



Diverse Sources of SCN Resistance in Soybeans

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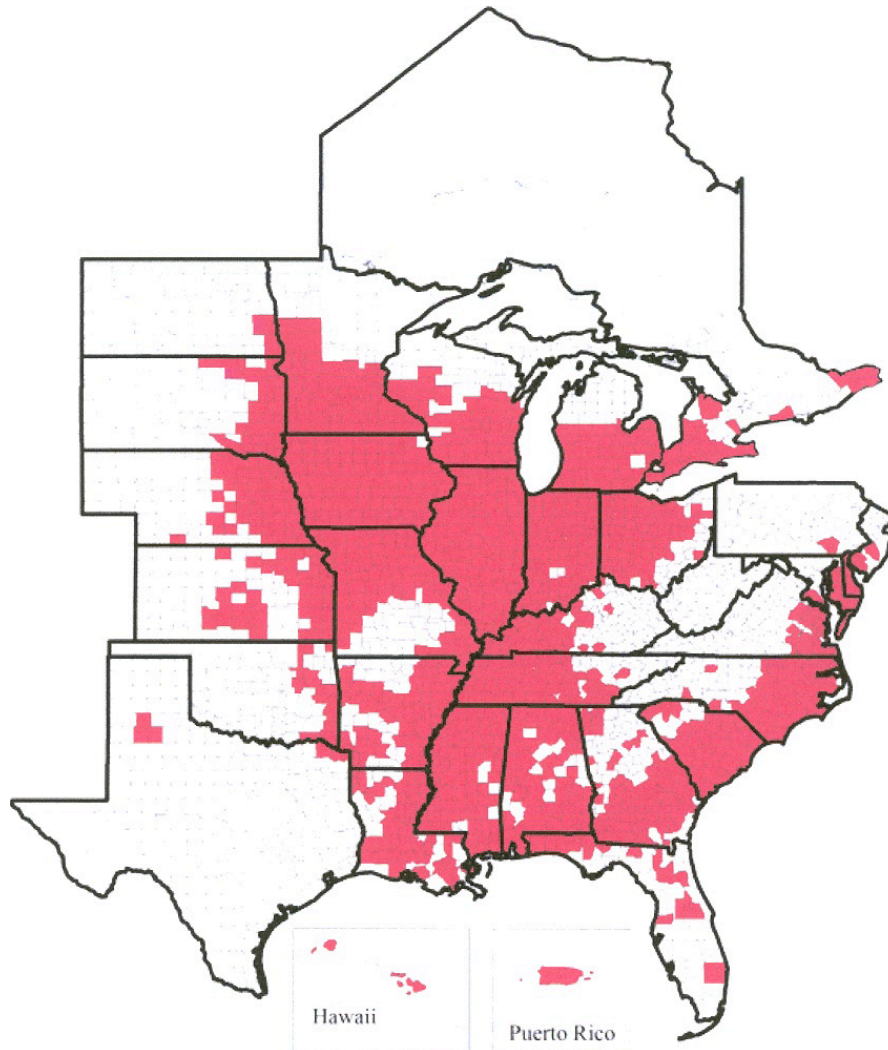
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A Brief History of Soybean Cyst Nematode

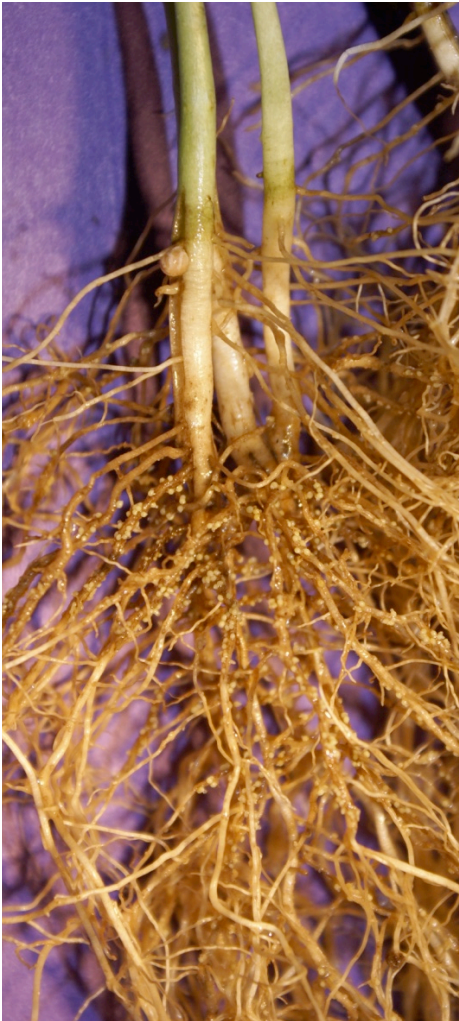


- Reports indicate SCN was first observed in North Carolina in 1954 (Winstead et al., 1955) and soon spread to all soybean growing states in the US.
- Soon after this, sources of resistance were identified, the genetics of resistance was studied and breeding was initiated.

Why SCN is a Pervasive Soybean Pest

- Ross and Brim (1957) screened approximately 2800 soybean lines and identified Ilsoy, Peking, PI 84751 and PI 90763 as resistant.
- Peking was used to develop the first SCN resistant soybean, “**Pickett**”, in 1966, but soon nematodes overcame the resistance.
- In 1988, Bernard’s group released **cv. Fayette** using PI 88788 as the source of resistance.
- Soybean PI 437654 was identified as an additional resistance source in 1985. This has comprehensive resistance to several nematode populations was used to develop cv. Hartwig in 1992. PI 437654 is susceptible to LY1, a synthetic population developed in the greenhouse.

Why SCN is a Pervasive Soybean Pest



- One estimate states that over 90% of resistant cultivars utilize PI 88788 genes for resistance.
- Due to the widespread deployment of resistance genes, predominantly from PI 88788, the nematode populations continue to respond with phenotypic changes expressed in parasitism.
- Continued use of Peking and/or PI 88788 resistance genes is causing frequent population shifts in nematodes because **two of the three major genes are in common.** (*Arelli et al., 1992. Crop Science.*)

How Many Resistant Accessions Are Available Today?

118 soybean accessions are available with resistance to one or more HG Types.

- Arelli et al., 1997. Crop Science.
- Arelli et al., 2000. Crop Science.



Can We Utilize the Remaining Sources?

Yes, we can! However, it may be better to identify resistant sources that are diverse from Peking, PI 88788 and/or PI 437654.

- **Diers, Skorupska, Arelli and Cianzio. 1996. Crop Science.**
- **Xie, Arelli and Sleper. 1998. Soybean Genetics Newsletter.**
- **Zhang, Arelli, Sleper, Qiu and Ellersieck. 1999. Euphytica.**
- **Chen, Wang, Arelli and Nelson. 2006. Genome.**

Diverse Sources of Resistance

- Based on these studies, we have identified several diverse sources of resistance.
- Some of them are:
 - **PI 507354**
 - **PI 567328**
 - **PI 567516C**
 - **PI 89772**
 - **PI 438489B**
 - **Columbia (PI22897)**
 - **PI 437655**
 - **PI 494182**

Selections In Progress

Selections are in progress for the following crosses for developing germplasms with nematode resistance:

- **PI 507354 x HS93-4118**
- **PI 567516C x Hartwig
(JTN-5109)**
- **PI 567516C x 5601T
(JTN-5209)**
- **PI 438489B x Hamilton
(JTN-4108)**
- **PI 437655 x Hartwig**
- **PI 567328 x 5601T**
- **PI 89772 x Hamilton**
- **LG01-5822 x (PI 88788 x
Columbia)**

Take Home Message

1. Sources of nematode resistance should be diversified for durable resistance.
2. Source materials using diversified sources of resistance, such as: PI 438489B, PI 567516C, PI 507354, PI 89772, PI 494182, PI 22897, and PI 437655 should be developed.
3. Pyramiding resistance genes from traditional sources with the genes from diversified sources will be far more effective and a better strategy.

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THANKS!

