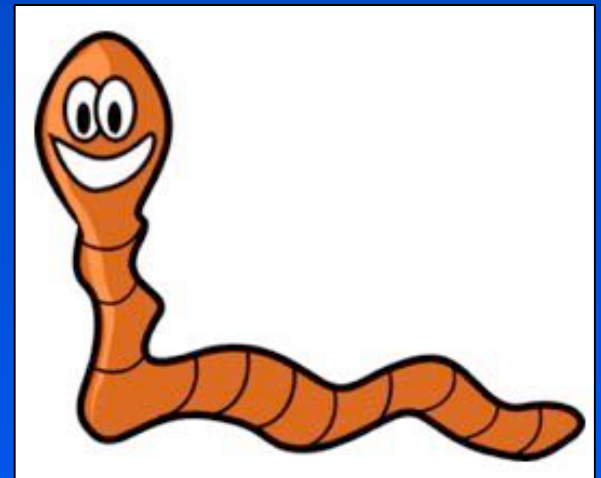


# Nematode Management for Pitahaya Production

Antoon Ploeg  
Department of Nematology  
University of California, Riverside

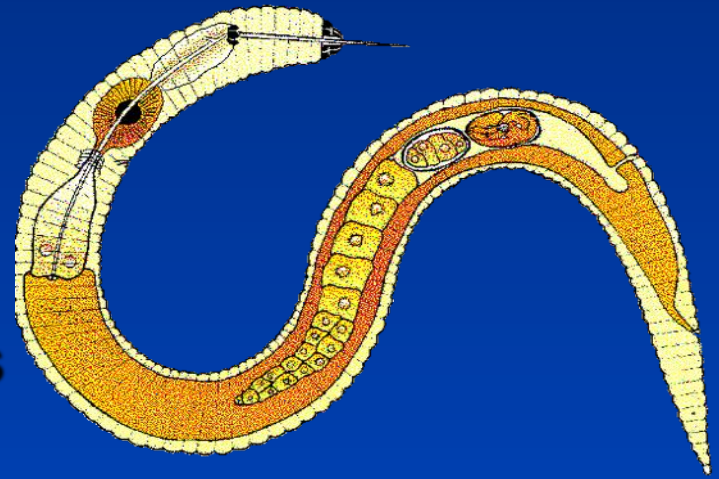
[antoon.ploeg@ucr.edu](mailto:antoon.ploeg@ucr.edu)

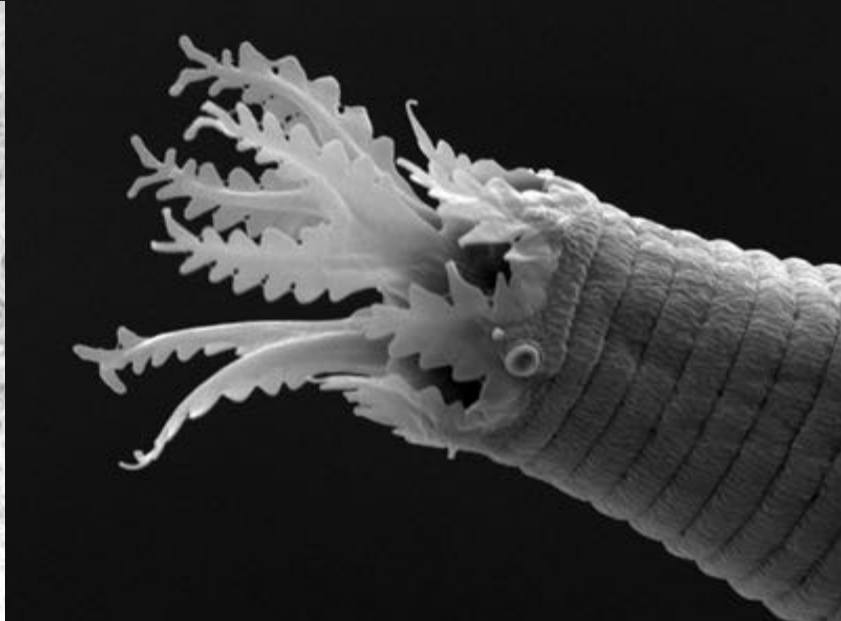
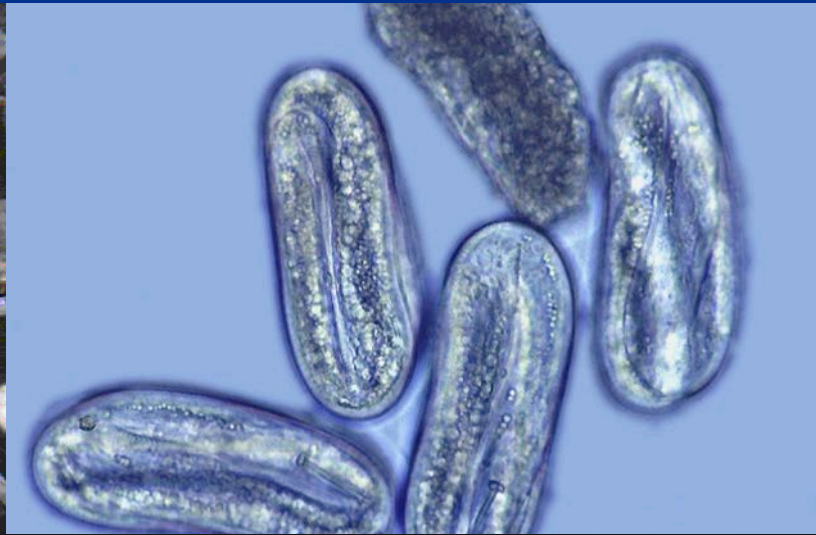
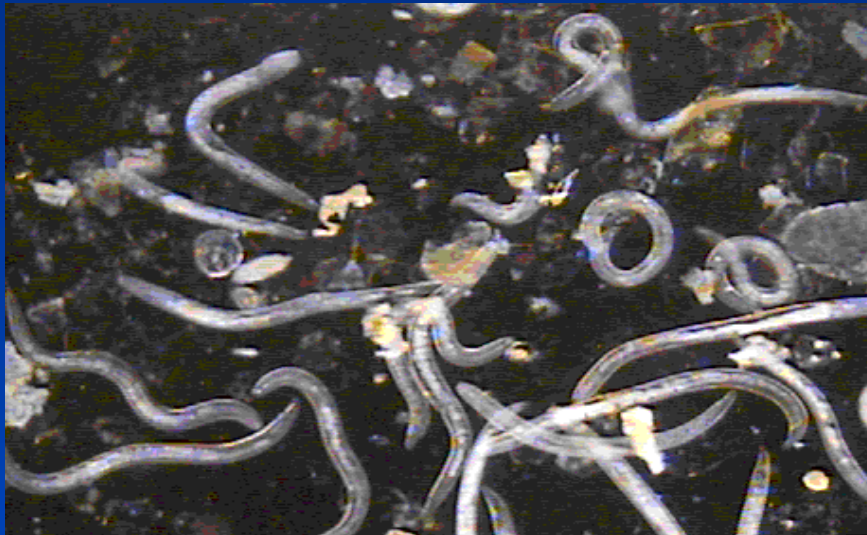
San Marcos, August 21, 2015



# What are nematodes?

- unsegmented, aquatic roundworms
- possess digestive, nervous, excretory, and reproductive systems; no circulatory or respiratory system
- range in size from 1/16 inch to over 24 ft
- ubiquitous
- 500,000 species(?), most abundant multicellular organisms





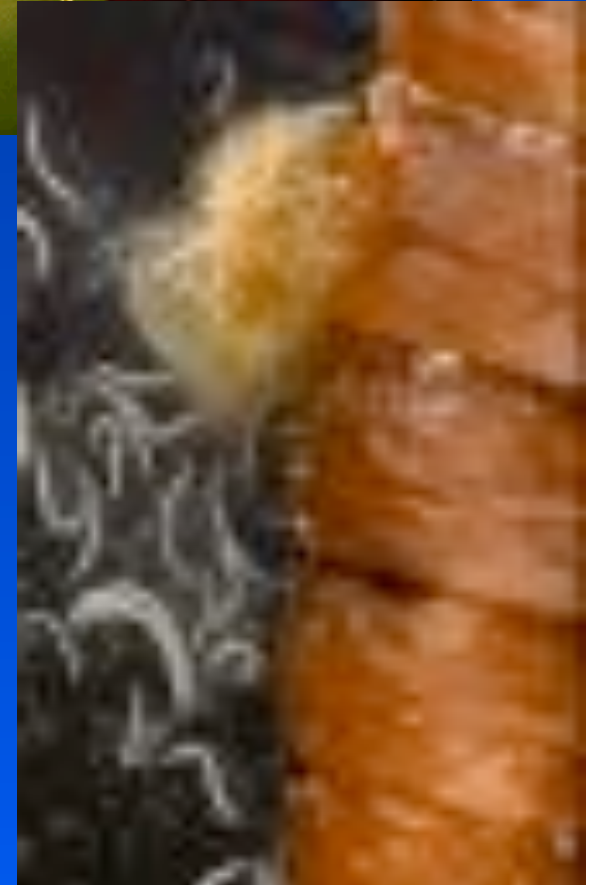
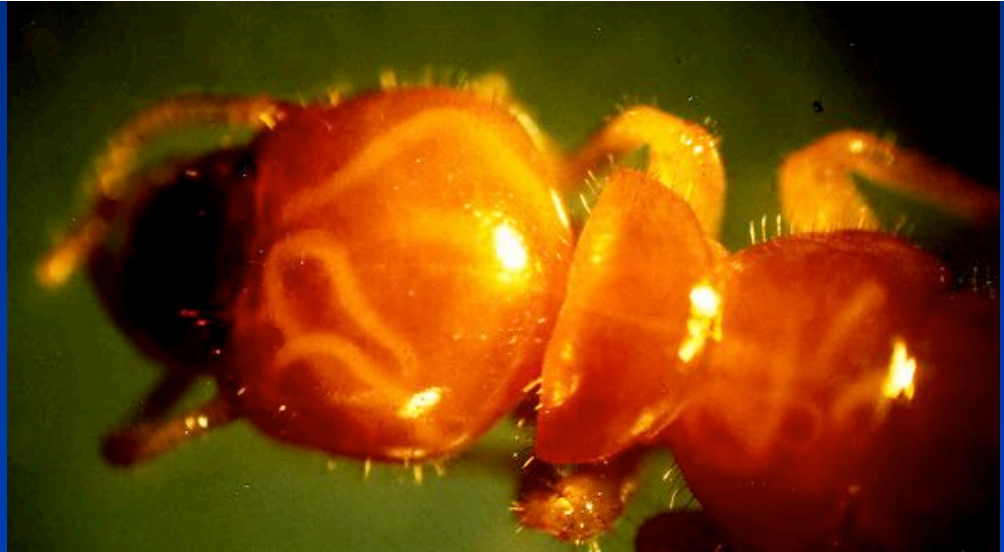
" If all the matter in the universe except the nematodes were swept away, our world would still be dimly recognizable..." N.A. Cobb, 1914

“Elephantiasis” -  
a nematode parasite  
of humans.





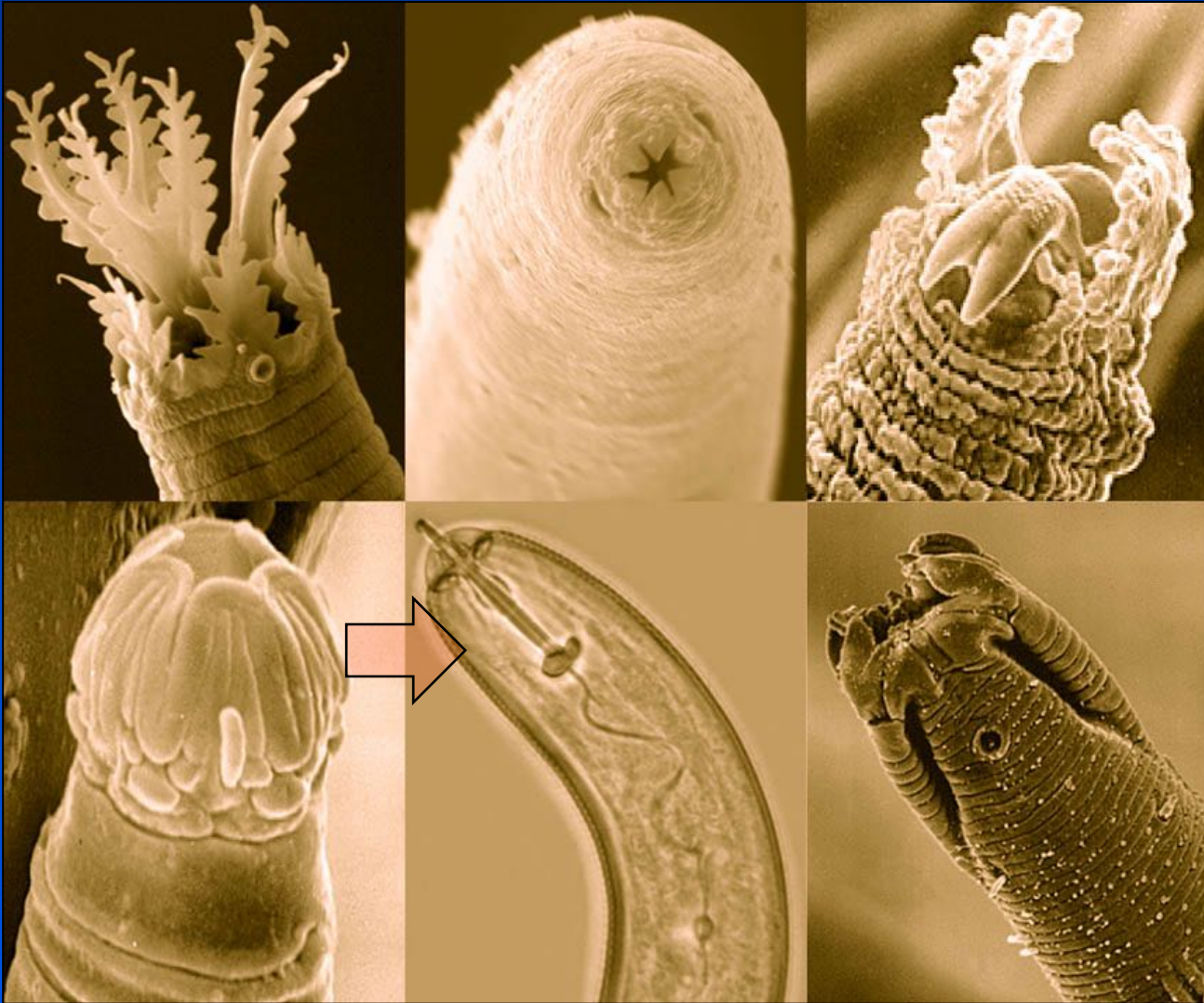
# Entomopathogenic nematodes



“Mononchus” - predator  
nematodes eating other  
nematodes.







## Plant-parasitic nematodes

- every plant species can be attacked by nematodes.
- many nematodes can attack different plant species.



## Plant-parasitic nematodes

- all have a stylet to penetrate cell walls.
- all lay eggs, have 4 juvenile stages, then become adults.
- most live always in soil, but not all!
- they need water.

ARAUJO, L. & MEDINA, O., 2008.- Reconocimiento de patógenos asociados al cultivo de pitahaya amarilla (*Selenicereus melaganthus* Haw.) en el departamento de Valle del Cauca. Trabajo de grado presentado como requisito para optar al título de Microbiólogo. Universidad Popular del Cesar.

CASTAÑO, S.; RINCÓN, A. & VARÓN, F., 1989.- Observaciones preliminares sobre el manejo de nemátodos en pitahaya *Acanthocereus* pitahaya. ASCOLFI Informa 15(5): 48-49.

PALACINO, J.H., 1990.- Interacción entre *Glomus manihotis* y *Meloidogyne incognita* en pitaya amarilla y roja bajo condiciones de vivero. Cenicafé (Colombia) 41 (3): 80-90.

CASTAÑO, S. & VARÓN F., 1989.- Reconocimiento y evaluación del daño de nematodos asociados con Pitahaya *Acanthocereus* pitahaya. ASCOLFI Informa 15(5): 46- 48.

VARÓN, F., 2006.- Enfermedades del cultivo de la pitahaya y su manejo. Revista ASIAVA. pp 17-21.

## **Yahoo Group: Pitaya And Other Dessert-Fruiting Cacti**

*Hi all, I currently find myself in a battle with root knot nematodes, which, through my own carelessness, I have allowed to spread throughout my yard. So far though, they don't seem to be affecting the dragon fruit. I haven't found any useful info on the web as to whether nematodes cause damage to them.*

*Can anyone shed light on this situation? I know that treating them so far has been not so successful.*



## **Nematode damage**

**Excellent start, good yield and fruit size.**

**Destroyed the plants in years 4 & 5.**



**from; Noemi el-Zur  
7<sup>th</sup> Int. Cactus Congress, 2010**

## Pitaya pests

In tropical countries pitayas are infested with many fungi, bacteria, viruses, insects and nematodes. In Israel which is a semi-arid zone, this crop was free from any pests for many years. Only recently we found that two nematode species are causing damage mainly to the *Selenicereus megalanthus* and few other *Hylocereus* genotypes. *The nematodes belong to the Meloidogyne genus; they are M. incognita and M. javanica, and cause problems only in sandy soils. Resistant clones of pitayas are available to be used as rootstocks. It is very easy to graft these plants and they become productive one year after grafting.*

**Yosef Mizrahi**

Department of Life Sciences, Ben-Gurion University of the Negev, Beer-Sheva, Israel. E-mail: [mizrahi@bgu.ac.il](mailto:mizrahi@bgu.ac.il)



## RECONOCIMIENTO DE NEMATODOS FITOPARÁSITOS EN PITAHAYA AMARILLA (*Selenicereus megalanthus* HAW.)

Óscar Adrián Guzmán-Piedrabita,<sup>1</sup> Leonardo Pérez<sup>2</sup> y Andrés Patiño<sup>3</sup>

### IDENTIFICATION OF PLANT PHYTOPARASITE NEMATODES IN YELLOW PITAHAYA (*Selenicereus megalanthus* HAW.)

#### Abstract

The phytoparasite nematodes cause lesions in the pitahaya roots system affecting both the vegetative and reproductive growth. The objective of this study was to characterize the phytonematodes affecting the roots system of yellow pitahaya in farms affiliated to the Association of Producers of Yellow Pitahaya (ASOPPITAYA). Samples of roots and soil were collected in 22 farms of the departments of Quindío, Risaralda and Valle del Cauca. The phytonematodes samples were extracted following the centrifugation and flotation in sugar method, and identified using taxonomic keys. The specie *Helicotylenchus dihystera* was identified and the genera *Meloidogyne*, *Dorylaimus*, *Tylenchus*, *Aphelenchus* and *Pratylenchus* were also recognized , with a frequency of 100, 50, 27, 23 and 5%, respectively. *H. dihystera* presented the highest population with 12,360 individuals/ 100g of roots and soil; followed by *Meloidogyne* with 2,742 juvenile stages (J2)/100g of roots and soil. It was demonstrated that *H. dihystera* is the most limitant phytoparasite nematode of pitahaya, requiring monitoring of its populations to implement integrated management practices.

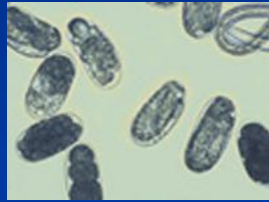
**Key words:** Phytonematodes, frequency, *Helicotylenchus dihystera*, *Meloidogyne*.



## Root-knot nematodes

- *Meloidogyne incognita*
- *M. javanica*
- (*M. hapla*)
- (*M. arenaria*)
- (*M. chitwoodi*)
- Usually on sandy/loamy soil
- wide host range
- rapid multiplication - depends on temperature
- economically very important (25-40% loss)





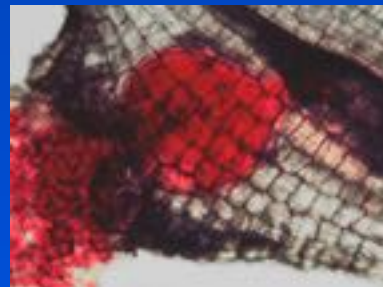
eggs (&J2) overwinter  
in absence of host.



J2 hatch and  
invade host.



J2 develop  
inside host.



Females form and  
deposit eggs

## Root symptoms are very obvious

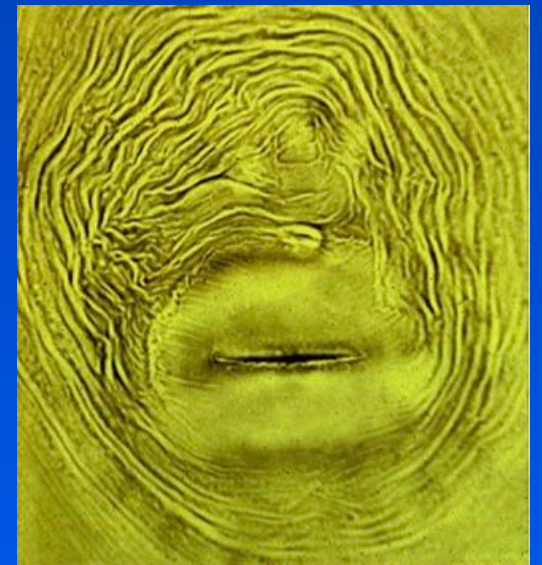
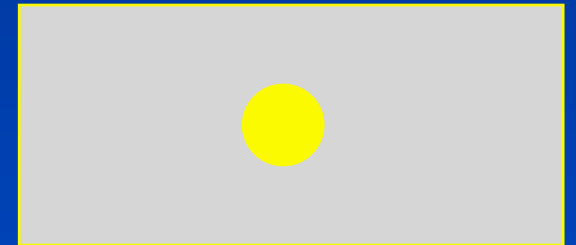
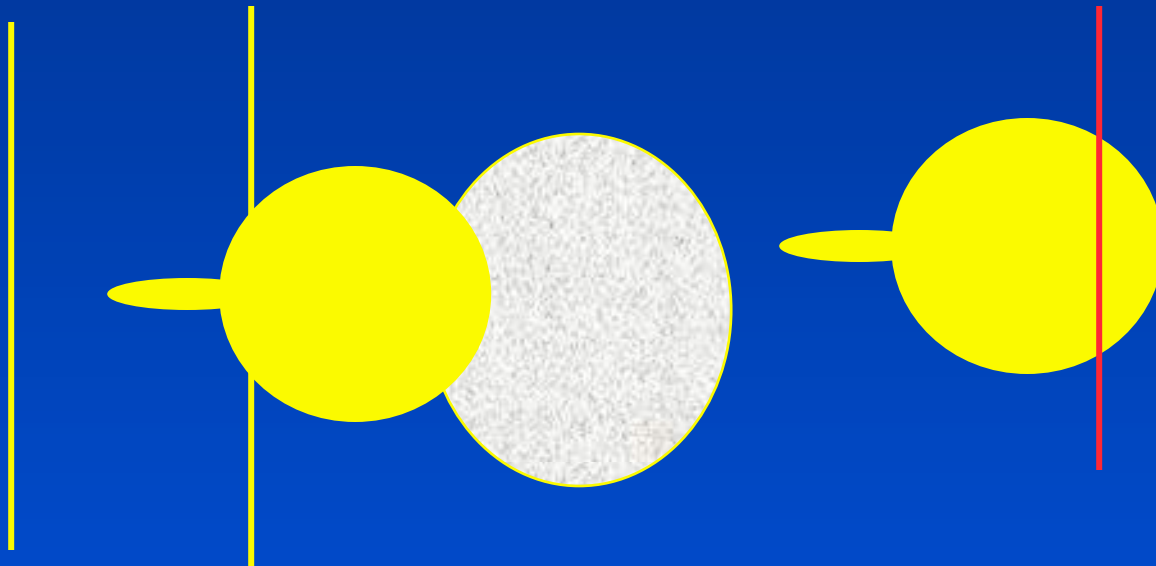




## Control/Management:

- *Which nematodes are present?*
- *How many nematodes are present?*
- *How many nematodes are damaging?*

*Which nematodes are present?*



## host range:

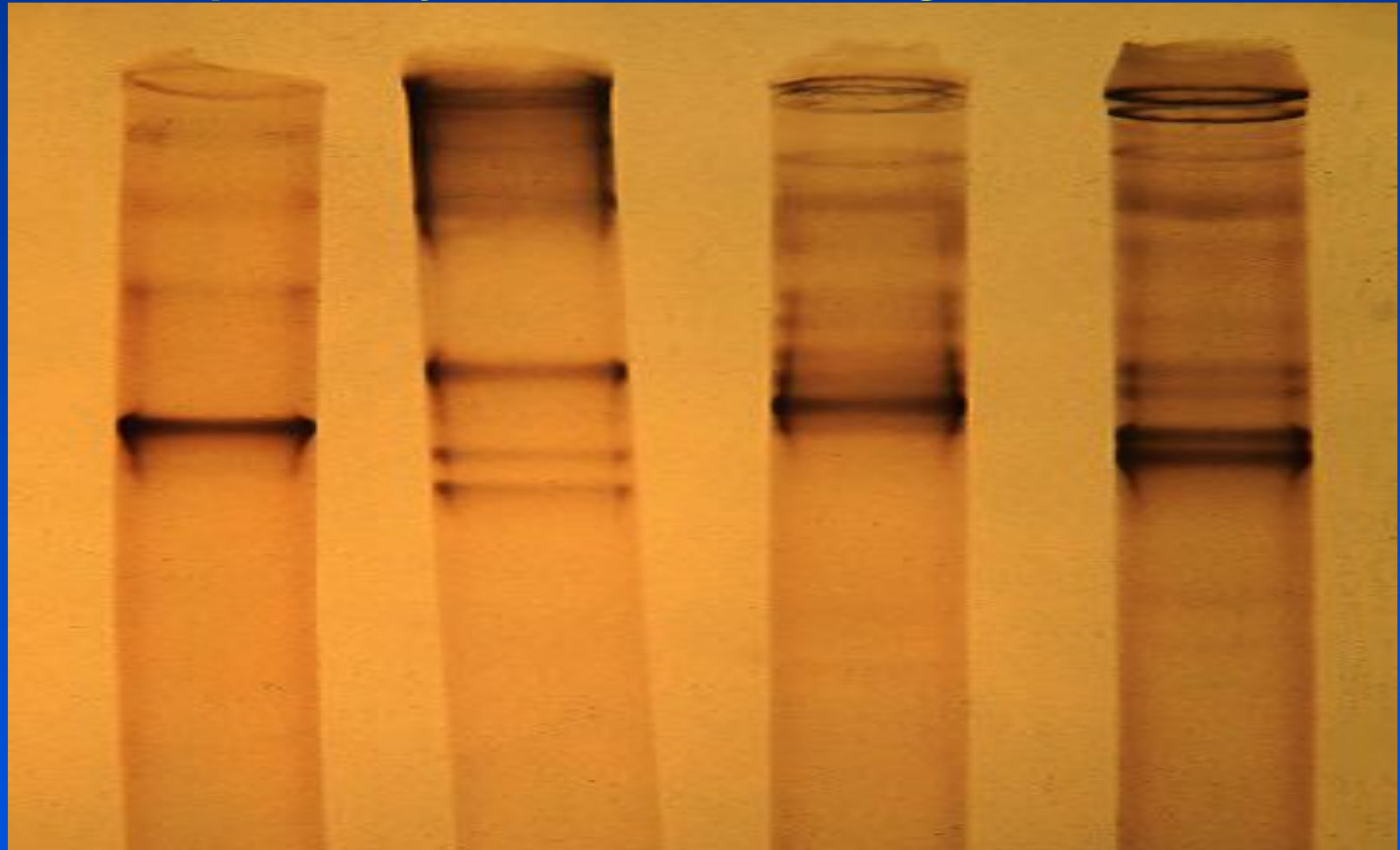
	tobacco	cotton	pepper	watermelon	peanut	tomato
<b>M. incognita</b>						
race1	-	-	+	+	-	+
race2	+	-	+	+	-	+
race3	-	+	+	+	-	+
race4	+	+	+	+	-	+
<b>M. arenaria</b>						
race1	+	-	+	+	+	+
race2	+	-	-	+	+	+
<b>M. javanica</b>	+	-	-	+	-	+
<b>M. hapla</b>	+	-	+	-	+	+



## isozyme patterns:

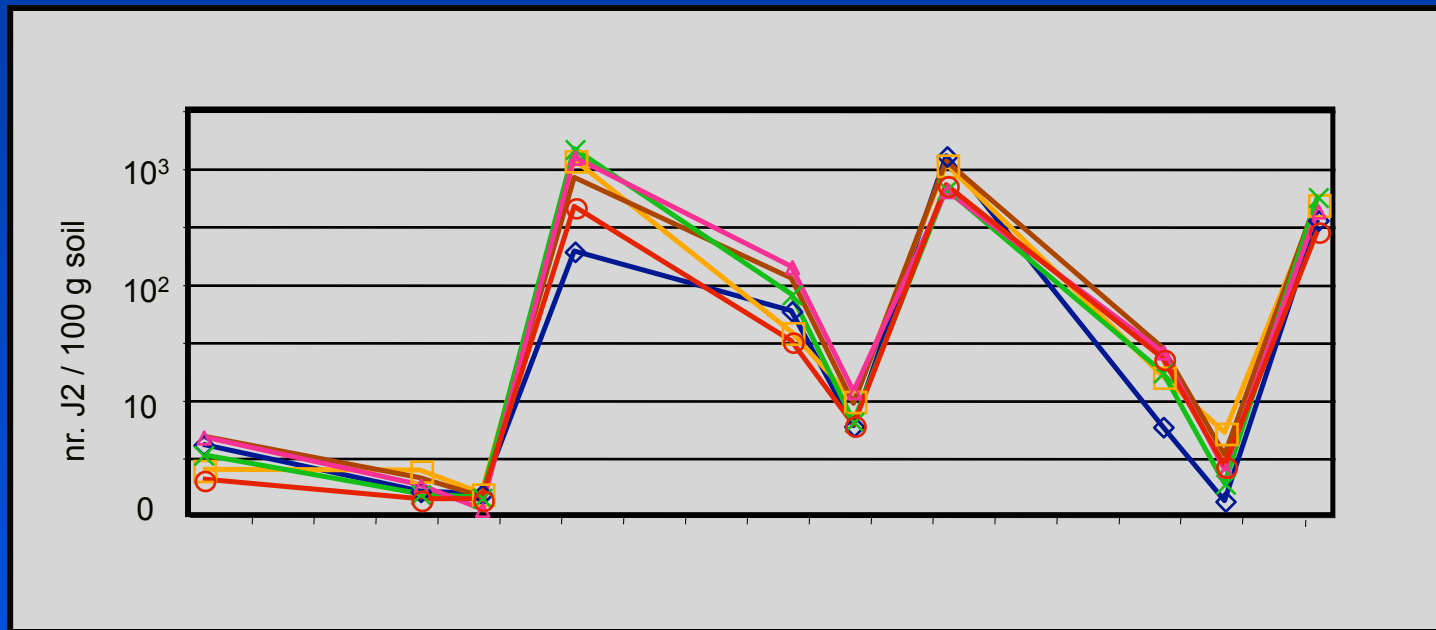
- based on differences in proteins
- quick, reliable, relatively easy to learn
- no race identification
- difficult when mixed populations occur
- requires special apparatus/chemicals

**M. hapla, M. javanica M. incognita M. arenaria**



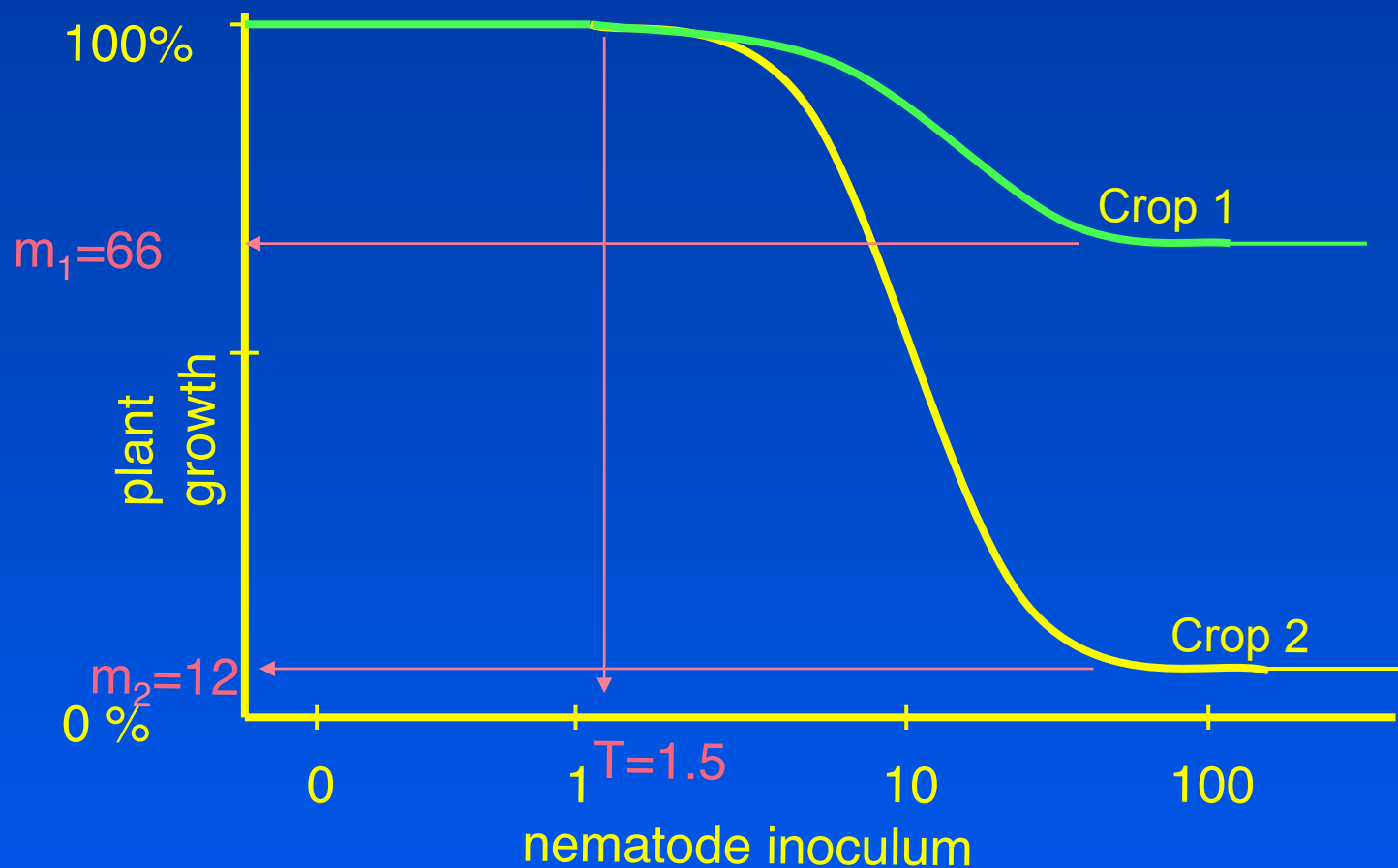
## How many nematodes are present?

- soil sampling - when?



## How many nematodes are damaging?

- depends on the crop, nematode species, soil type, climate, etc.





## *Management/Control*

- Prevent introduction – clean planting material
- Prevent spread – machinery, water
- Chemical control - ???

## *Management/Control*

- Using resistant cultivars
  - Requires few changes in cropping practices
  - Very few nematode resistant crops
  - Grafting could be used (mainly in tree crops)



## *Drawbacks:*

- 2x seed necessary
- lots of manual labor
- makes it viable only in high value annual crops or perennial crops.

## *Solarization*

- solarization works in upper layers only
- only in certain areas
- gives plant time to grow before nematodes come in.





## *Overall*

- Very little documented information available:
  - nematode species – Pitahaya associations
  - symptoms
  - damage potential
  - host status
  - tolerance / resistance
  - control / management
- ..but..some of this information would not be too difficult to obtain.....

*Questions / More Information:*

*contact your local UC Farm Advisor  
(or me: [antoon.ploeg@ucr.edu](mailto:antoon.ploeg@ucr.edu)).*