

CLICK TO START

Detecting Tobamoviruses using LED

Jeroen Reintke – Enza Zaden Seed Operations B.V.

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WORKSHOP

PATHOLED: LIGHT SOURCES & PLANT PATHOLOGY TEST OUTCOMES

Tuesday, May 14, 2019 8:15 am - 5:30 pm GEVES, 25 rue Georges Morel, 49071 BEAUCOUZÉ

Detecting Tobamoviruses using

Outline

- Introduction / Background
- Technical
- Before and After





ENZA ZADEN Introduction / Background

Seed Health method development

Goal: To develop seed health protocols

- Align with vision: more, quicker, better
- Focus on molecular methods and standardization of detection methods
- Higher throughput
 - Pre-screen molecular assay
 - Automation of detection
- Better standardization over assays for improved reliability
 - Automation of detection
 - Standardized spikes and controls
- Validation for NAL accreditation for phytosanitary purposes
- Troubleshooting Routine Seed health





FL5266 [RM] (c) www.visualphotos.com

Tobamoviruses

- Tobamo virus, family of Virgaviridae
 - Single positive stranded genomic RNA
 - 6.3-6.6Kb genome size
- 37 species in Tobamovirus group
- Consists of two groups
 - Tobamovirus group 1 solanaceae
 - Tobamovirus group 2 Cucurbit viruses
- Virus is very stable
- >10 yrs in seed
- Thermal inactiviation point 90C for 10 min in plant sap



Tobamoviruses – epidemiology

- Virus spreads:
 - Mechanically
 - Tobacco/cigarettes
 - Tabasco/Sambal
 - Fresh fruits
 - Water
 - Irrigation water
 - Pollen
 - Bees
 - Seeds
- Co-infections with other viruses make symptoms worse and plants more susceptible
- Up to 30% yield loss



Detection of Tobamoviruses

- Bioassay for determination of presence and infectiousness
 - Tobamoviruses infecting Solanaceae are detected in bioassay
 - Rub inoculate leaf and/or seed materials (12x250)
 - Based on the ability of producing necrotic lesions on tobacco leaves
 - Nicotiana tabacum L. var Xanthi
 - Nicotiana glutinosa
 - Main Back draw:
 - increased demand
 - Low capacity
 - Lot of space for 1 test

~40m² per test

Table. Overview of published and ISHI-Veg tested Tobamovirus strains developing necrotic lesions on indicator plants used in Tobamo biossay

	Necrotic lesions				
Tobamo virus	Identity	source material	N. tabacum Xanti nc	N. glutinosa	Source
TBRFV	TO-150629-TBRFV-041	tomato leaf	+	+	Company 1
TBRFV	TO-151220-TBRFV-054	tomato leaf	+	+	Company 1
TBRFV	No identity	tomato leaf	+	+	Luria et al. 2017
TBRFV	No identity	n.k.	+	+	Company 2
TBRFV	No identity	tomato leaf	+	+	Company 3
TBRFV	No identity	n.k.	+	+	Company 4
TBRFV	No identity	Seeds	+	+	Company 5
TBRFV	No identity	Seeds	+	+	Company 6
ToMV	No identity	n.k.	+	+	DPVweb.net
TMV	No identity	n.k.	+	+	DPVweb.net
PMMoV	No identity	n.k.	+	+	DPVweb.net
TGMMV	No identity	n.k.	+	+	DPVweb.net
RMV	No identity	n.k.	+	+	DPVweb.net
BePMV	No identity	n.k.	nt	+	Verhoeven et al., 1995
ToMV	ToMV-D		nt	+	Verhoeven et al., 1995
ToMV	ToMV-O3		nt	+	Verhoeven et al., 1995
TMV	No identity	n.k.	nt	+	Verhoeven et al., 1995
PMMV	No identity	n.k.	nt	+	Verhoeven et al., 1995
TGMMV	PV0112		nt	+	Verhoeven et al., 1995



From: Blanchard, 'Tomato diseases

FN7A 7ADFN

Technical

Starting with LED

- Will it work?
- What type of LED?
- Brands?
- Who?



Max. output µmol/s per colour

2.2 µmol/J



Horticulture LED Solutions

PHILIPS

GreenPower LED production module Dynamic



67 32 29 24 Specifications Value 120 cm 150 cm Typical photon flux* 67 µmol/s 83 µmol/s 62 W Power consumption (max) 62 W 121.3 x 4.0 x 4.0 cm 151.3 x 4.0 x 4.0 cm Dimensions (excl. cables) 75 cm Power cable length 75 cm 75 cm 90 cm Data cable length Weight 2.0 kg 2.3 kg Dimmable Efficacy Up to 2.2 µmol/J light Light colours (channels) deep red, blue, white, far red output 120-277 V AC, 50-60 Hz Power input >0.9 Power factor 25.000 hrs. L90B50 Lifetime (@ 62W) (90% flux maintenance) (T, 25 °C / 77 °F) Adjustable Ingress protection rating IP66 light Passively air-cooled Cooling spectrum Easy to CE, RoHS, ISO Approval marks install Accessories Comprehensive range of accessories available for easy and guick installation Lighting control system GrowWise Control System User interface GrowWise Control Software Warranty 3 years Efficacy up to A total light output of 67 or 83 µmol/s is possible for most common

light recipes. Depending on the settings the photon flux, efficacy and power consumption will change.

Technical

Starting with LED

Just Do It

- We bought 2 research Danish Carts
- 3 layers
 - Each layer with 3 LED units fully programmable
- Started testing different light conditions.
- Goal:
 - Plants that look comparable to the control method
 - Same number of necrotic lesions





ENZA ZADEN **Technical**

Starting with LED

Just Do It





Output µmol/s per colour

84

35

Deep Red, Blue, White, Far red 40 4,8 4,5 1,2



ENZA ZADEN Before and After

It works, now what?

- Improve!
 - Plug and Play
- Implement
- Validate
- NAL certificate



ENZA ZADEN Before and After

It works, now what?

- Next step
- Difference between growth- and test carts
- More
 - 50 layers
 - ▶ 5 in 1 (200m² brought back to 40m²)



Now I should LED you ask a Question

Greenhouse Facilities

Niels Dekker

Ron Dijkstra

John Zwerver

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