



Nematodes: an increasing threat for the potato crop in Europe?

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Agriculture and Fisheries Policy Area

Nematodes considered threats to potato

EPPO quarantine and alert lists

A2-list:

Globodera rostochiensis and *G. pallida*

Ditylenchus desctructor

Meloidogyne chitwoodi

M. fallax

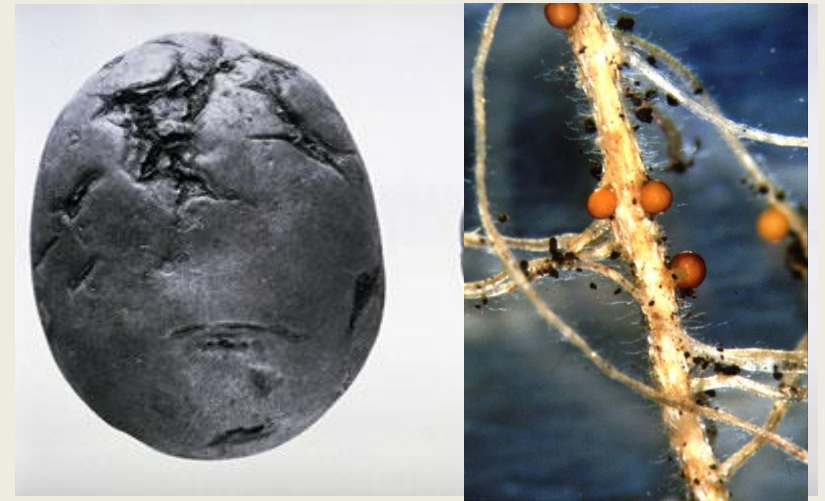
M. enterolobii

A1-list:

Nacobbus aberrans

Alert list:

M. ethiopica



Source: EPPO

Nematodes considered threats to potato

EU phytosanitary regulations

Globodera rostochiensis and *G. pallida*:

Potato cyst nematode directive 2007/33/EC (applied 2010)

Ditylenchus desctructor

Meloidogyne chitwoodi and *M. fallax*

Nacobbus aberrans

Plant Health Directive 2000/29/EC :

M. enterolobii

M. ethiopica

no regulations (yet)

Nematodes considered threats to potato

Plant Health Directive 2000/29/EC

No import of
seed potato
from outside EU

Trade of ware potato
restricted
to listed countries

Plants for planting free
of Q nematodes
(passport)

Plants in
growing medium/soil
free of harmful
nematodes

WE ARE SAFE !

International trade

Belgium: the largest importer of potatoes in the world

Source: Belgapom & GTIS – World Potato Markets (1 312 659 ton in 2010-11)

Top 8 importing countries in the EU

imported **5 281 775 ton** ware potato in 2010/2011

Interceptions of nematodes on all commodities imported into the EU
Data from EUROPHYT (all EU Member States) (2009-2013):

1177 interceptions because of nematodes in **5 years**

- > 355 plants for planting
- > 115 wood and bark
- > 19 aquatic plants
- > 5 soil/growing media
- > 2 in ware potato

ARE WE SAFE ?

International trade

- Enormous amounts of commodities: we cannot check everything
- Different EU countries perform inspection differently
- Some regulations inadequate: e.g. visual inspection for *Meloidogyne chitwoodi* & *M. fallax*
- Soil adhering to tubers is not regulated



Photo: PCA

Trade and spread within the EU

POTATO CYST NEMATODES (PCN)

EU directive 2007/33/EC: *Globodera rostochiensis* and *G. pallida*

→ statutory field sampling (1500 ml/ha) for seed potato

→ annual survey in every country

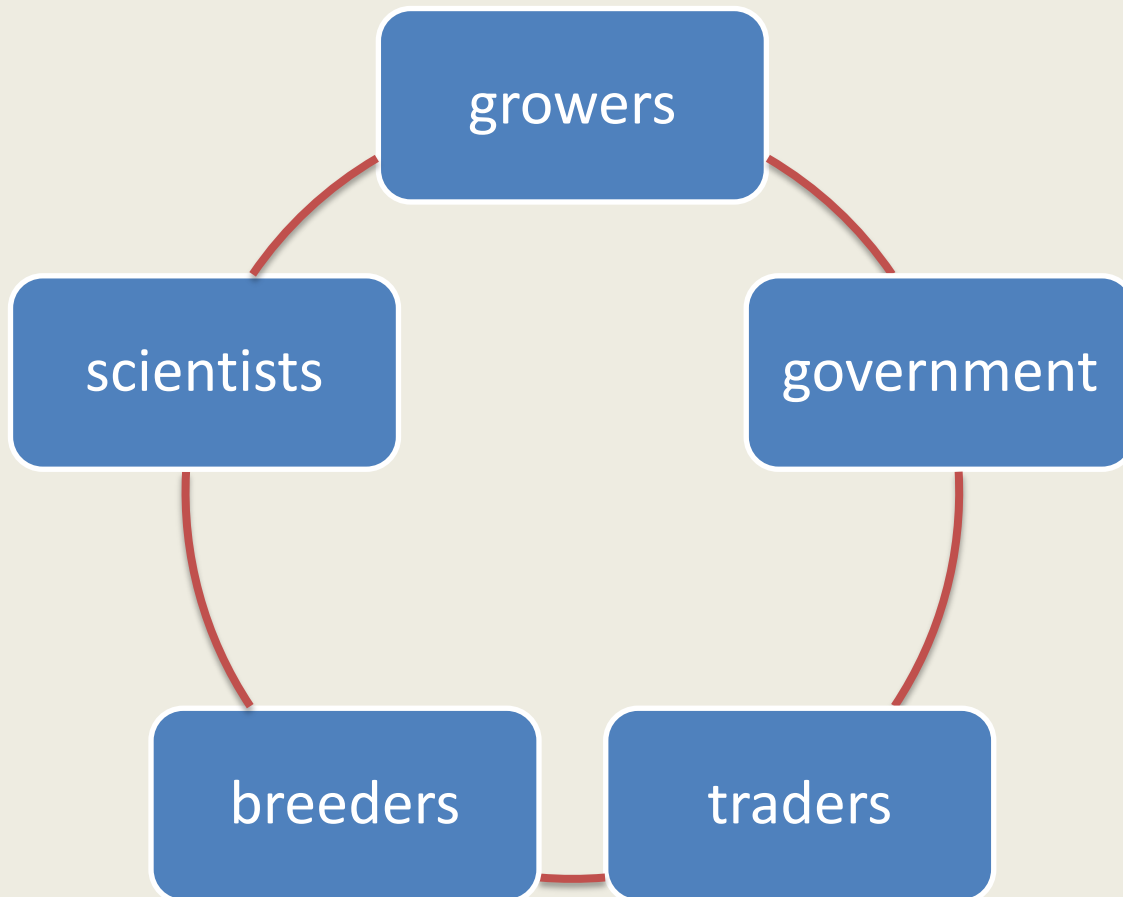
→ measures (rotation, resistant varieties, nematicides, trap cropping...)



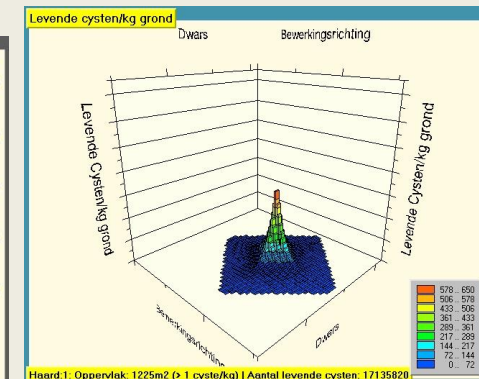
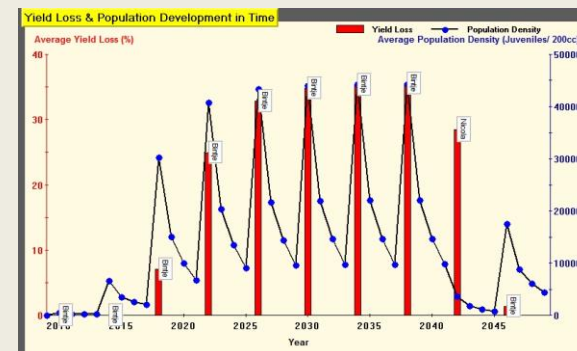
Trade and spread within the EU

POTATO CYST NEMATODES (PCN)

“PCN is not a problem in the Netherlands”



- awareness of growers and trade
- intensive sampling-monitoring
- species level
- resistant varieties
- nematicides
- trap cropping
- decision support system (NemaDecide)



Trade and spread within the EU

POTATO CYST NEMATODES (PCN)

PCN is still a problem in the EU!

- Ignorance
problem &
solutions
- Spread of cysts
 - machinery
 - waste soil

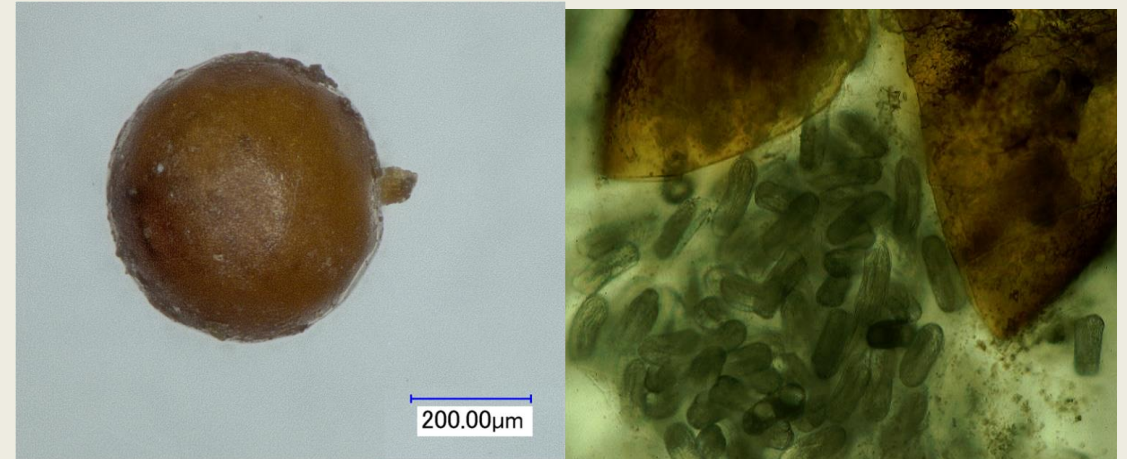


Photo: T. Been

Trade, and spread within the EU

SOIL= PASSIVE SPREAD OF PCN



Soil loss (ton/ha/harvest)

	MEAN	MIN - MAX
Potato harvest: 29 fields tested	3.2	0.2 – 21,4
- soil adhering to tubers	1.2	0.2 – 3,6
- lose chunks of soil	1.9	0.0 – 21,0
- stones	0.2	0.0 – 4,4
Sugar beet harvest 26 fields tested	3.6	0.7 – 30,1

Ruysschaert et al., 2007

Soil returned to fields:
different fields, regions, countries,....

Belgium:
315 random samples tare soil
of ware potato (incl. import): 22%
contained PCN

Trade, and spread within the EU

SOIL= PASSIVE SPREAD OF NEMATODES



- *Meloidogyne* spp.
- *Pratylenchus* spp.
- Trichodoridae
-

Survival?

root-knot nematodes (*Meloidogyne* spp.)



M. chitwoodi – Q



M. minor- not Q



lesion nematodes (*Pratylenchus* spp.)



trichodorids

(*Trichodorus* spp., *Paratrichodorus* spp.)



damaged leek roots

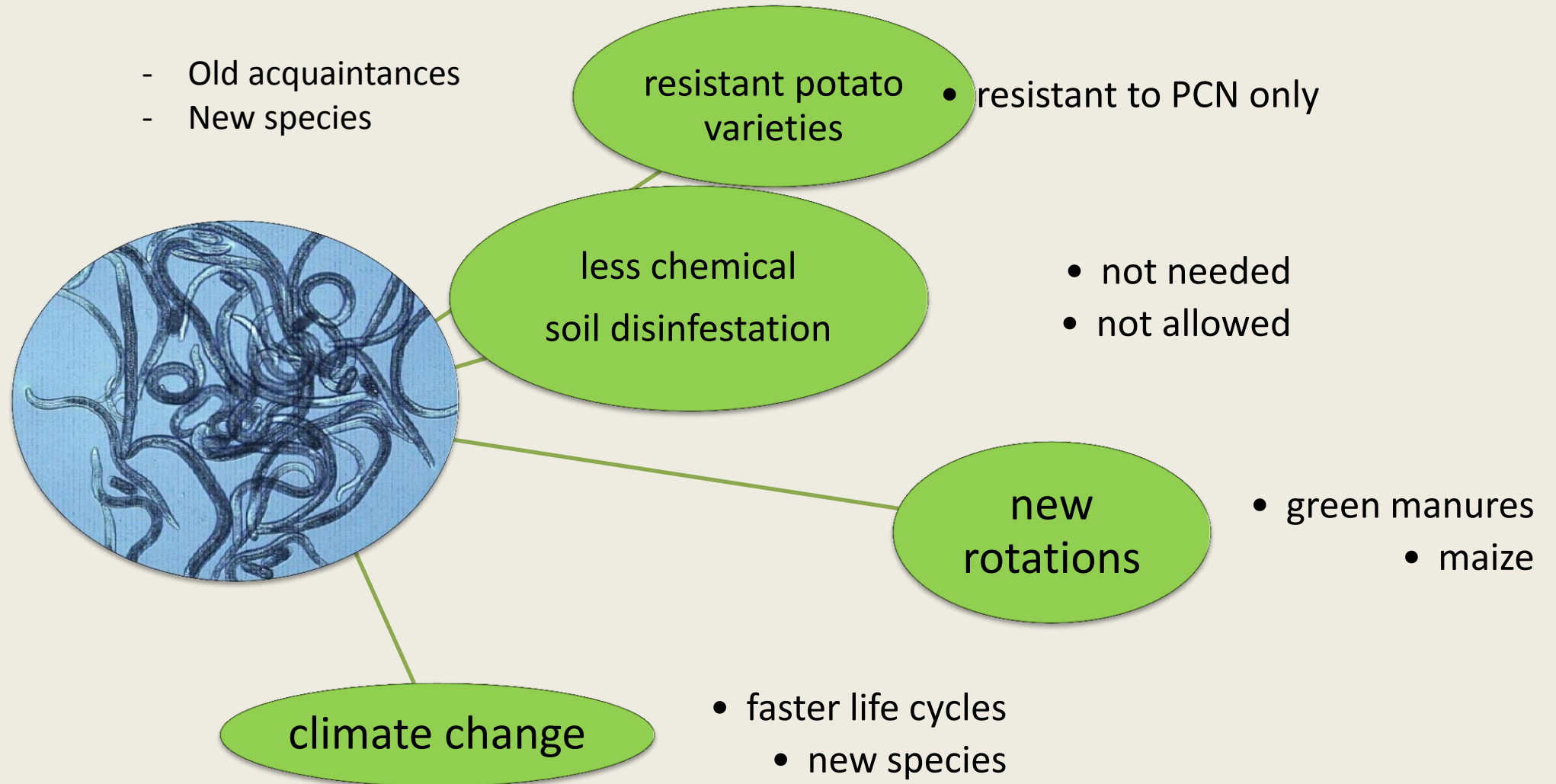


TRV
spraing
symptoms



Nematodes: an increasing threat for potato

NON-QUARANTINE NEMATODES ON THE RISE



Nematodes: an increasing threat for potato

SEED POTATO = PASSIVE SPREAD OF NEMATODES

❑ certified seed potato

- pre-plant soil sampling *Globodera* spp.
- visual inspection for quarantine *Meloidogyne* spp.
- **no inspection** for other nematode species

❑ farm-saved seed potato



Belgium: 160 samples of seed potato/year
inspected for *Meloidogyne* spp.
based on nematode extraction from potato peels

➡ about 30% of samples contain *Pratylenchus* spp. !



Nematodes: an increasing threat for potato

SPECIES EXPANDING IN EU

FIELD DAMAGE IN POTATO BY LESION NEMATODE *PRATYLENCHUS PENETRANS*, ITS ASSOCIATION WITH TUBER SYMPTOMS AND ITS SURVIVAL IN STORAGE

R. Holgado et al., 2009, *Nematol. medit*

Root-lesion nematodes, *Pratylenchus* spp., parasitizing potato in Portugal

I. Esteves , C. Maleita and I. Abrantes

Abstract 6th International Congress of Nematology, May 2014

Root-knot nematodes (*Meloidogyne* spp.), a growing problem in French vegetable crops.

C. Djian-Caporalino, EPPO Bulletin, 2012

...we observe in **Germany** over the last few years increasing nematode densities and damage caused by ***Pratylenchus*** (potato, cereals), ***Trichodorus*** (potato) ...

(pers.comm. J. Hallman, 2014)

Nematodes: an increasing threat for potato

NEW CROPS AND ROTATIONS



green manures & energy crops
yellow mustard
rapeseed,
fodder radish, ...

maize

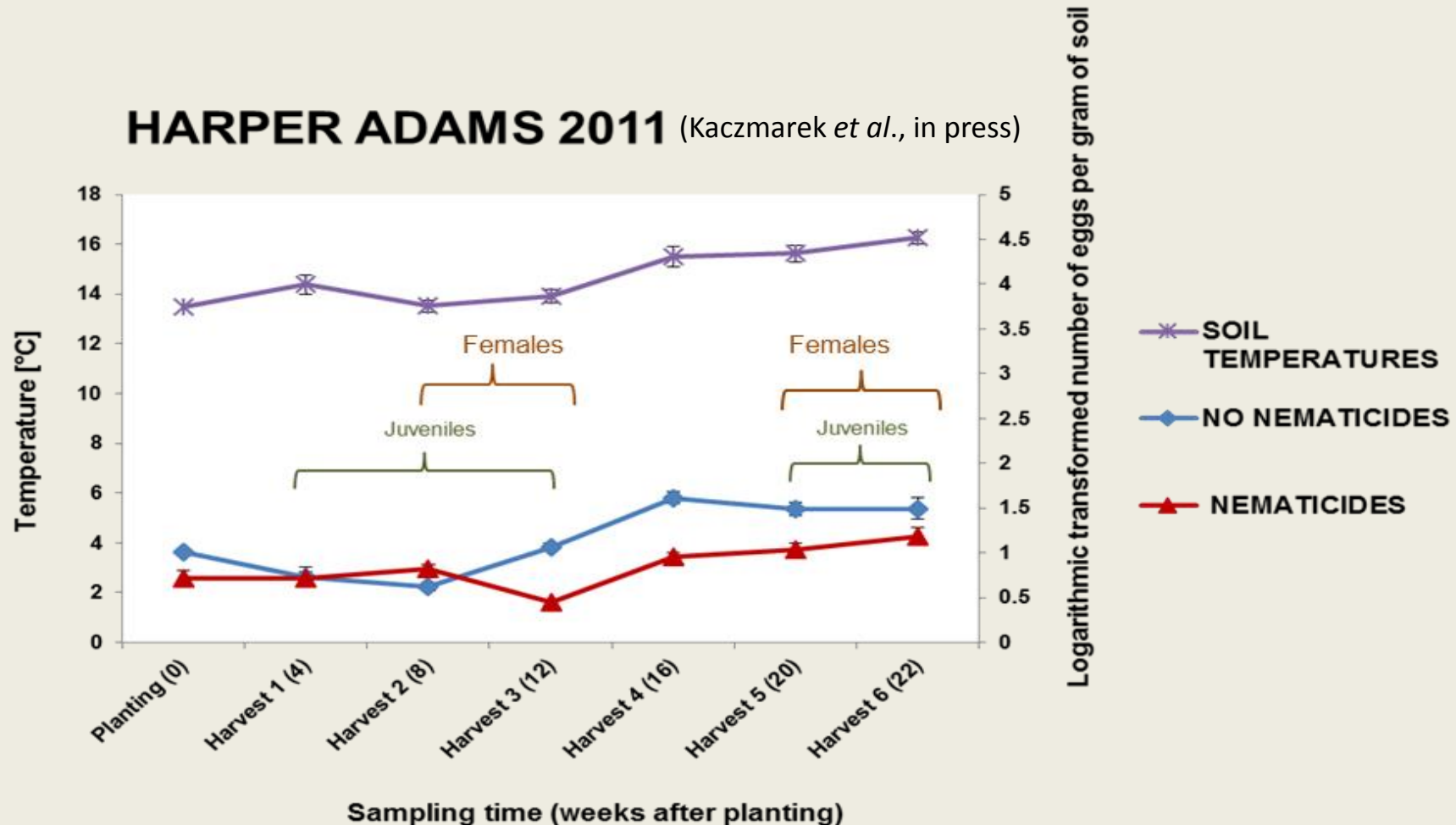


lawn turf

Nematodes: an increasing threat for potato

CLIMATE CHANGE?

2 generations of PCN per growing season in northern EU?



Nematodes: an increasing threat for potato

NEW SPECIES IN EU

First report of the root-knot nematode *Meloidogyne ethiopica* on tomato in Slovenia.

Sirca S. *et al.*, Plant Disease, **2004**

Description of *Meloidogyne minor* n. sp (Nematode: Meloidogynidae), a root-knot nematode associated with yellow patch disease in golf courses

Karssen *et al.*, Nematology, **2004**

First Report of the Root-Knot Nematode *Meloidogyne minor* on Turfgrass in Belgium

Viaene *et al.*, Plant Disease, **2007**,

Nouvelle espèce de nematode dans les serres suisses

Kiewnick S. *et al.*, *Der Gemüsebau/Le Maraîcher*, **2008**

[*Meloidogyne enterolobii*]

First Report of Root-Knot Nematode *Meloidogyne*

hispanica Infecting Grapevines in Southern Spain.

Castillo *et al.*, Plant Disease, **2009**



Nematodes: an increasing threat for potato

THE UNKNOWNNS



Yam (*Dioscorea* spp.)
Africa: 96% global production



Photos: Kolombia, Van Vaerenberg

Nematodes: an increasing threat for potato

THE UNKNOWNNS



infected tubers



healthy tuber

Photos: Mwamula (left) and Kolombia (right)

Nematodes: an increasing threat for potato

THE (UN)KNOWNNS

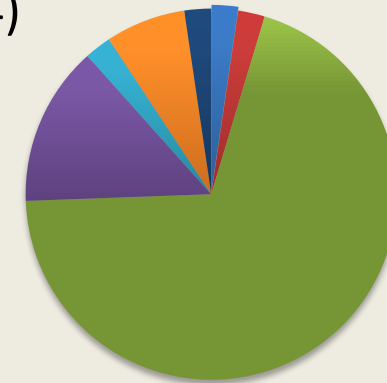
Scutellonema bradys, the yam nematode
(Mwamula, 2013)

found in 4 out of 18 yam tubers
sold in Belgian stores (22%)



Photo: Coyne, D., IITA

Species composition of 42 *Meloidogyne* populations
isolated from yam in Nigeria
(Kolombia et al., 2014)



- M. arenaria
- **M. enterolobii**
- M. incognita
- M. javanica
- M. arenaria & M. incognita
- M. enterolobii & M. incognita
- M. enterolobii, M. incognita & M. javanica

Nematodes: an increasing threat for potato

THE KNOWN & UNKNOWN

the known knowns

the known unknowns

Meloidogyne spp.

Pratylenchus spp.

Paratrichodorus sp.

Longidorus spp.

Belonolaimus longicaudatus

Scutellonema sp.

the unknown unknowns !?!?

Nematodes: an increasing threat for potato

THE KNOWN & UNKNOWN

We know the unknowns:

- Investigate – pest risk analysis
- Monitor
- Make people aware

→ Roles for scientists, NPPOs, EPPO, EU, but also for the potato trade



Unknown unknowns: keep our eyes and ears open

Nematodes: an increasing threat for potato

THE GOOD NEWS

- Molecular identification tools: species and pathotypes
- Decision support systems
- Treatments and regulations for waste soil
- New plant health directive
- Resistance
- New nematicides





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Thank you for your attention!

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