

# ROOT-KNOT NEMATODE CONTROL ON TOBACCO: ALTERNATIVES TO FUMIGANT NEMATOCIDES

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**TOBACCO RESEARCH BOARD**

**KUTSAGA**

# Presentation Outline

- Background
- Objectives
- Materials and Methods
- Results and Discussion
- Conclusion
- Acknowledgments

# Background

- ❑ Tobacco is the largest agricultural export commodity in Zimbabwe
- ❑ Flue-cured tobacco – largest proportion
- ❑ Mostly grown on sandy soils - **Root-knot nematodes** (RKN) is a very serious pest



# Background cont'd

## RKN - Management

### Crop rotations

Sunnhemp,  
Katambora  
Rhodes grass

### Resistant Cultivars



### Chemical (Fumigants)

Methyl bromide,  
EDB, 1,3-D...

- Extremely effective  
& inexpensive

... they pose a serious threat to the  
ecological balance

# Background cont'd

- ❑ Thus globally, there has been a general trend of **banning, phasing out** and **de-registration** of most fumigant nematicides
- ❑ Hence, there is a need for research aimed at developing economically feasible and environmentally compatible alternatives

# Objectives

- To evaluate/validate the efficacy of alternative chemical nematicides for RKN control in:
  - conventional tobacco seedling production system and
  - tobacco fields.

# Conventional seedbed trials

# Materials and Methods

## Conventional seedbed trials

- **Design:** Split-plot in 3 RCB
- **Main plot:** Tobacco cultivars  
K M10 & K RK64





# Materials and Methods cont'd

## Conventional seedbed trials

### □ Sub plot : Nematicides

#### 1<sup>st</sup> trial

1. Untreated control
2. Methyl bromide (35 g/m<sup>2</sup>)
3. Metham sodium (100 ml/m<sup>2</sup>)
4. Metham potassium (100 ml/m<sup>2</sup>)
5. 3 rates: Oxamyl

#### 2<sup>nd</sup> trial

1. Untreated control
2. Methyl bromide (35 g/m<sup>2</sup>)
3. Fluopyram (0.5 ml/m<sup>2</sup>)
4. Fluopyram (1 ml/m<sup>2</sup>)
5. Fluopyram (2 ml/m<sup>2</sup>)

# Root-knot nematode assessment

□ Daulton and Nasbaum (1961) scale of 0 – 8

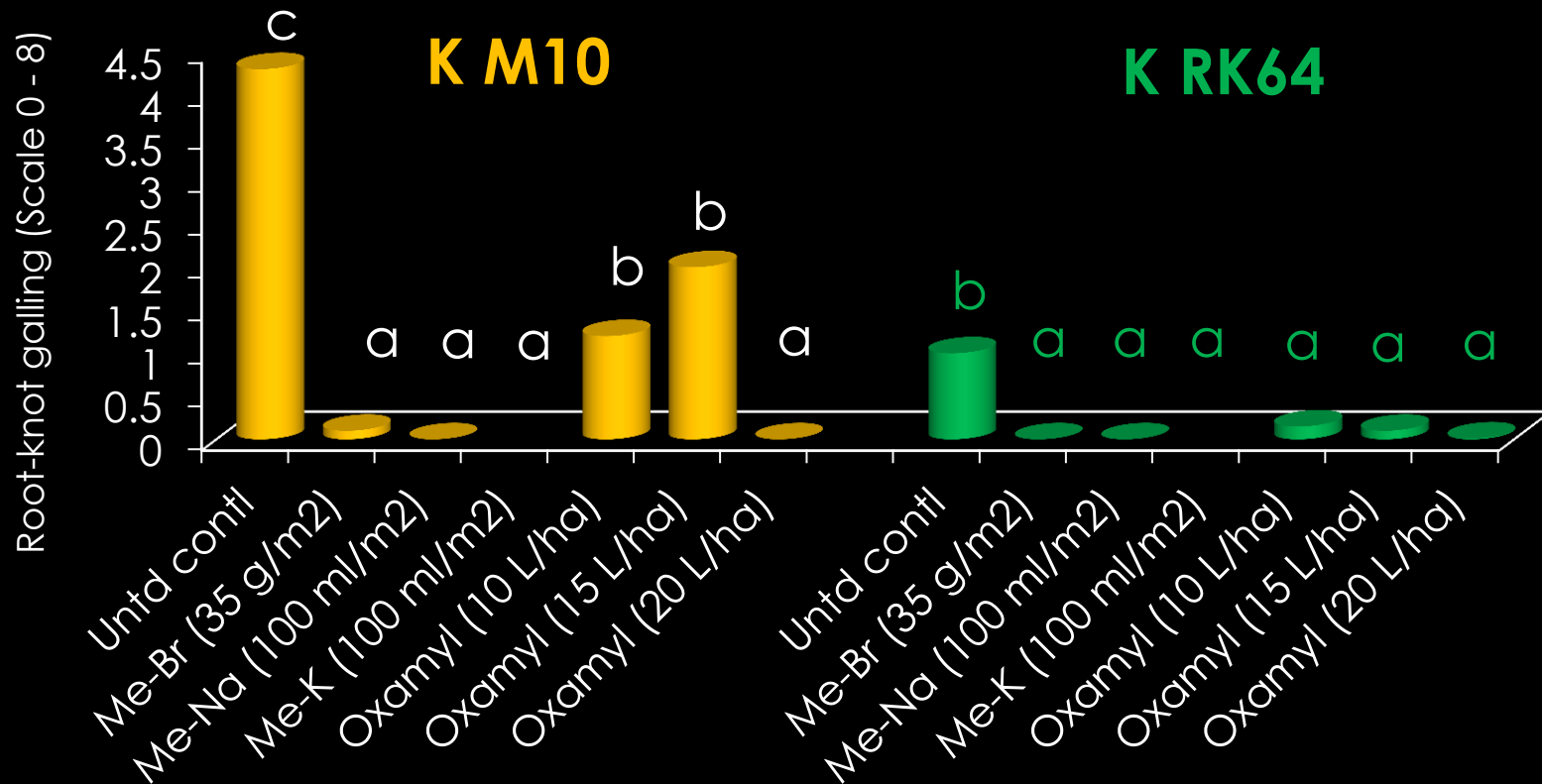
Infection class	Index value	Degree of galling
0	0	Free from galls
1	1	< 5 galls
2	5	Trace to 25 galls
3	10	20 – 100 galls
4	25	Moderate galls
5	50	Many coalesced
6	75	Heavy, mostly coalesced
7	90	Very heavy, mass invasions
8	100	Mass invasion, no root development

# Data Analysis

- ❑ The RKN gall ratings were subjected to analysis of variance (ANOVA) using GenStat 17th edition (2014, VSN International)
- ❑ Treatment means were separated using the Least Significance Difference at  $P < 0.05$

# Results – Conventional seedbeds

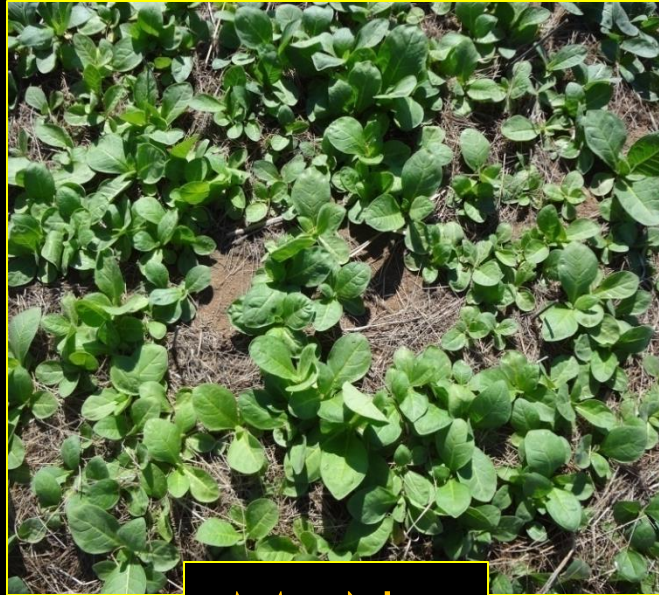
Fig. 1



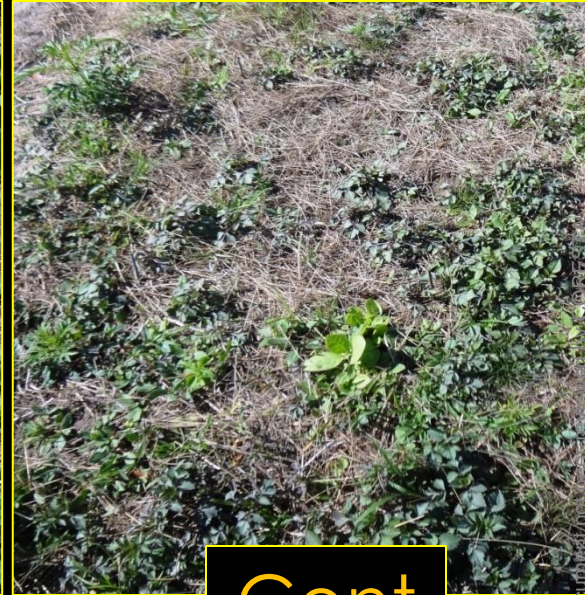
# Key observation: Seedlings in MeBr, MeNa and untreated plots



MeBr



MeNa

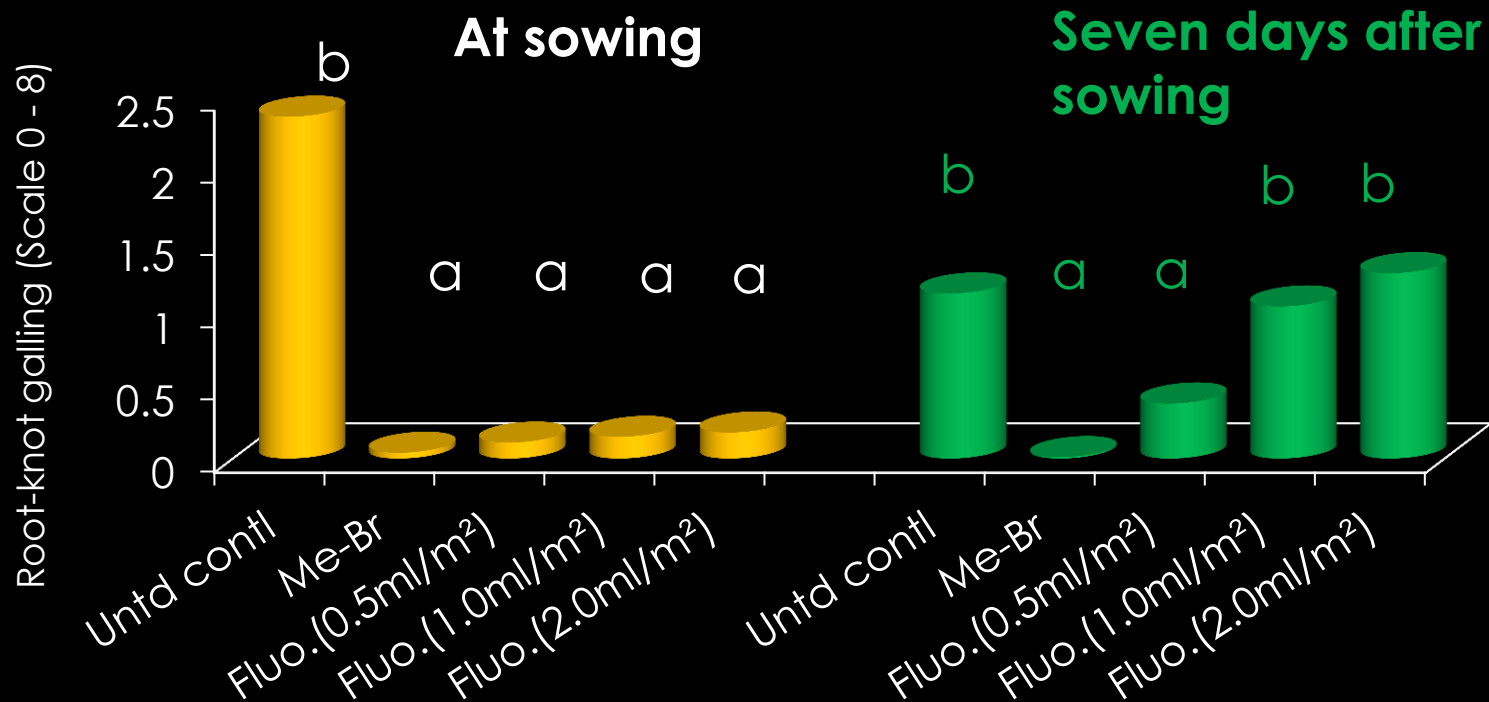


Cont

# Results – Conventional seedbeds cont'd

Fig. 2

**K M10  
only**



# Results – Summary

## Conventional seedbed

- ❑ Fluopyram, Me-K, Me-Na and Oxamyl (20 L/Ha) gave exceptionally good control of RKN.
- ❑ Seedlings in Me-K treated plots consistently had clean roots.

# Field trials



# Materials and Methods

## Field trials

- ❑ **K M10**, a nematode susceptible tobacco variety was grown for two seasons.
- ❑ **Design:** Split-plot in 3 RCB.
- ❑ **Main plot:** Tobacco cultivars (K M10 & K RK64).



# Materials and Methods cont'd

## Field trials

### □ Sub plot : Nematicides

#### 1<sup>st</sup> trial

1. Untreated control
2. Fenamiphos
3. Sesamin (10 L/Ha)
4. Sesamin (15 L/Ha)
5. Sesamin (20 L/Ha)

#### 2<sup>nd</sup> trial

1. Untreated control
2. Fenamiphos
3. Fluopyram (0.3 L/Ha)
4. Fluopyram (0.6 L/Ha)
5. Fluopyram (0.9 L/Ha)
6. Fluopyram (1.2 L/Ha)
7. 3 rates: Abamectin  
(2.5, 3 and 3.5 L/Ha)

# Materials and Methods cont'd

## Field trials

### □ Sub plot : Nematicides

1. Untreated control
2. Fenamiphos std
3. Oxamyl 10 G (15 kg/Ha)
4. Oxamyl 10 G (22.5 kg/Ha)
5. Oxamyl 10 G (37.5 kg/Ha)
6. Fenamiphos (New source)
7. Fluopyram 400 EC (0.9 L/Ha)
8. Fluopyram 500 EC (0.9 L/Ha)

3<sup>rd</sup> trial

# Materials and Methods cont'd

- ❑ Tobacco seedlings used were raised in float beds in a pine bark based soilless media (Kutsaga Gromix)
- ❑ Spacing: 120 cm x 56 cm (14 881 plants /ha)
- ❑ Standard Cultural practices were done

# Materials and Methods cont'd

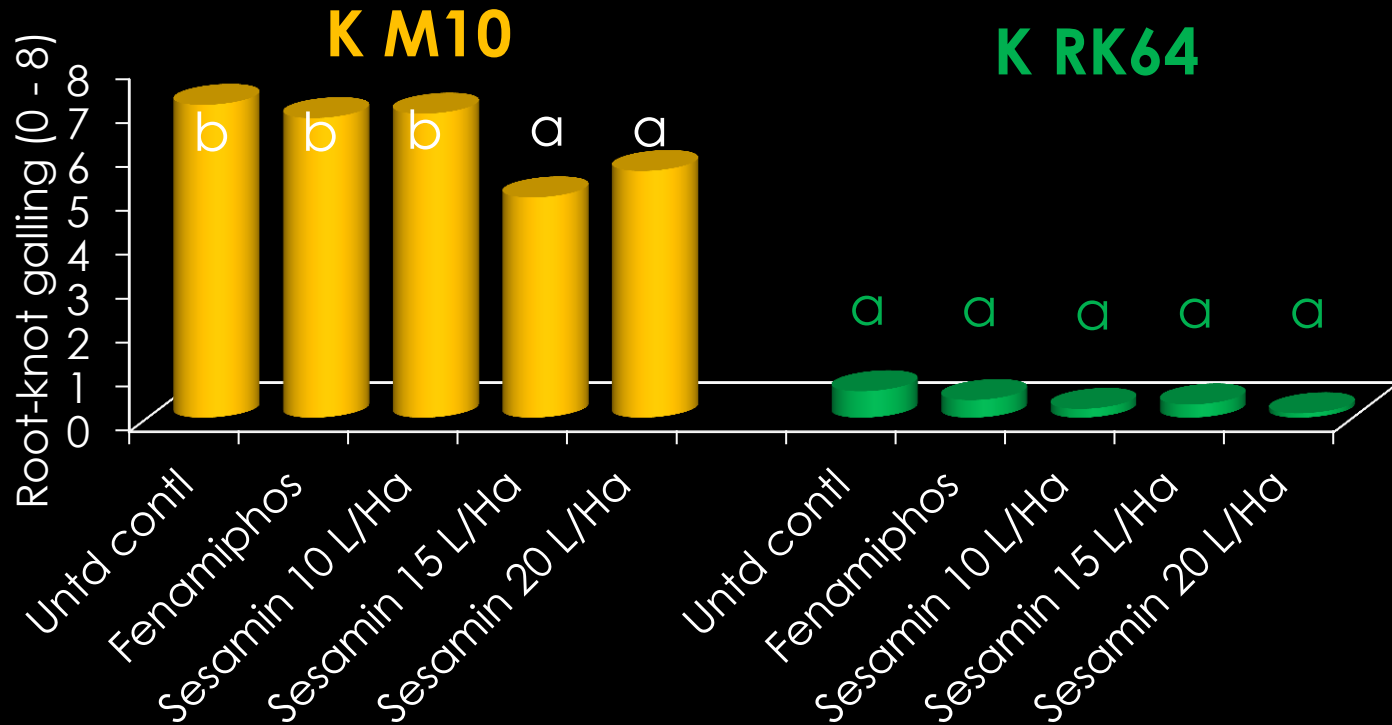
- ❑ **RKN assessment** - Daulton and Nasbaum (1961) scale of 0 – 8

## Data Analysis

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- ❑ Treatment means were separated using the Least Significance Difference at  $P < 0.05$

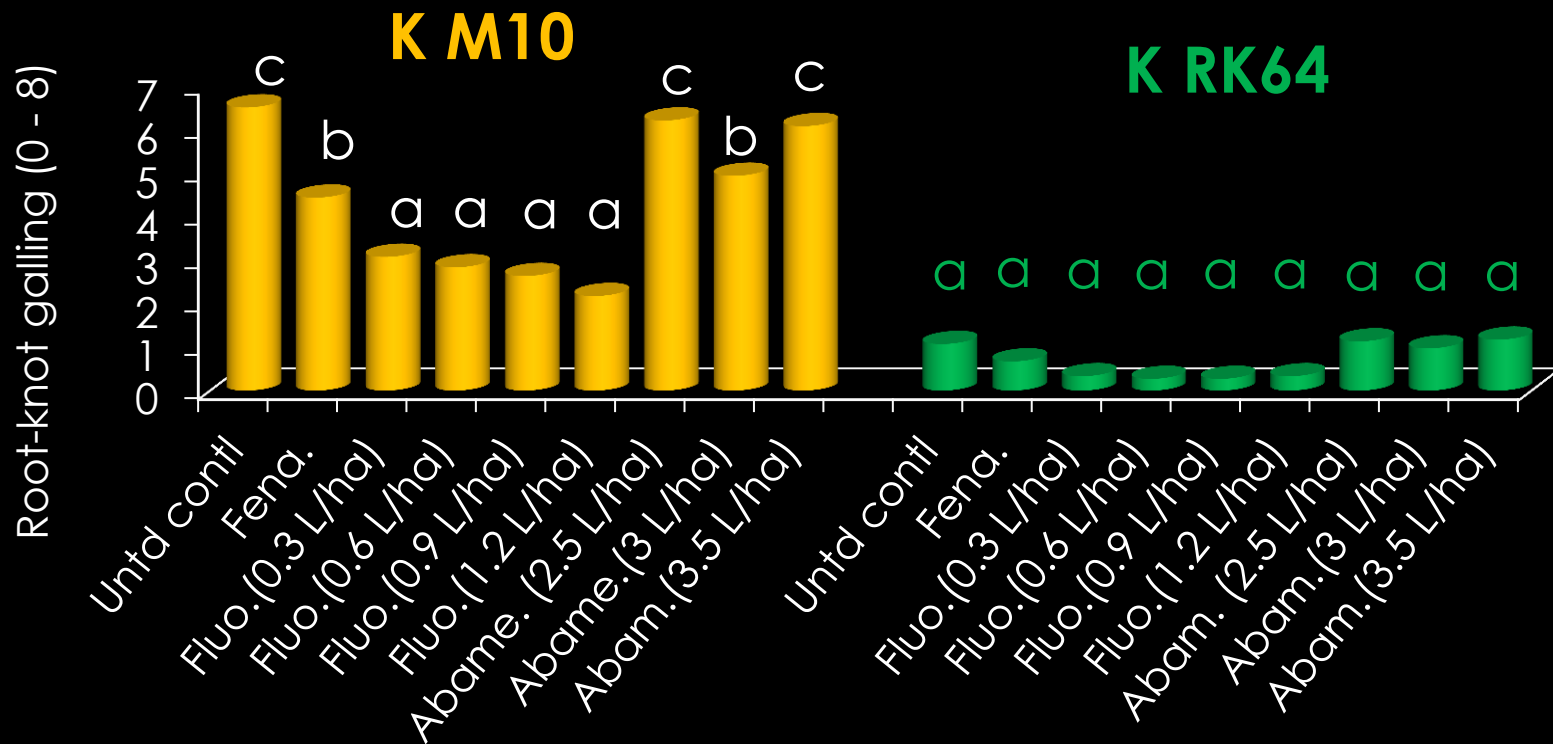
# Results – Tobacco fields

Fig. 3



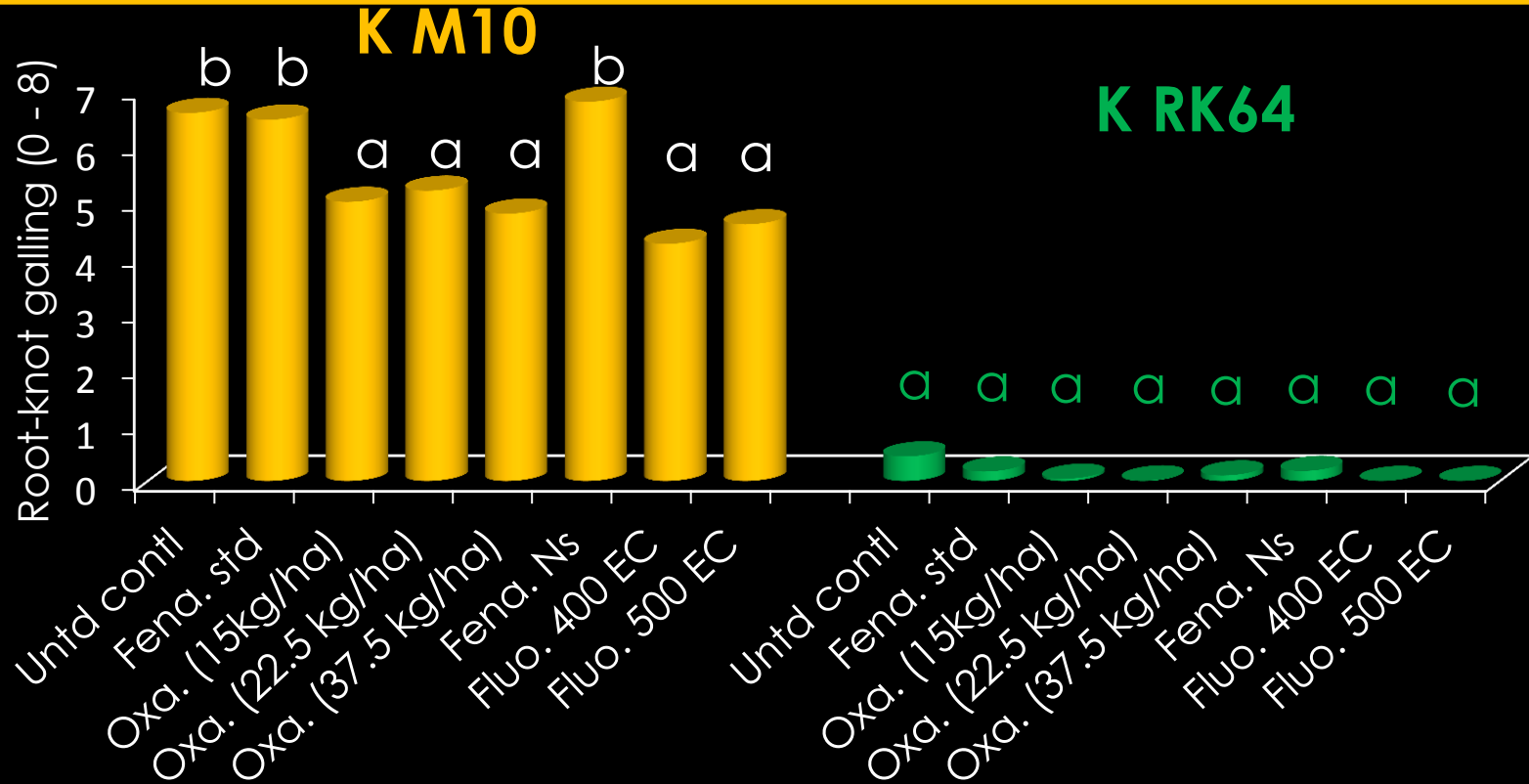
# Results – Tobacco fields cont'd

Fig. 4



# Results – Tobacco fields cont'd

Fig. 5





# Results – Tobacco fields cont'd

## Key Observation



Untreated control

# Results – Tobacco fields cont'd

## Key Observation



Fenamiphos

# Results – Tobacco fields cont'd

## Key Observation



Fluo.(Vellum)

# Results – Tobacco fields cont'd

## Key Observation



Aba.(Solvigo)

# Results – Summary

## Field trials

- ❑ Sesamin - the middle (15 L/ha) and high rate (20 L/ha) gave some control of nematodes.
- ❑ All tested rates of Fluopyram were effective for RKN control.
- ❑ Oxamyl significantly control RKN better than Fenamiphos.

# Conclusion

- ❑ Me-Na, Me-K, Fluopyram and Oxamyl can be effectively used in tobacco seedling production.
- ❑ Velum, Oxamyl and Sesamin, have a place in nematode control (Fields).
- ❑ However, for **season-long nematode control** – multiple applications seem to be necessary.

# *Acknowledgements*

*Tobacco Research Board Management  
and Staff*

***THANK YOU***

