

# Integroidun torjunnan menetelmiä käytännössä belgialaisilla mansikkatiloilla

11/02/2026  
Online



# Belgia?



- 30.689 km<sup>2</sup>
- 11,8 miljoonaa asukasta
- Tuotanto 48 miljoonaa kg mansikoita vuonna 2024
- Tuotanto pääasiassa tunnelissa tai kevyissä kasvihuoneissa



# Pahimmat kasvintuhoojat

## Tuhohyönteiset

- **Thrips Ripsiäiset**
- Two-spotted spider mite vihannespunkki
- White fly jauhiaiset
- Aphids kirvat
- **Spotted wing Drosophila (*Drosophila suzukii*) täplämahlakärpänen**
- Strawberry foliar nematode (*Aphelenchoides fragariae*)  
mansikka-ankeroinen

## Kasvitaudit:

- **Powdery mildew (*Podosphaera aphanis*) mansikanhärmä**
- Grey mold (*Botrytis cinerea*) harmaahome
- Soft rot (*Rhizopus stolonifer*) hedelmämätä
- Crown rot and red stele (*Phytophthora cactorum*, *Phytophthora fragariae*)
- Tyvimätä, punamätä



# Thrips Ripsiäiset

# Thrips ripsiäiset

## Different species éri lajeja

*Frankliniella (occidentalis, intonsa,...)* & *Thrips (tabaci, major, fuscipennis,...)*

Kalifornianripsiiäinen, intosa, tupakkariipsiiäinen, vadelmaripsiiäinen, ruusuripsiiäinen

## Damage tuhot:

Thrips feeds on the flowers which causes, syö kukkia:

- Bronzing fruits, pronssiset marjat
- Seedy karttakuviot marjassa
- Misshapen fruits, epämuotoiset marjat

Period: yearround with peak in summer

Ympäri vuoden, mutta suurimmat tuhot kesällä



# Beneficials hyödyt



1) Predatory mites: *Amblydromalus limonicus* / *Amblyseius swirskii* /  
*petopunkit*

*Neoseiulus cucumeris*

Mode of action: Käyttö

- Preventative and curative ennalta ehkäisy ja torjunta

Application: Levitys

Preventative bags or disperse mites pussit, levitys

At low pressure: extra feed with pollen (Nutrimite) lisäravintoa pieni tuholaispaine

At high pressure: repeatedly disperse mites or introduce *Orius laevigatus* *ripsiaäisrikkalude*

Experience: Kokemukset

A quick population build-up at the start of the crops leads to a good management.

# Beneficials Hyödyt

## 2) Bug: *Orius laevigatus petoluteet*

Mode of action: toimintatapa

Generalist: feeds on thrips, pollen, aphids, spidermite, white fly, eggs of mots, ....

➤ Curative Yleispeto

Application: Lisäys

Dispers adults on the leaves

Experience:

Essential to use in management systems with a longer growing period or when pressure is very high. Also appears natural. Very sensitive for many chemical treatments. Pitkälle kasvukaudelle ja suuri tuholaispaine. Herkkä kemikaalikäseittelyille.

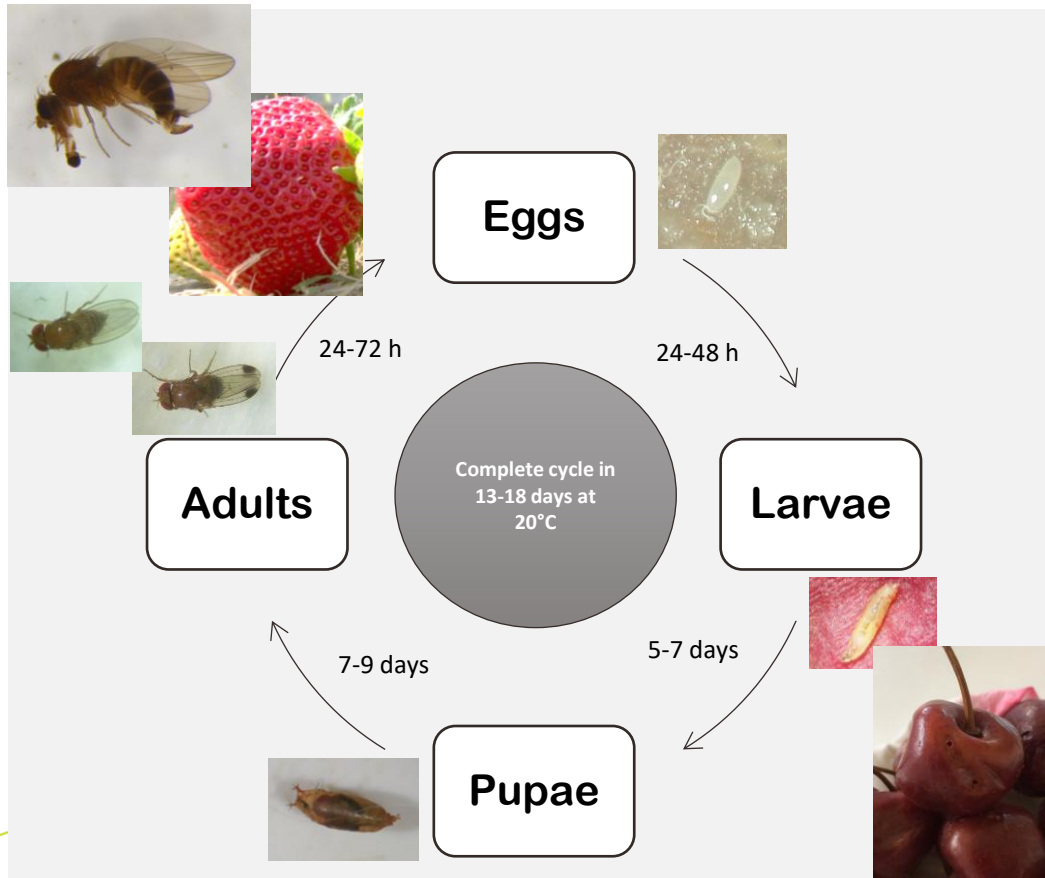


Source: Biobest



● *Drosophila suzukii*  
*täplämahlakärpänen*

# *Drosophila suzukii*



- Optimal temperatures: 20-25°C, Lämpötilaoptimi
- Relative humidity is important, Kosteus tärkeää
- Cultivated and wild hosts
  - *Prunus padus. tuomi*
  - *Phytolacca americana* lännenkermesmarja
  - *Pyracantha coccinea* välimerentulimarja
- Damage: tuhot
  - Wounds of egg-laying is sensitive to secondary infections. Sekundääri taudit
  - Larvae causes damage in fruits. Toukat kaivautuvat marjoihin

# IPM strategies

- Hygiene
  - Continuous picking (cold storage!) poiminta
  - Remove affected/rot fruits huonot pois
  - Store affected fruits in tonnes
  - tiivis astia saastuneille marjoille
- Traps with lure nestehoukutusansat
  - Self-made traps (transparent bottles with 25 holes of 0,5 cm diameter)/ Commercial traps
  - Lure: Neste sekoitus: väkiviinietikka, punaviini, pesuneste
    - Mixture of 1/3 apple cider acid, 1/3 red wine, 1/3 water and droplet of soap
    - Commercial lures
  - 100 traps/ha for mass-trapping massapyydytystys



# In case of high pressure, massaesiintymien torjunta

Crop protection	<i>Drosophila suzukii</i>			Period
	Adults	Larvae (preventative)	Larvae (curative)	
Spinosad	+++	+++	+-	+-
Cyantraniliprole	++	++++	+-	++++
Lambda-cyhalothrin	++++	++	+-	++

Source: PCFruit

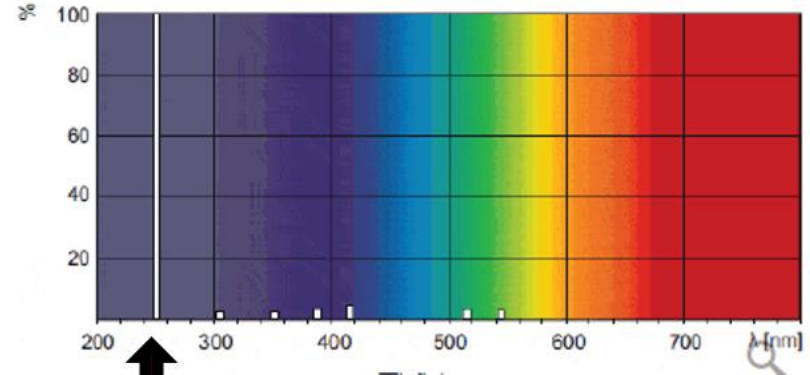
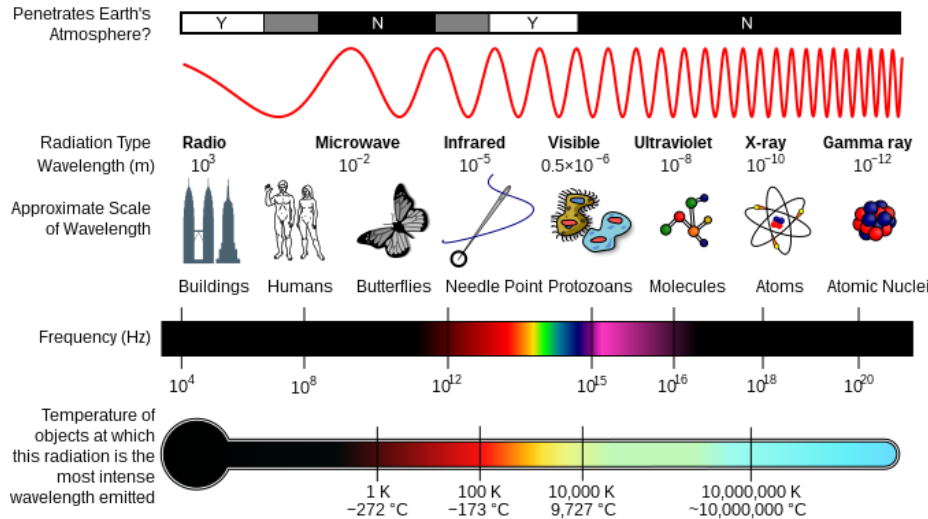
# Managing Powdery mildew with UV-c, Härmäntorjunta UV-c valon avulla

# What is ultraviolet radiation? Mikä on ultraviolettivalo?

- Part of the electromagnetic spectrum
- Invisible for the human eye
- Ei näy silmälle

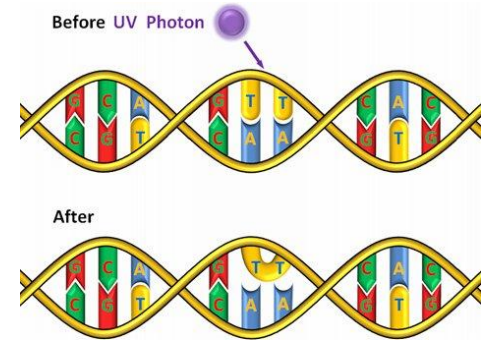
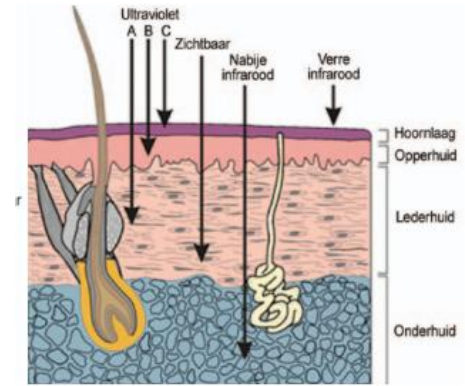
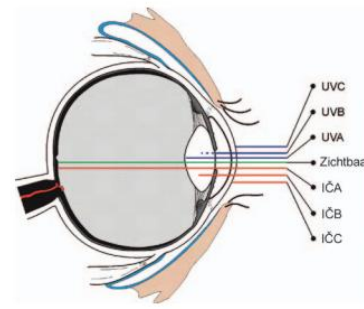
Types UV:

- UV A (315-400 nm)
- UV B (280-315 nm)
- UV C (100-280 nm)



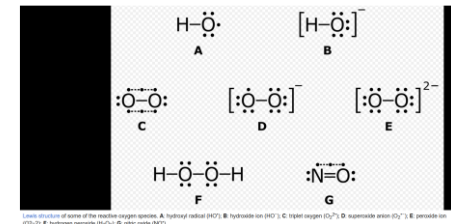
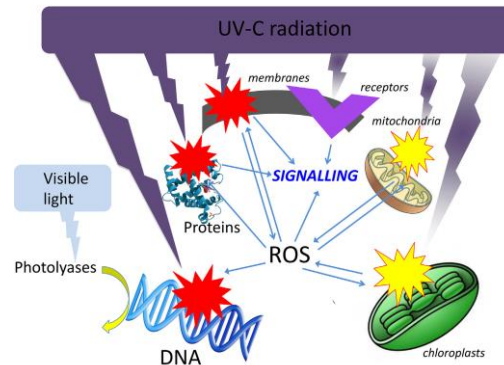
# What does UV-c do?

- Dammmages:
  - Human (eye and skin)
  - Micro-organisms (E.g. pathogens)
  - Plants
- Dammmages DNA, membranes, proteins
- Affects mitochondria, chloroplasts
- Indirect effect of ROS



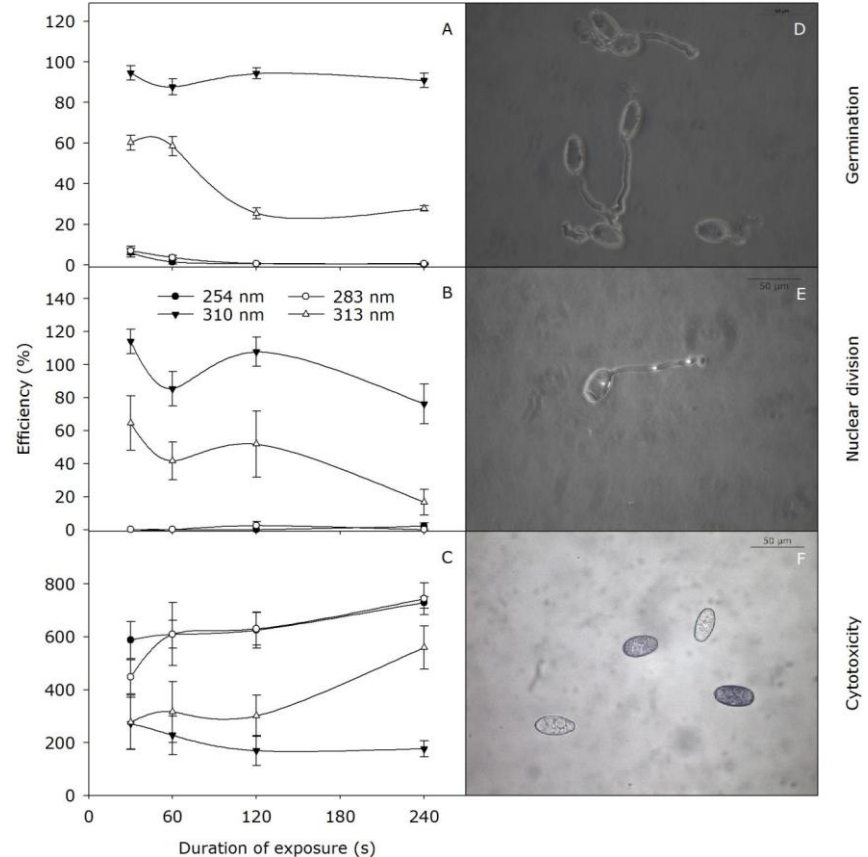
Schmid et al. 2017

Urban, L., Charles, F., de Miranda, M. R. A., & Aarouf, J. (2016). Understanding the physiological effects of UV-C light and exploiting its agronomic potential before and after harvest. *Plant physiology and biochemistry : PPB*, 105, 1–11. <https://doi.org/10.1016/j.plaphy.2016.04.004>

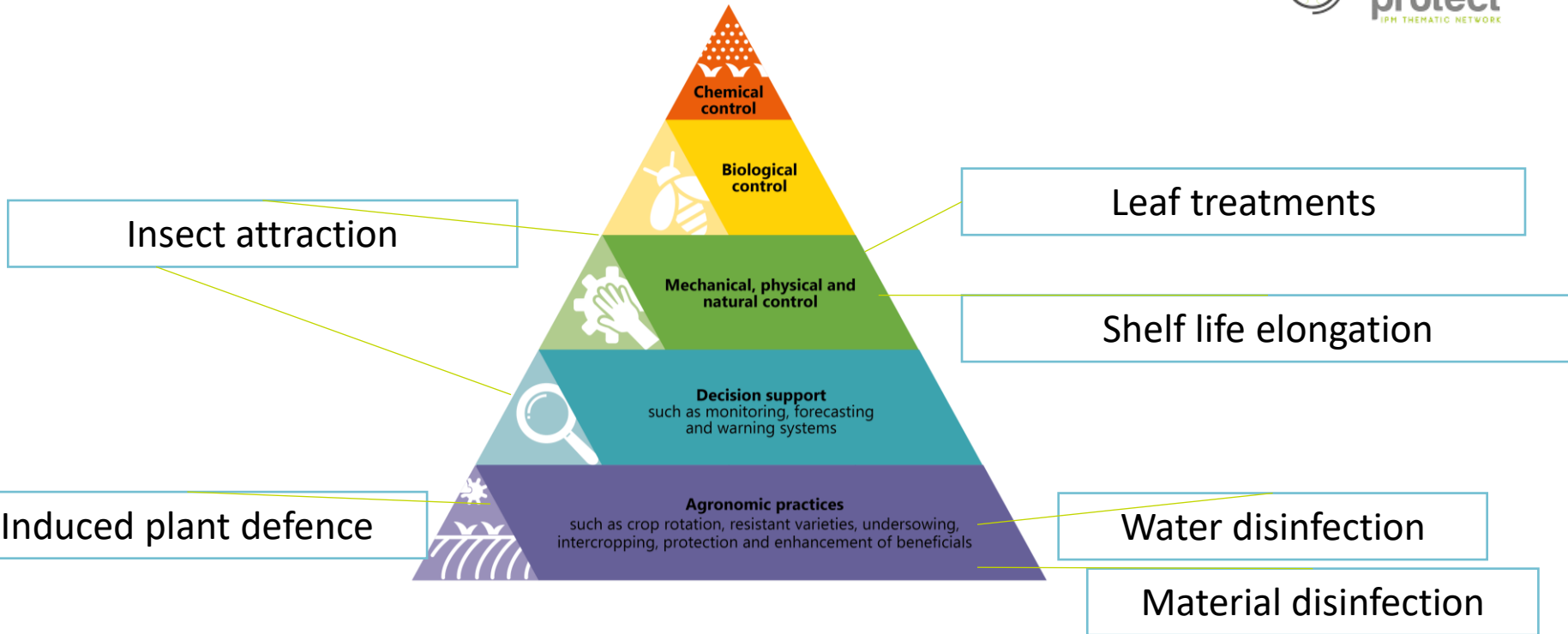


# Effects of UV on fungi

Fig. 2. Wavelength dependent effect of UV irradiances ( $8 \pm 0.2 \mu\text{mol}/\text{m}^2/\text{s}$ ) on efficiency of germination (A, D), nuclear division (B, E), and cytotoxicity (C, F) of *Oidium Neolycopersici* conidia on water agar exposed to near monochromatic UV of 254 nm, 283 nm, 310 nm or broadspectrum



# Different ways to use UV in IPM



# Different types of use and distributors for strawberries

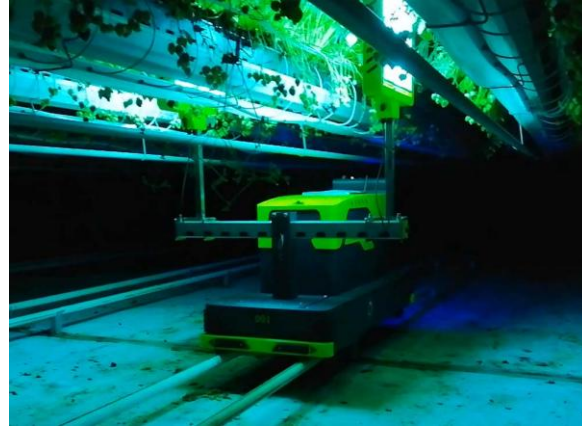
Types of use:

- Glasshouse on rails/wheels
- On caterpillars/wheels

Distributors: Jälleenmyyjä

- Octica
- Micothon
- Nauws
- Boogaerts
- Thorvald, Cleanlight, UV-Dragon (DIY) ...

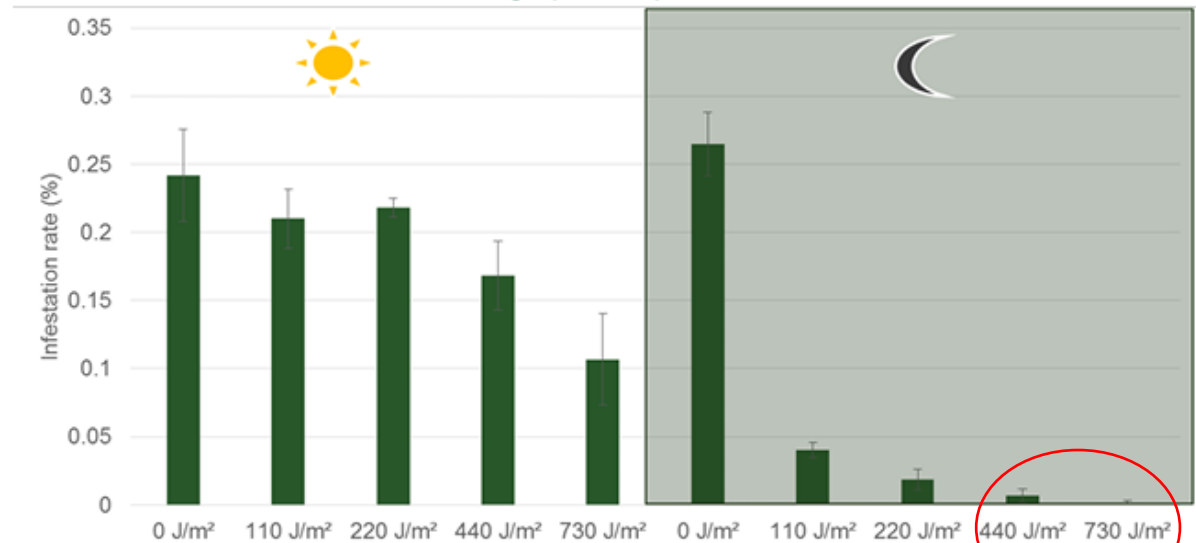
More info: <https://platform.smartprotect-h2020.eu>



# How to implement?

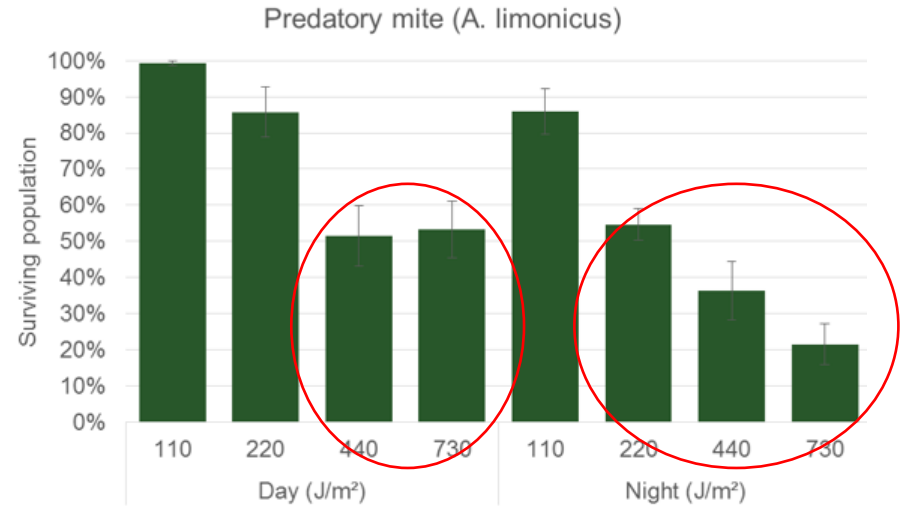
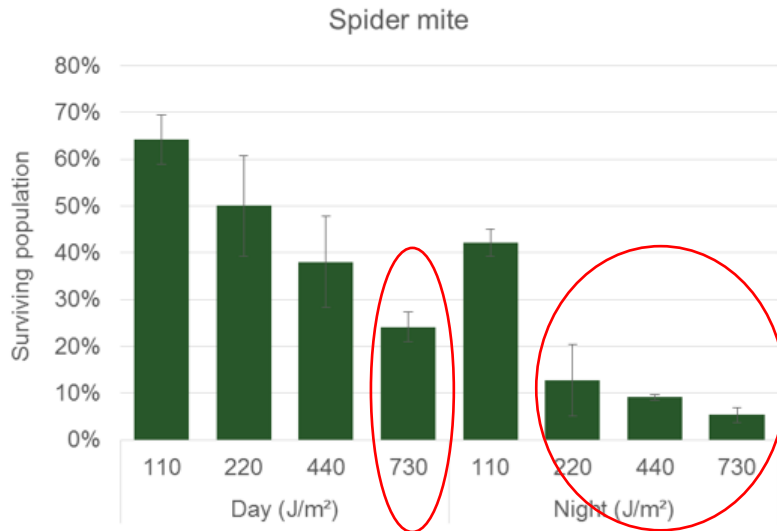
Late crop (2018)

- 3 times a week at noon or after sunset



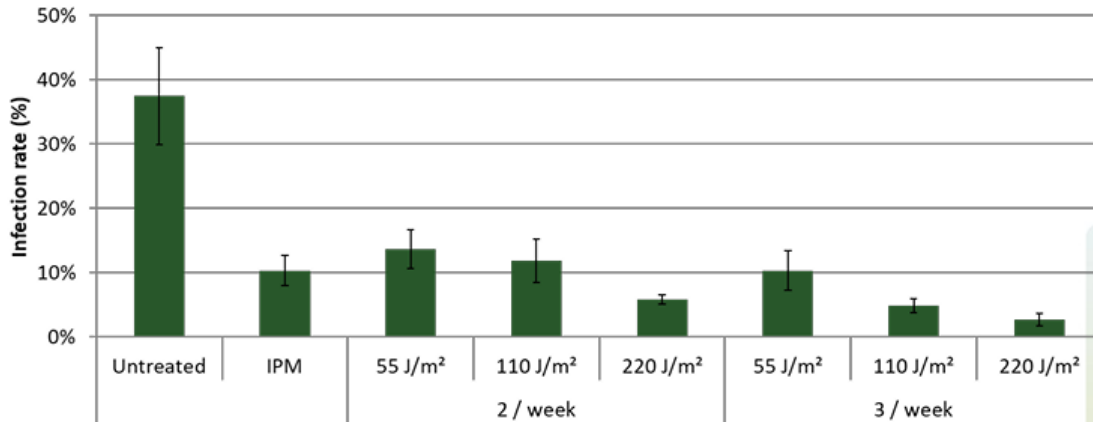
Yield loss!

# Side effects of UV



# UV-c as good as IPM

IPM: Takumi / Signum+Topaz / Vacciplant / Luna Sensation / Karma / Karma



Witziektebeoordeling 5 juli 2019

# Key findings UV research



## Treatments against powdery mildew:

- 3/week
- Night treatment
  - Start 1h before sunset
  - Till 3h before sunrise
- Dose:  $90 \text{ J/m}^2$  ( $2 \times 45 \text{ J/m}^2$ )  $\Rightarrow$  80% killing

## Side effects:

- Predatory mites are saved for thrips and white fly management petopunkit selvisivät (86%)
- Spidermites are killed hämähäkit kuolivat (65%)

# Thanks

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AdvisoryNet**PEST**



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