



Breeding for SCN Resistance in the Southern US



Survey Participants

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Question

Do Farmers place high priority on SCN resistant seed?

- **SCN resistance sells seed – MO, AK, TN, NC**
- **Less important in GA, LA, MS**
- **NC – Important but resistance is not effective**
- **Seed dealers like SCN resistance for added benefits over different conditions**

Races of SCN in North Carolina- Survey 1995-1997, Steve Koenning

- **45%- Race2**
- **25%- unknown**
- **17%- Race 4**
- **7%- Race 5**

**94% of SCN populations in NC with few
effective cultivars**

Predominant Races in Southern MO

- **Primarily Race 2**
- **Some race 4**

(Mitchum et al. 2007)

Question

Are Peking & PI 88788 still effective?

- Yes, when properly placed
- **Some benefit, but need broader resistance**
- Probably not

Question

SCN sources used?

- PI 88788
- Peking
- PI 437654 (Hartwig type)
- PI 438489B, Columbia, 567516c, 467312, 507354 and others (TN & MO)

Hartwig type resistance

- **Hartwig released in 1992**
- **Peking and PI437654 SCN sources**
- **Good yielding types from Hartwig**
 - **JTN varieties from Tennessee**
 - **Anand, and Jake from Missouri**

Performance of S06-4649RR

Yield Means, by Soil Type S. E. Missouri, 2007-09

<u>Variety</u>	<u>Loam</u>	<u>Clay</u>	<u>Sand</u>	<u>Combined</u>
S06-4649RR	65.6	68.3	62.4	64.7
GP5 RR Checks	56.7	65.2	42.2	56.7
# Loc	6	6	2	14

**Importance of SCN in So. USA 2008-09
(Steve Koenning disease loss est. So. States)**

Yield loss to SCN as % of losses to all diseases

SCN accounts for 17% of all disease losses

**All nematodes account for 35% of all losses
SCN, RKN and other nematodes**

Question

Do Southern farmers know if they have SCN?

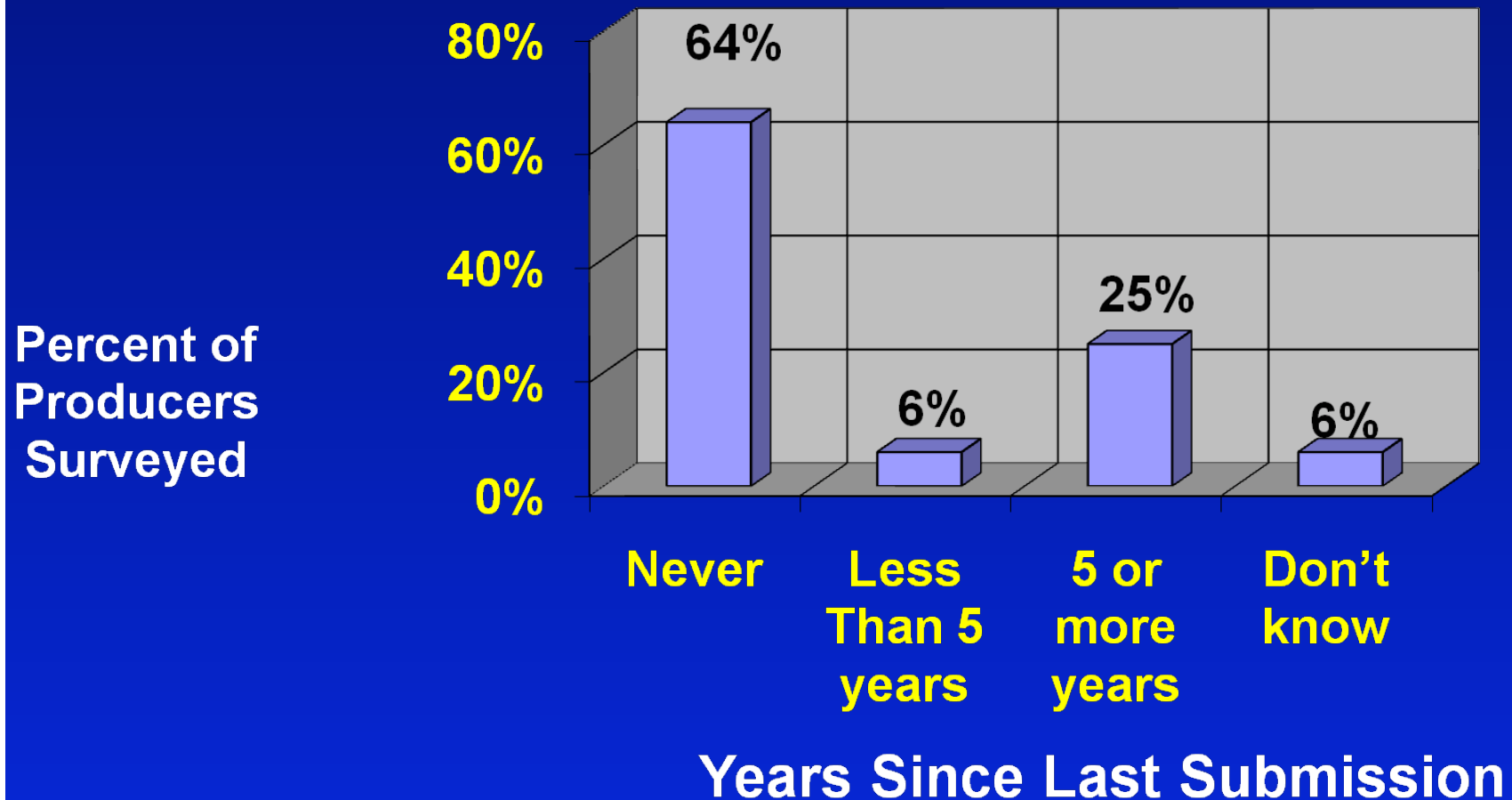
- **Generally no**
- **A few cases – not many**
- **Better managers do**

Damage in Field With No Symptoms

- Yield Losses of Up to 30% Without Visible Symptoms



Last SCN Sample Submission for Egg Count



Question

Is SCN breeding a *high* priority for you?

- **Many say YES – Very high to medium**
- **Others say NO – Just not a big problem**

Question

How do you screen for SCN?

- **Mostly in greenhouse**
- **Some use molecular markers**
- **Some field evaluation**

Question

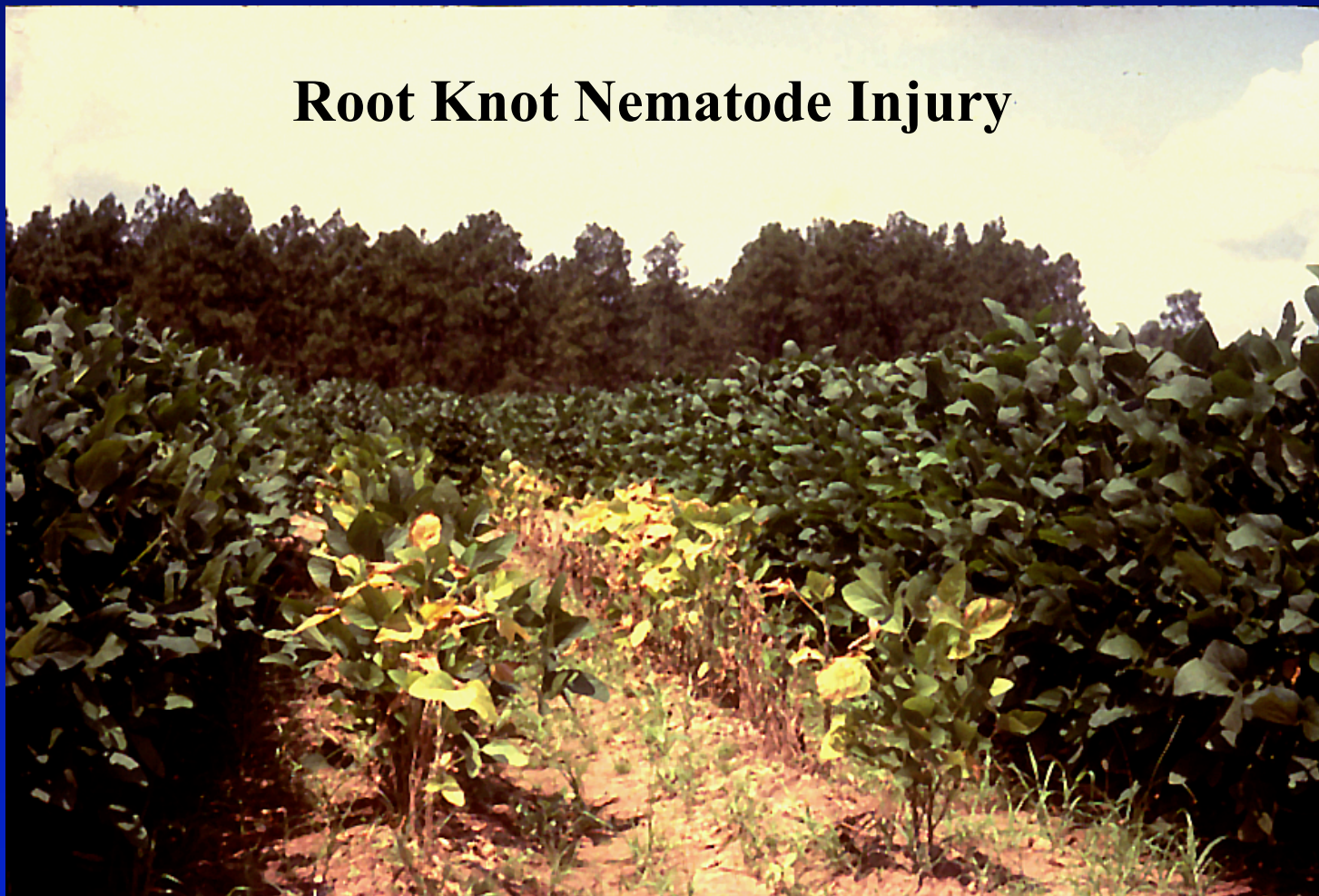
If SCN is not the primary Southern disease, what is it?

- **Root Knot Nematode**
- **Phytophthora Root Rot**
- **Stem Canker**
- **Cercospora Leaf Blight**

Last 3 years- More sandy land from cotton to beans and corn

- **Corn, soybeans and cotton are all hosts to root knot nematode**
- **Reniform nematode is now a factor**

Root Knot Nematode Injury



Root Knot Resistance Nursery



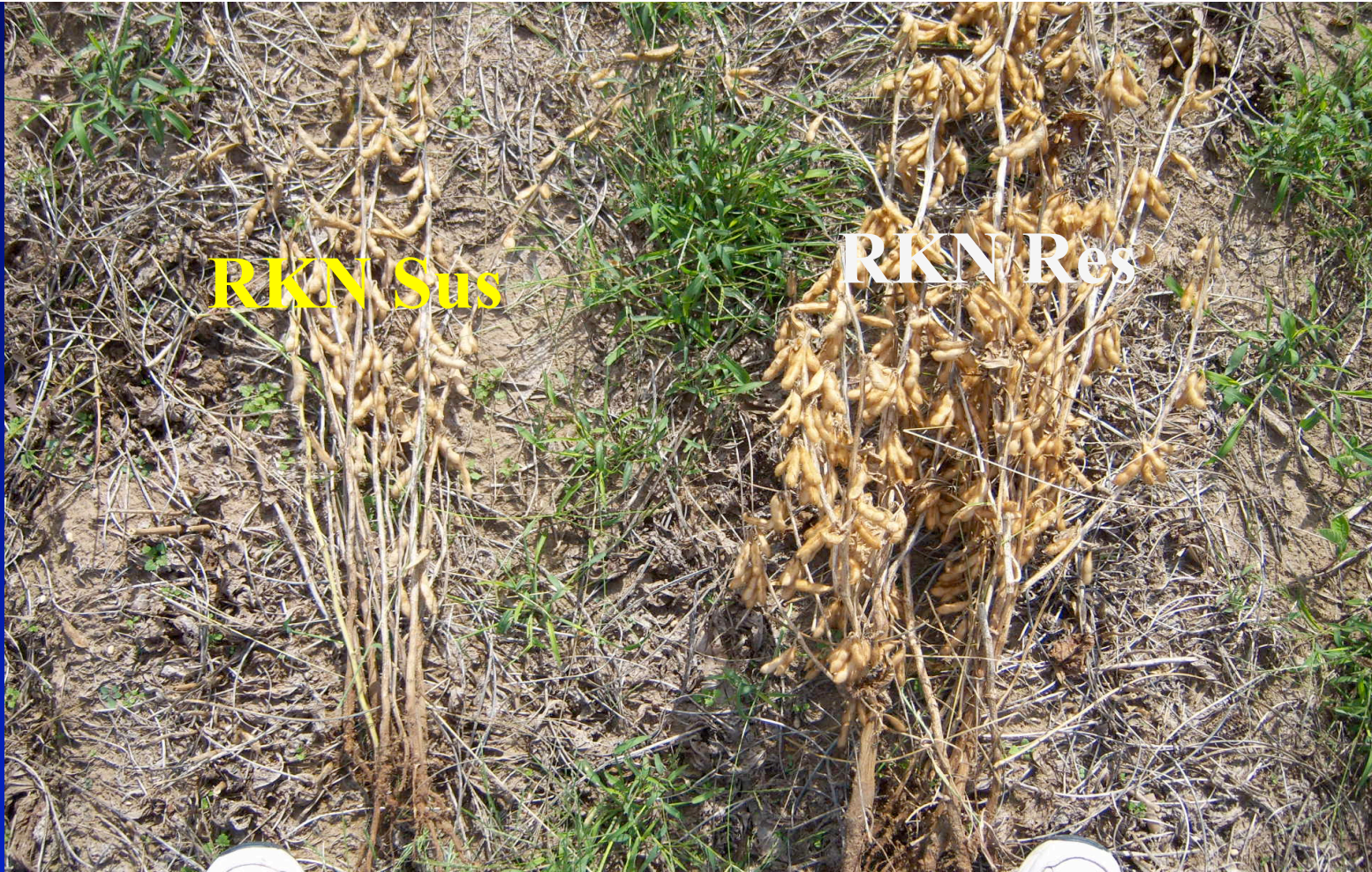


RKN Resistant

RKN Susceptible

RKN Sus

RKN Res



Yield of S05-11482 & AG4903 over soil types, SEMO, 2007-2009

Variety	Loam	Clay	Sand	Combined
S05-11482	63.6	61.8	73.6	64.9
AG4903	62.8	54.2	42.2	55.2
Locations	6	6	3	15

Productive soybeans with Hartwig type SCN resistance

- **Jake**
- **S05-11482**
- **S06-4649RR**

Broad resistance to SCN Races 1,2,3,5 &14

MS – MR to races 1 and 3, R to 2, 5 and 14

**Did not recover all of the resistance from
Hartwig, but can get yield. Also have
resistance to RKN and reniform**

PIs resistant to multiple nematode species (U of MO and U of AR- Robbins)

- ~ 120 SCN resistant PIs studied for resistance to root knot nematode and reniform nematode
- **64 SCN PIs showed resistance to RKN.**

At least 27 of these showed resistance to reniform nematode

Are some of the same genes for SCN resistance closely linked or the same genes for resistance to reniform and RKN?

Last Question

Other additions or SCN breeding approaches?

- **Need more field sampling (what races?)**
- **Need more adapted germplasm with durable resistance and resistance to other nematodes**
- **Markers for durable sources**
- **Transgenic approaches**



The National Center for Soybean Biotechnology University of Missouri

SCN Core phenotyping facility



**THANK YOU
VERY MUCH!**