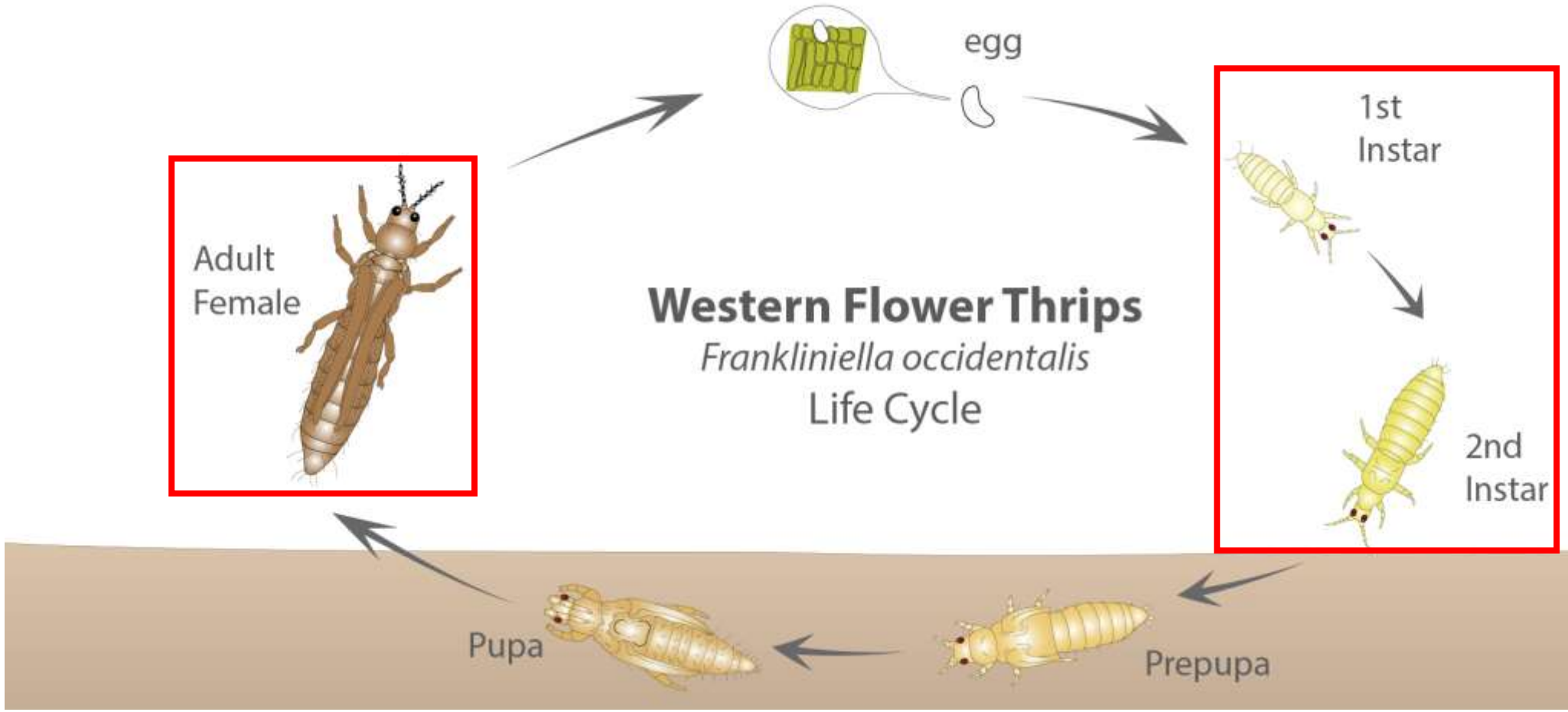
Biology: Life cycle



Thrips species life cycle

Western flower thrip (*Frankliniella occidentalis*)

Biology: Life cycle



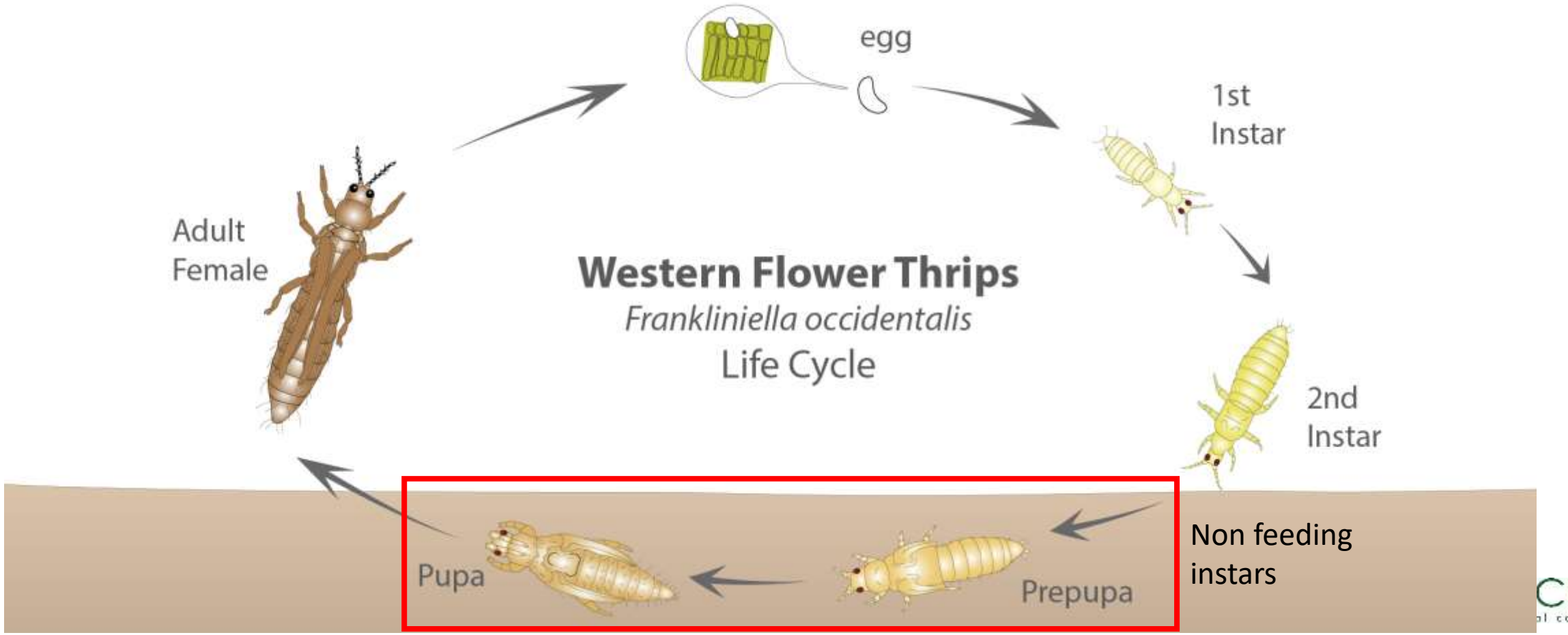
Actively feeding instars

Starts feeding immediately after hatching

Thrips species life cycle

Western flower thrip (*Frankliniella occidentalis*)

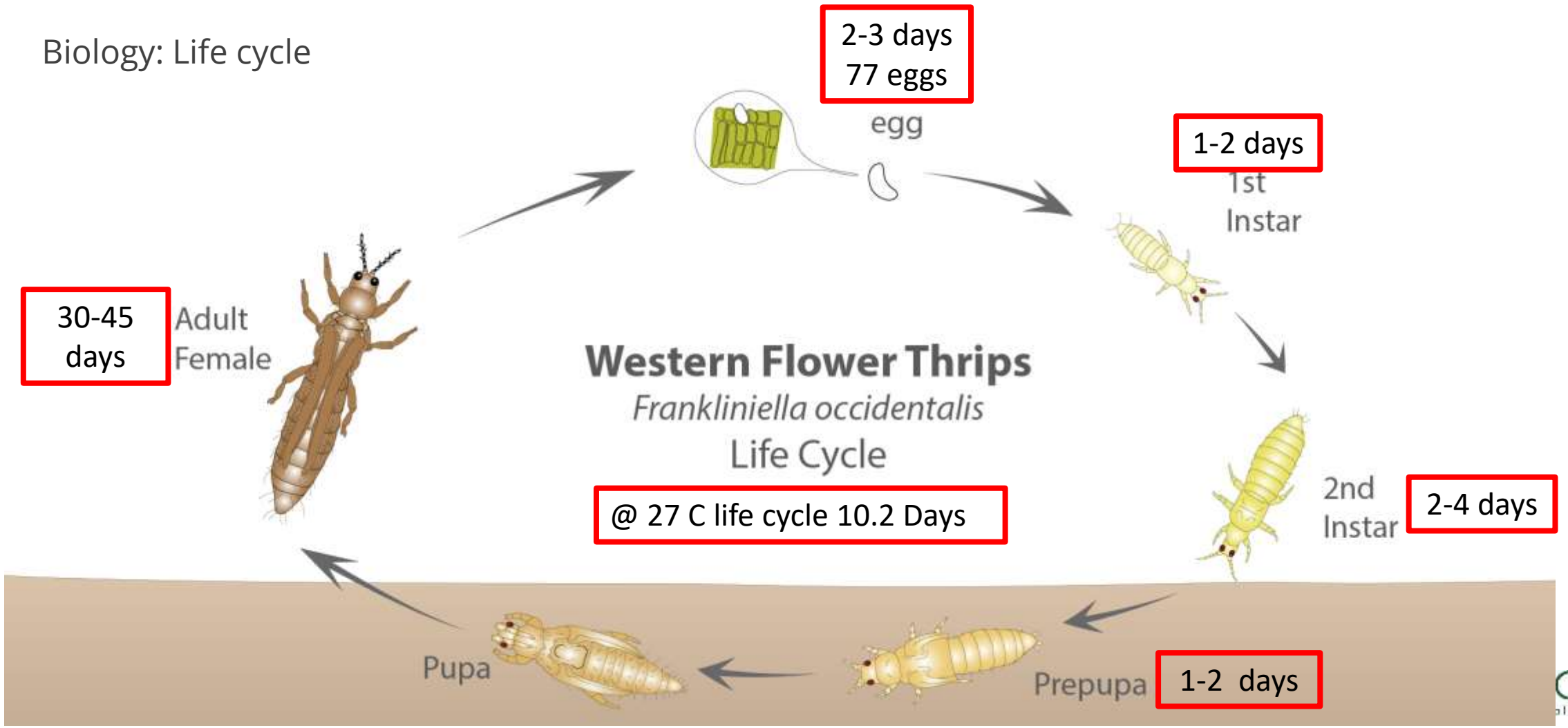
Biology: Life cycle



Thrips species life cycle

Western flower thrip (*Frankliniella occidentalis*)

Biology: Life cycle



Thrips species life cycle

Western flower thrip (*Frankliniella occidentalis*)

Biology: Life cycle

Environmental conditions influence population (life cycle duration)

- Temperature
- Rain
  - Intensity (mortality)
  - Frequency (availability of food)

Proximity of host plants

Thrips species life cycle

Western flower thrip (*Frankliniella occidentalis*)

Biology: Temperature

NOTE

Eur. J. Entomol. **95**: 301–306, 1998
ISSN 1210–5759

Effect of temperature on development of the Western Flower Thrips, *Frankliniella occidentalis* (Thysanoptera: Thripidae)

JAMIE R. McDONALD[1], JEFFREY S. BALE[1] and KEITH F.A. WALTERS[2]

[1]School of Biological Sciences, University of Birmingham, Edgbaston, B15 2TT, UK;
e-mail: j.r.mcdonald@bham.ac.uk

[2]Central Science Laboratory, Ministry of Agriculture, Fisheries and Food, Sand Hutton, York, YO4 1LZ, UK

TABLE 2. Thermal requirements for development and results of linear regression relating developmental rate of immature stages of *Frankliniella occidentalis* to temperature.

	Egg	Larval stages	Propupa	Pupa
Equation	y = 0.017x – 0.168	y = 0.007x – 0.043	y = 0.041x – 0.214	y = 0.026x – 0.239
R^2	0.866	0.809	0.638	0.692
p	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Threshold	9.9°C	6.1°C	5.2°C	9.2°C
Degree-days	59.0	143	24	38
Observations	726	265	248	219

+/- 268 DD

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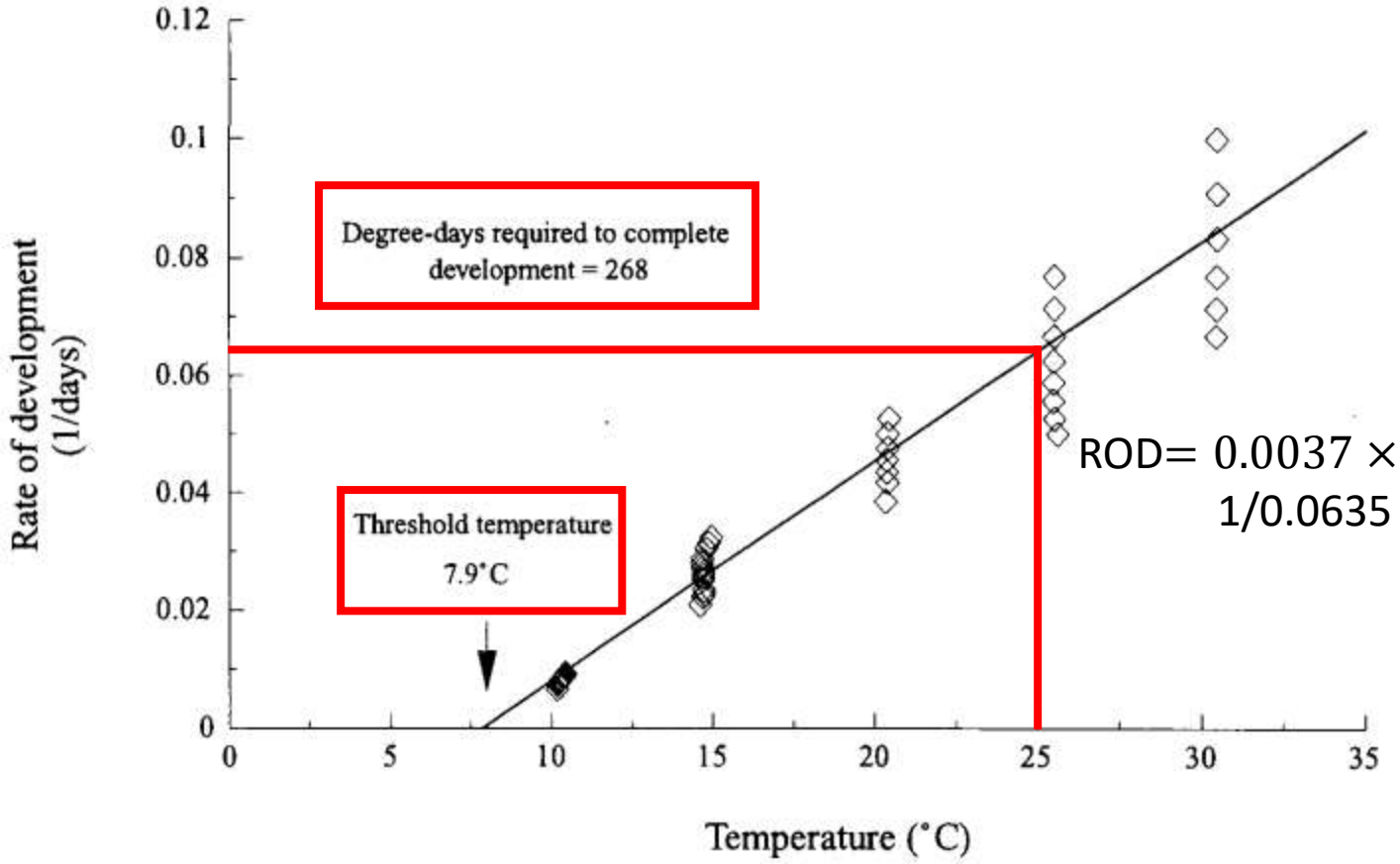
Thrips species life cycle

Western flower thrip (*Frankliniella occidentalis*)



ROD= $0.0037 \times temp\ (C) - 0.029$

1/0.0635 days = 15.7

Fig. 1. Rate of development, from egg to adult (1/days), of *Frankliniella occidentalis* as a function of mean daily temperature experienced (°C). Linear regression: Rate of development = 0.0037 (temperature) – 0.029, ANOVA F = 3701, d.f. 1,213, $p < 0.001$, $R^2 = 0.946$.

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Thrips species life cycle

Western flower thrip (*Frankliniella occidentalis*)

Biology: Rainfall

Rainfall duration (min)

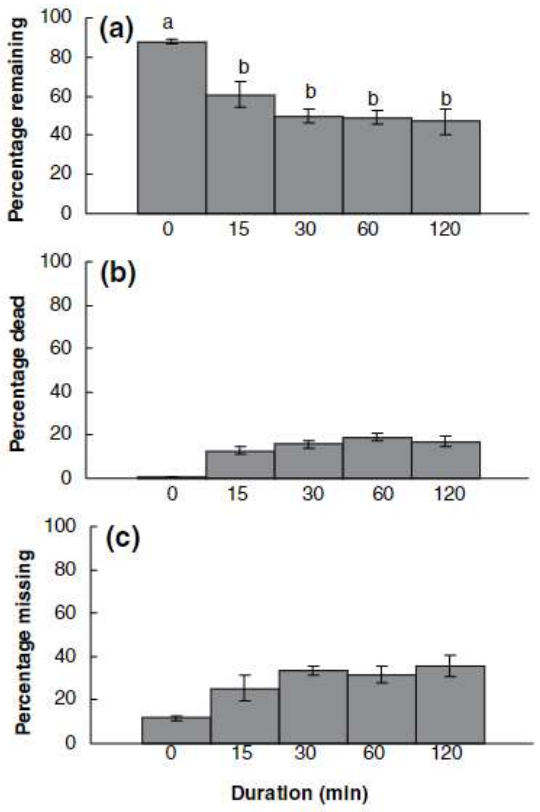

Fig. 2. The fate of thrips exposed to different rainfall durations. (a) The percentage remaining on the gorse bouquet; (b) the percentage found dead; (c) the percentage missing. Different letters indicate significant differences between the treatments. The error bars are the standard error of each treatment.

Rainfall intensity (mm h^{-1})

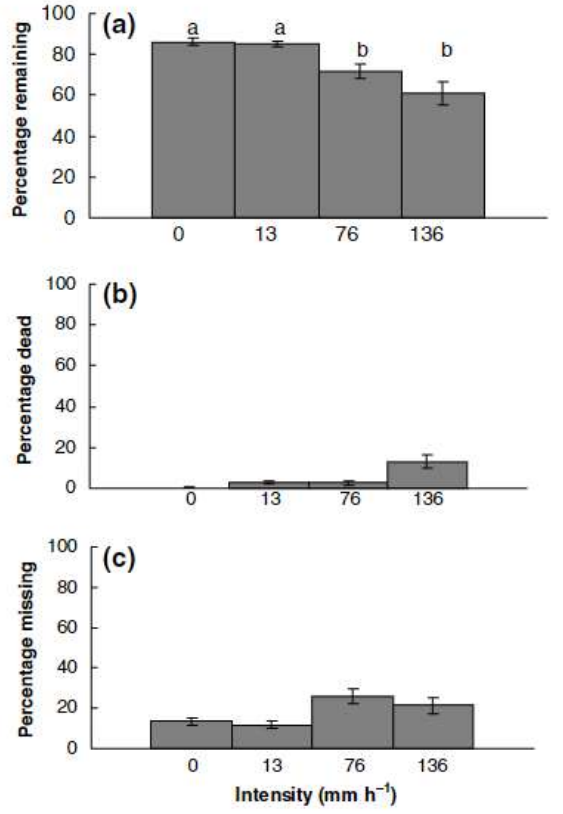

Fig. 3. The fate of thrips exposed to different rainfall intensities. (a) The percentage remaining on the gorse bouquet; (b) the percentage found dead; (c) the percentage missing. Different letters indicate significant differences between the treatments. The error bars are the standard error of each treatment.

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Thrips species life cycle

Western flower thrip (*Frankliniella occidentalis*)

Biology: Life cycle

Coppert YT channel QR code

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Thrips damage on blueberries

Damage caused due too feeding

- causes scarring of leaves and stems
- Short internode growth
- Most prominent on flush – new growth after pruning
- Affects photosynthesis, stunted growth, production of new wood and buds for the following season
- Can severely affect size and quality of crop in the coming season

David Haviland, UC Coop Ext, Kern County, May 2008

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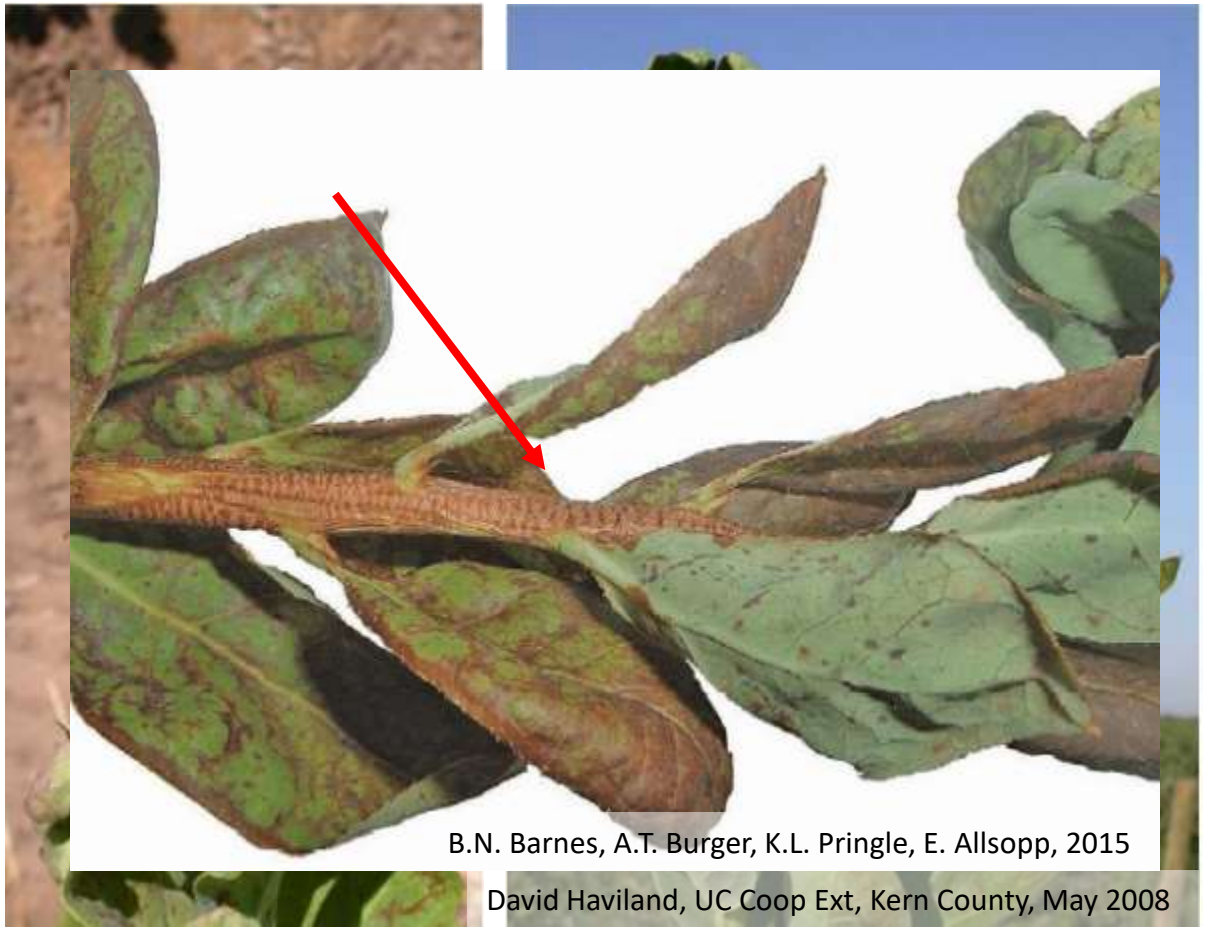

B.N. Barnes, A.T. Burger, K.L. Pringle, E. Allsopp, 2015

David Haviland, UC Coop Ext, Kern County, May 2008

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Thrips damage on blueberries

Damage caused due too feeding

- Feeds on all parts of the blueberry flower (petals, ovary, pistil and calyx)
- Scarred, distorted fruit, fruit abortion
- Egg laying can also cause damage (pansy spot)
- Clustered fruit (silvering)

Abel Moeti, 2023

J.A. Payne, USDA ARS, Bugwood.org

H.A. Arévalo, University of Florida

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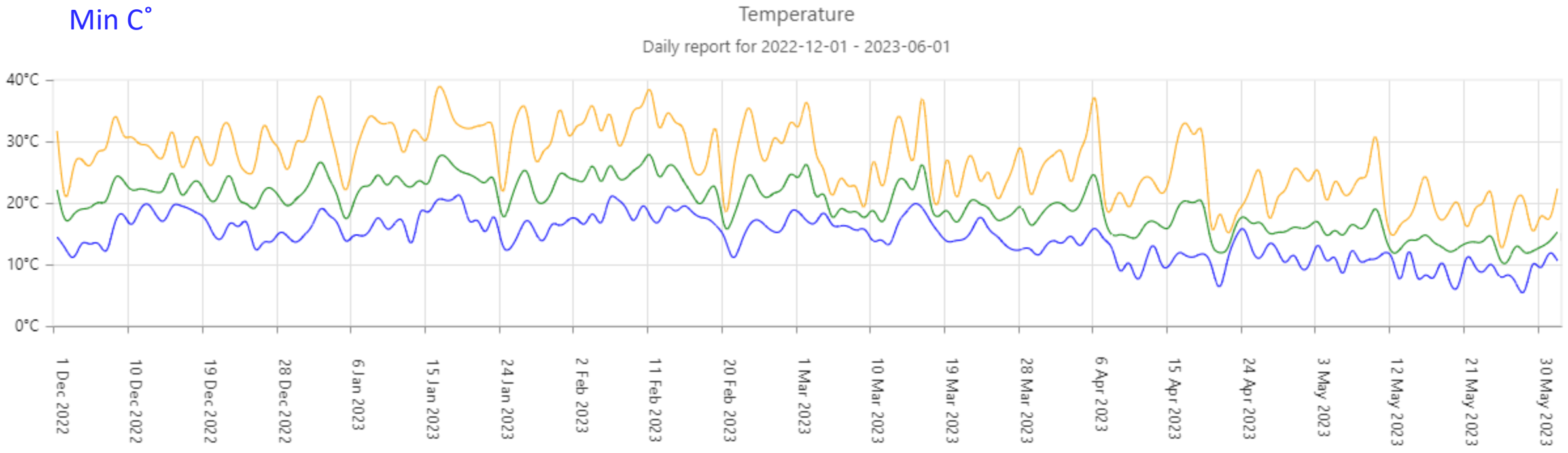
Thrips Control

Western Cape

- New growth (flush) need to be protected (determines harvest)
- Fast new growth rate – regular protection needed

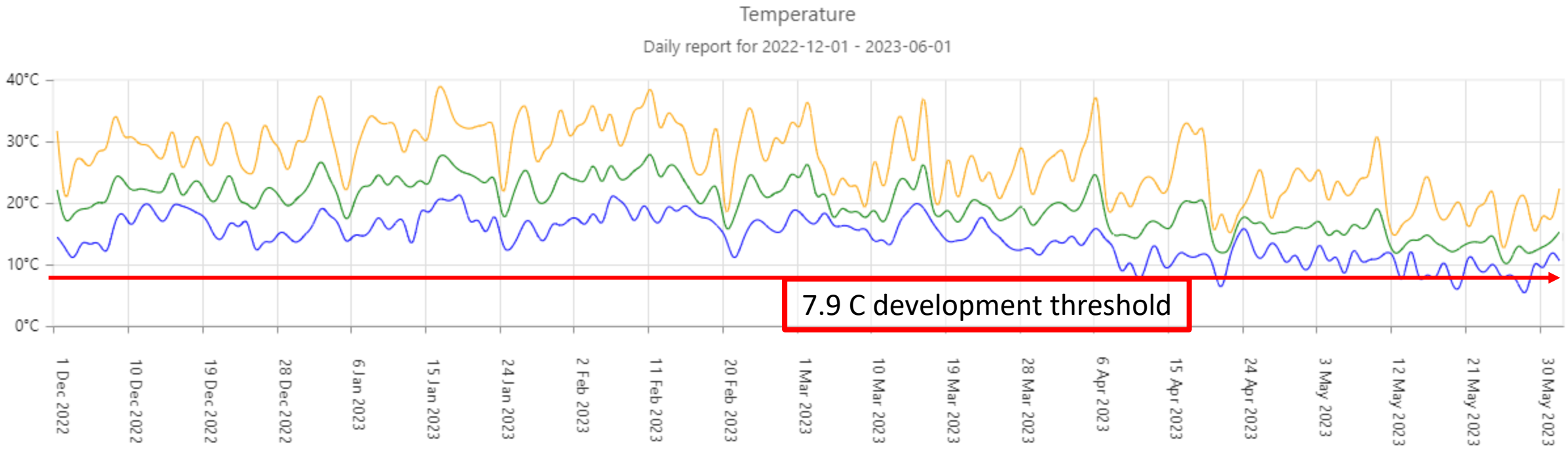
Max C˚
Mean C˚
Min C˚



Thrips Control

Western Cape

- New growth (flush) need to be protected (determines harvest)
- Most vulnerable period December to early April
    - High maximum temperatures; low relative humidity

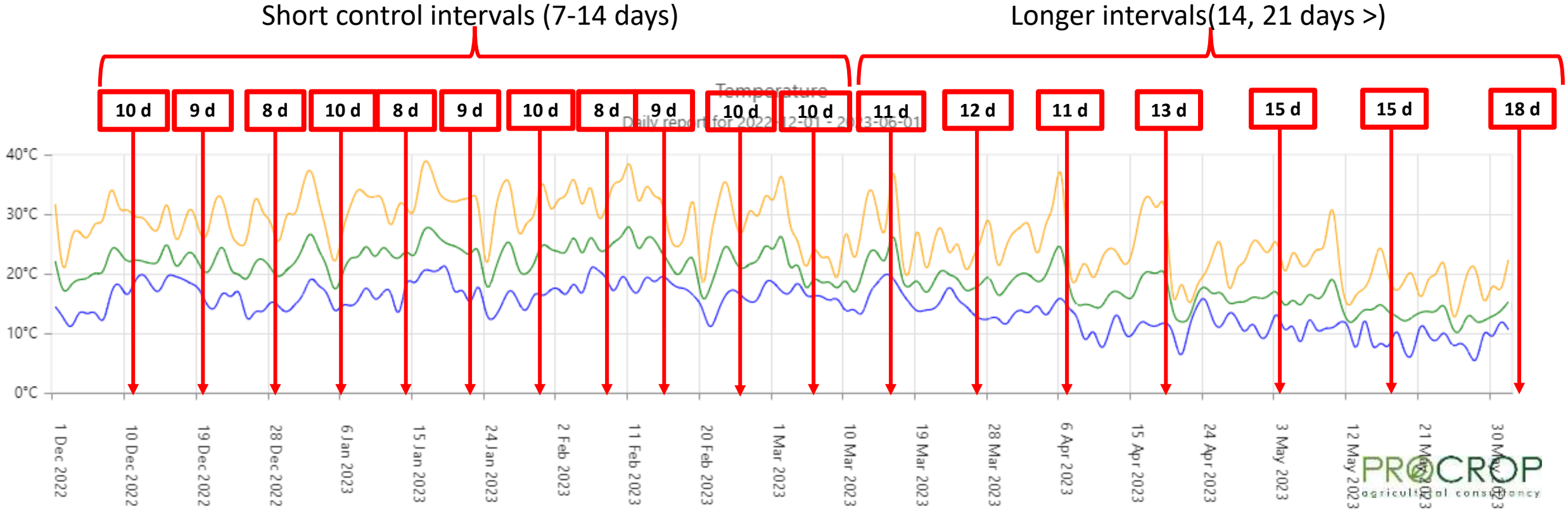


Thrips Control

Western Cape

- Short duration to complete life cycle (268 DD)
- High rate of new plant growth

$$\text{Degree-days} = [(T_{max} + T_{min}) / 2] - \text{threshold for development}$$



Thrips Control

INFO ON PESTICIDES FOR THE CONTROL OF THRIPS									
Active Ingredient	Trade names	Formulation	Dosage (g or mℓ) per 100 ℓ water or kg/ha	IRAC Code	Local (RSA)		EU		Notes
					MRL	PHI	MRL	PHI	
Acetamiprid	Tamprid	200g/kg WP	20-40g/100L	4A	2	35	2	35	Maximum 2 applications per season *Will also control mealybug, although not registered for this purpose.*
canola oil + garlic juice extract + pyrethrin extract	Kannar KangroShield 100	250; 642; 3,5 g/l	500 ml/100L	3A		2	1		
	Kannar Pygar 932	473; 473; 0,6875 g/l	1.5 ℓ to 2.0 ℓ			1	1		
Natural Pyrethrum	Xterminator	7.5g/L SC	500ml/100L	3A	0	1	1	0	Spray interval must not exceed 3-5 days
Metarhizium anisopliae	Real Metarhizium 69	-	200-400ml/ha	UN	0	0	0	0	This product is an entomopathogenic fungus and field efficacy might be erratic, depending on environmental condition and infestation level.
Spinetoram	Delegate	250g/kg WG	10g/100L	5A	0.01	7	0.4	7	Do not apply in more than 2 consecutive applications and not more than 3 sprays in total per season.

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Thrips Control

INFO ON PESTICIDES FOR THE CONTROL OF THRIPS									
Active Ingredient	Trade names	Formulation	Dosage (g or mℓ) per 100 ℓ water or kg/ha	IRAC Code	Local (RSA)		EU		Notes
					MRL	PHI	MRL	PHI	
Spinosad	Entrust Naturalyte 800 WP	800g/kg WP	9g/100L	5A	0.05	14	1.5	14	Do not apply in more than 2 consecutive applications and not more than 3 sprays in total per season.
Spinosad	Tracer 480 SC	480g/L	15ml/100L	5A	0.05	3	1.5	3	Maximum 3 applications per season
Thiacloprid	Topstar	480g/L SC	30ml/100L	4A		14	NOT APPROVED		Maximum 2 applications per season Thiacloprid is on the restricted use list of several European supermarkets refer to addendum

Limited number of registered sprays available – should be kept for use close, during flowering

- Group 5A max 3 (if Delegate is used, Tracer cannot be used, *visa versa*)
- Thiacloprid limited use – limited market access
- Acetamiprid – Should be positioned for combined mealybug/thrip control – market access?

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Thrips Control

Limited number of registered sprays available

- **Vegetative period use alternative active ingredients**
- **Chemical control is the only effective control method in this period**
- **This is NB for resistance management and effective control**
- **Critical control period – determines harvest**
- Low/no residue risk up and to bud differentiation
- December to April +/- 6 to 10 sprays
- Use systemic actives – translocate with flush growth
    - Fast growth rate
    - 7 to 14 days spray intervals

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Thrips Control

Limited number of registered sprays available

- **Flowering and fruiting period use registered actives**
- Thrips are hard targets for contact sprays
    - Contact insecticides only effective on targets hit
    - No residual activity on surface – natural pyrethrin actives
- Natural predator releases not effective to control large populations with fast life cycle turn over
    - Rather reserve for the flower and fruiting period
- Only apply active ingredients the number of allowable sprays
    - NB for resistance management!

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Thrips Control

Cultural control options?

- Weed and flower control
  - Weed mat/pots vs soil planted with cover crop
  - Do not disturb cover crop – crop phenology

Thrips Control

Cultural control options?

- Weed and flower control
    - If orchard floor needs to be managed – should be done before flowering
    - Alternative chemical intervention period (before flowering)
    - Exclusion zones around orchards - free of host plants

Thrips Control

PHENOLOGICAL GROWTH STAGES OF BLUEBERRIES


Dormant


Bud swell


Green tip


Bud cluster


Pink bud


Bloom


Petal fall


Calyx


Green fruit


Fruit ripening

Systemic alternatives

Combined mealybug thrip control - Acetamiprid

Registered active ingredients, natural pyrethrins and biologicals

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Thrips monitoring

Scouting commences as soon as new shoot growth starts post pruning on weekly basis

- Scouting is done on 5 x shoot tips and 5 x flower/fruit canes per scouting site -
- Shake shoot tip over white page to check for thrips
- Check for any visible damage on shoots
- Most damage caused by 1st and 2nd instar larva

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Thrips monitoring

Select 25 evenly spaced inspection sites per scouting unit

Scouting unit (2 ha)

Scouting site (+-25 per unit)

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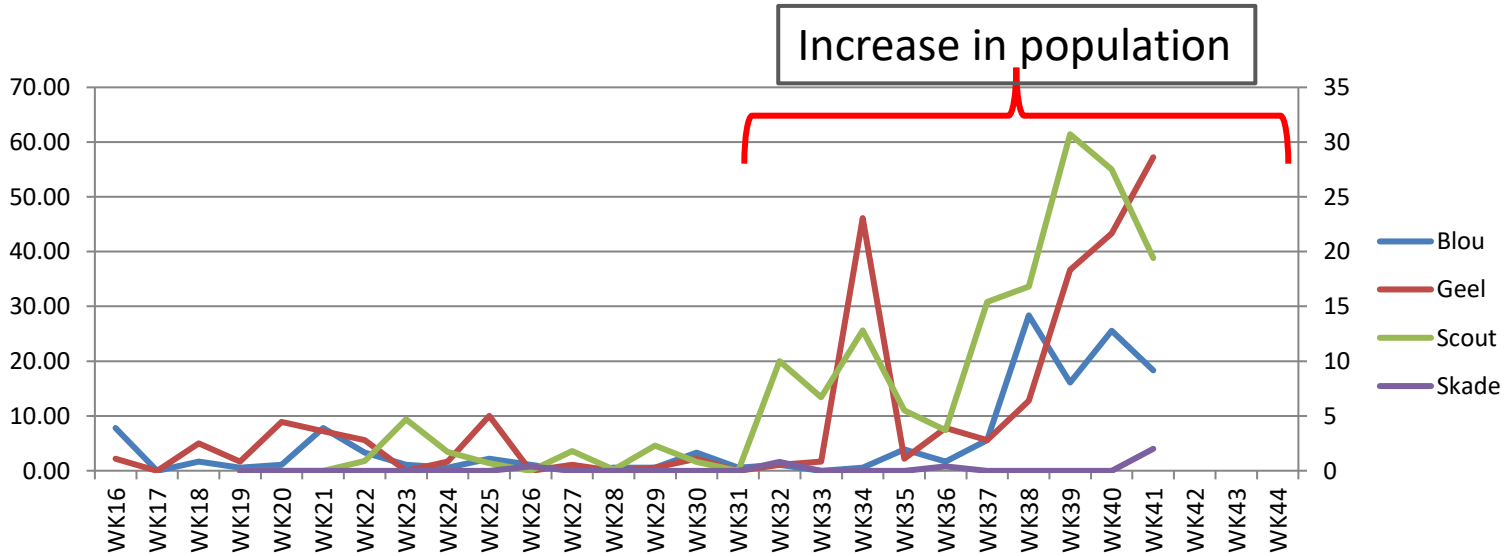
Thrips monitoring

Spray application planning

- No threshold numbers for thrips to activate control
- Thrips can cause damage at low population numbers
- Thus, monitor for increase in population to determine frequency and/or spray intervals
- Determine population trends over time



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Thrips monitoring

- *Orius spp*.

- *Amblyseius cucumeris*

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