

Management of Seedling diseases and Nematodes in the Southern High Plains

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Seedling Disease Losses Include

No emergence

Initial emergence and then
post-emergence damping off

Root Damage

Rhizoctonia solani
and Pythium



Thielaviopsis
basicola



Cotton Seed Treatment fungicides

- 1) **Pythium protection: Metaxayl (Allegiance FL) or mefenoxam (Apron XL).**
These both have the same active ingredient, though mefenoxam has twice the ai that metaxayl has.
- 2) **Rhizoctonia protection: LOTS of PRODUCTS (New and Old).**
- 3) ***Thielaviopsis basicola* protection: myclobutanil (Nuflow M, Spera), acibenzolar-S-methyl (Bion).**
- 4) **Fusarium protection: Sedaxane (Vibrance), Bion, Fludioxonil (Maxim)**

Combinations of Products

Seed companies typically include fungicides on their varieties that are effective on *Pythium* and *Rhizoctonia solani*.

There are usually levels of these products including base and elite or premium. The higher levels often include insecticides (thrips protection), and nematicides.

They may also include higher rates of the fungicides and/or additional fungicides that offer protection against more fungi (usually *Thielaviopsis basicola* and *Fusarium*). However, *T. basicola* and *Fusarium* are very difficult to control adequately with seed treatments (or any type of chemical applications).

Example: Americot offers base, enhanced and elite seed treatments. Base is for only fungicides, enhanced includes fungicides and insecticide, and premier also includes a nematicide.

Example: Avicta Complete Cotton includes Avicta[®] Duo COT202 (abamectin a nematicide), Cruiser[®] (an insecticide), and Vibrance CST (which contains four fungicides [metalaxyl, azoxystrobin, fludioxonil, and sedaxane]).

A different company's base fungicide seed treatment may include Spera (myclobutanil + metalaxyl for *T. basicola*+ *R. solani*+ *Pythium*), Vortex (Ipconazole for *R. solani*, *Fusarium*) and Evergol Prime (penflufen, for *R. solani*).



**Root-Knot
Nematode**



**Reniform Nematode
Damage**

Nematicide Seed Treatments

1st was Avicta (abamectin) developed by Syngenta. It was sold in a package (AVICTA COMPLETE Pack) which included the fungicides Dynasty CST (azoxystrobin, fludioxonil, metaxyl), and insecticide Cruiser.

2nd was AERIS which included the chemicals thiodicarb (nematicide/insecticide)+ imidacloprid (insecticide). It was developed by Bayer CropScience.

3rd was Votivo[®] (*Bacillus firmus*) (Bayer CropScience) which was sold in a package with an insecticide (Poncho[®]). Poncho Votivo 2.0 is available on corn and includes the bacteria *Bacillus thuringiensis*.

4th was Copeo (fluopyram) which was developed by Bayer CropScience and currently belongs to BASF. This same active ingredient is the basis of the infurrow nematicide Velum Prime (Bayer CropScience).

5th is Nemastrike (tioxazafen) which was developed by Monsanto and currently belongs to Bayer CropSciences. It has been on and off the market for several years, with some worker safety issues.

6th is BioST Nematicide, which belongs to Albaugh. It is derived from heat-killed *Burkholderia rinojenses* and its spent fermentation products. It includes enzymes and toxins that can affect nematodes.

7th is Truenemco which was developed by BASF and currently belongs to NuFarm. It utilizes *Bacillus amyloliquefaciens*.



**Damage due
to Root-knot
nematode
alone.**

**Damage due to
Root-knot
nematode +
fungi (*T.
basicola*, *R.
solani*, *Fusarium*)**

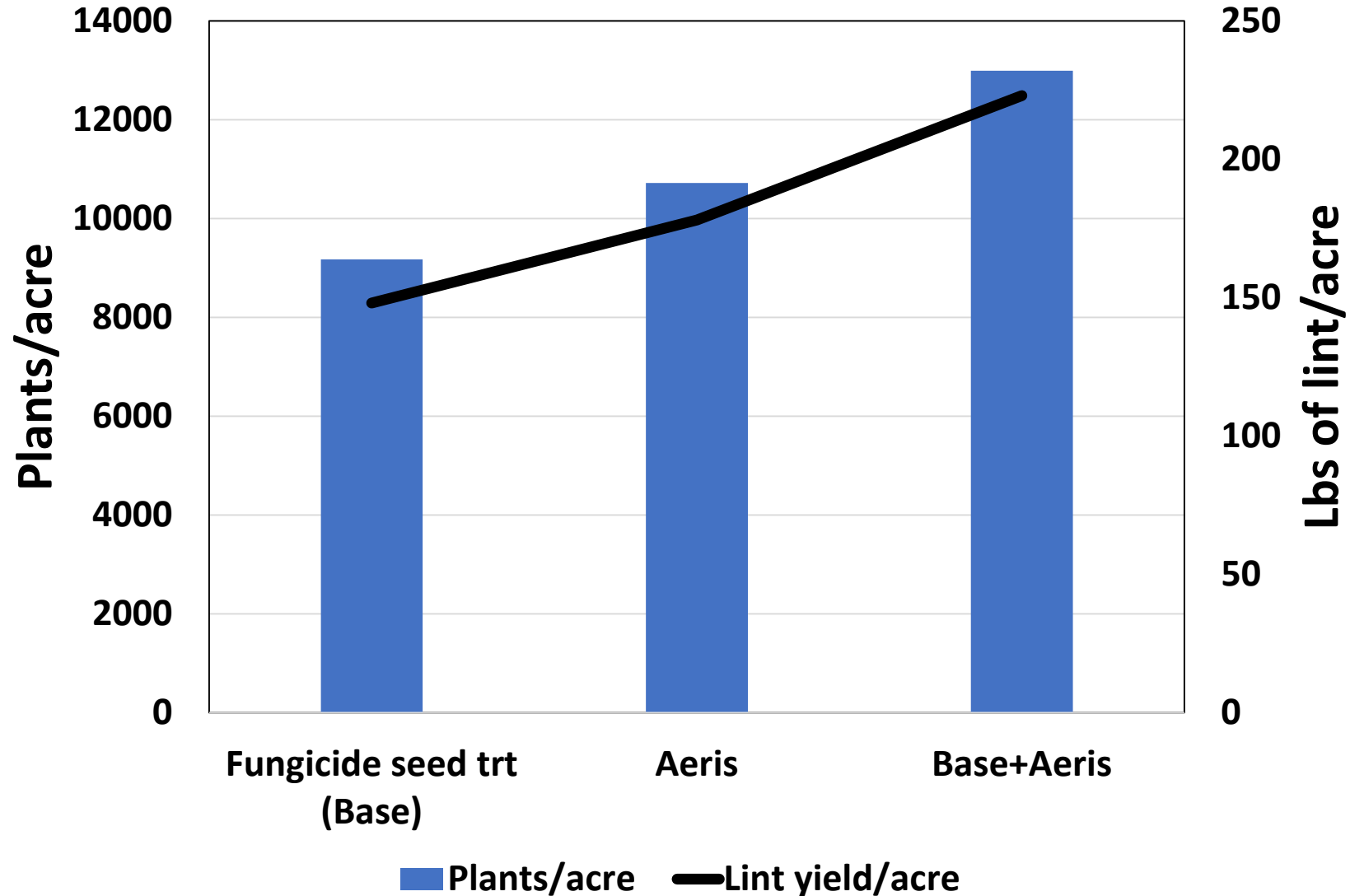


Stand loss was high in plots that received a fungicide seed treatment but did not have a nematicide seed treatment. It rained 1 day after planting (plots belonged to Dr. Cecilia Monclova-Santana).



**Interactions
between
Nematodes and
Seedling Disease
Pathogens**

Effect of using both a fungicide and nematicide seed treatment on plant stand and yield.



Nematicides (not seed treatments)

- **Temik/AGLOGIC (aldicarb) is an at-plant infurrow granular.**
- **Velum Total → Velum Prime (no insecticide) ai = fluopyram. An at-plant, infurrow liquid.**
- **Vydate CLV (Corteva)/Return XL (AMVAC) ai = oxamyl. Foliar applied.**

Fluensulfone (Nimitz) developed by Adama. This nematicide is labeled on a number of different vegetables, tree nuts, and pome fruits.

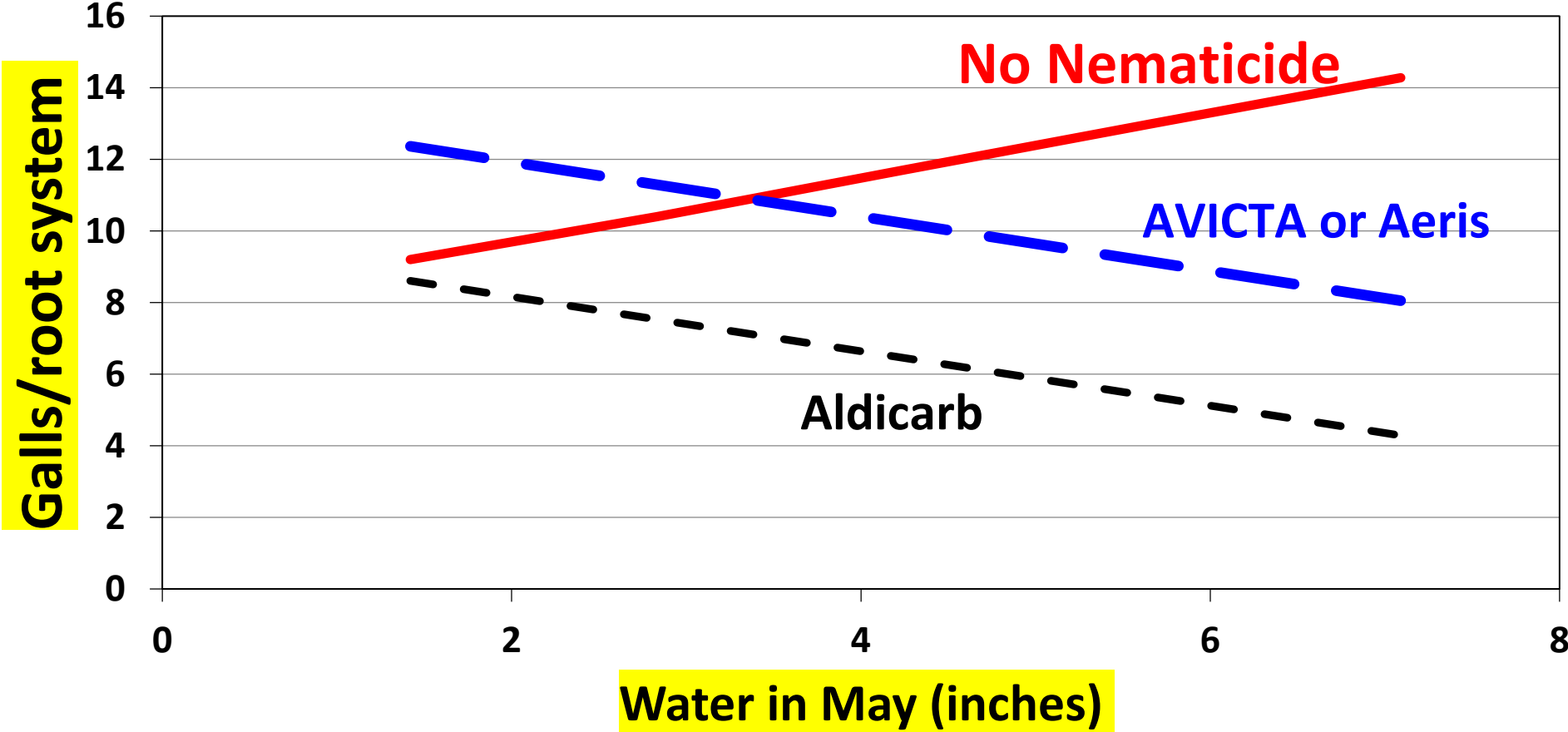
I tested it on cotton and found the most success when broadcast applied and incorporated into the soil, 2 weeks before planting. It also has a label for drip application.



Fluazaindolizine (Reklemel™) (Trade name =Salibro) developed by Corteva. This nematicide may be labeled in the U.S. in 2021. Currently, it is being tested on vegetables and to some extent on cotton in the U.S. In cotton, it is tested as a liquid infurrow at-plant application.

There are other companies testing experimental nematicides, and one or more appear to be promising on cotton.

Effect of Rain and Irrigation in May on Performance of Aldicarb and Seed Treatment Nematicides



The moral of the story is that higher rain/irrigation for 2-3 weeks or so after planting results in better performance of nematicides. The nematicides with **better water solubility** (aldicarb) will perform better than those with **poor water solubility**, when rain/irrigation is limited.

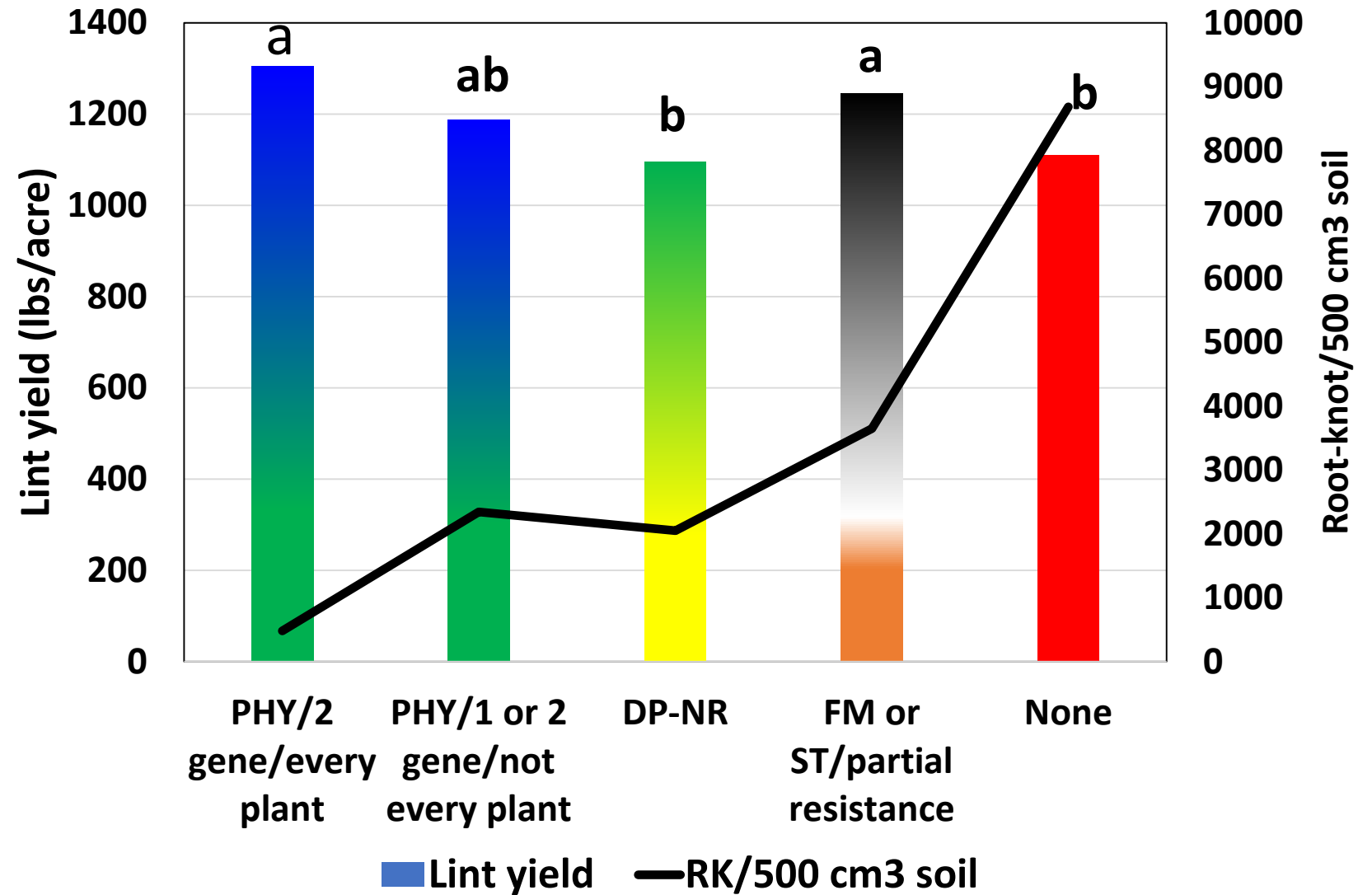
Root-knot Nematode Resistant Varieties (2016-2019)

PHY 2-gene: **PHY 480**
W3FE, PHY 500 W3FE, PHY
 580 W3FE

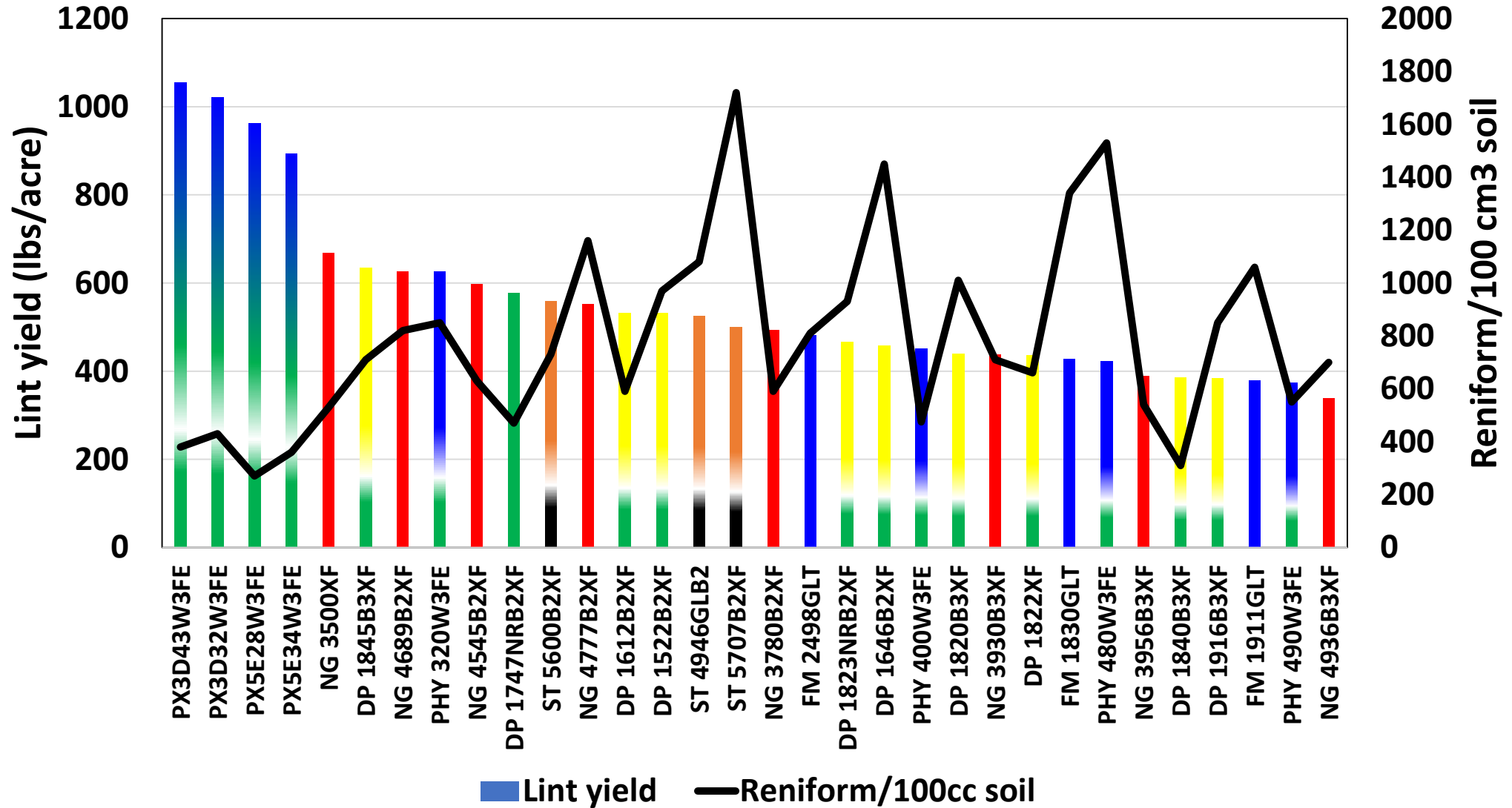
PHY 1-gene: PHY 440
 W3FE, PHY 400 W3FE, PHY
 350 W3FE, PHY 320 W3FE,
 PHY 250 W3FE

DP-NR: **DP 1747NR B2XF**,
 DP 1823NR B2XF

FM/ST: FM 2011GT, FM
 1911GLT, FM 1621GL, **ST**
4946GLB2



Reniform Nematode Resistance: 2019



**PX2D18W3FE= 290 reniform nematodes/100 cm³ soil, PX3D32W3FE = 170 reniform nematodes/100 cm³ soil
Susceptible varieties averaged 729/100 cm³ soil**



PX2D18W3FE



PX3D32W3FE

PX3D43W3FE= 250 reniform nematodes/100 cm³ soil, PX3E33W3FE = 115 reniform nematodes/100 cm³ soil

Susceptible varieties averaged 729/100 cm³ soil



PX3D43W3FE



PX3E33W3FE

PX4B08W3FE= 170 reniform nematodes/100 cm³ soil, PX5E28W3FE = 100 reniform nematodes/100 cm³ soil
Susceptible varieties averaged 729/100 cm³ soil



PX4B08W3FE

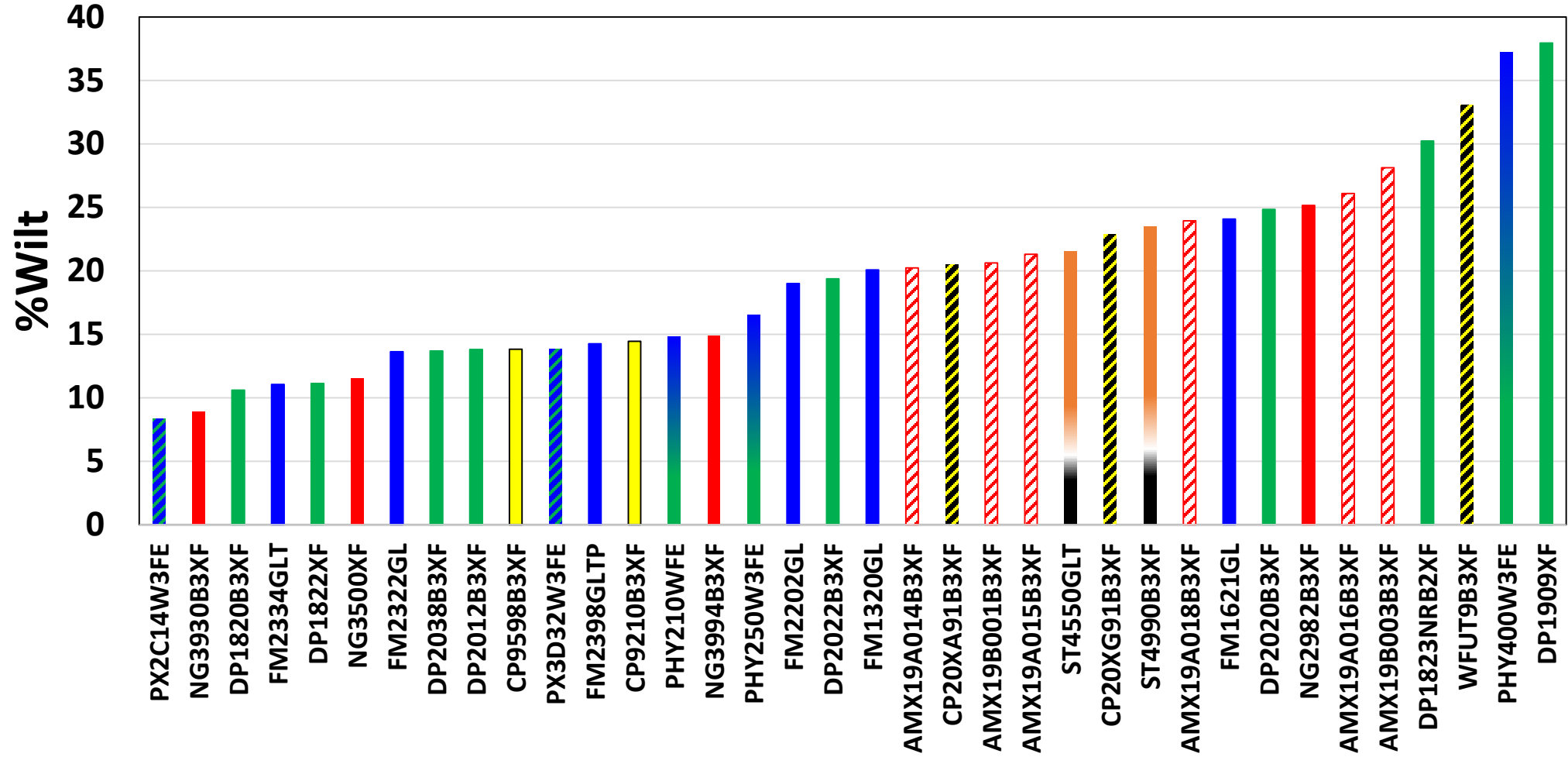


PX5E28W3FE

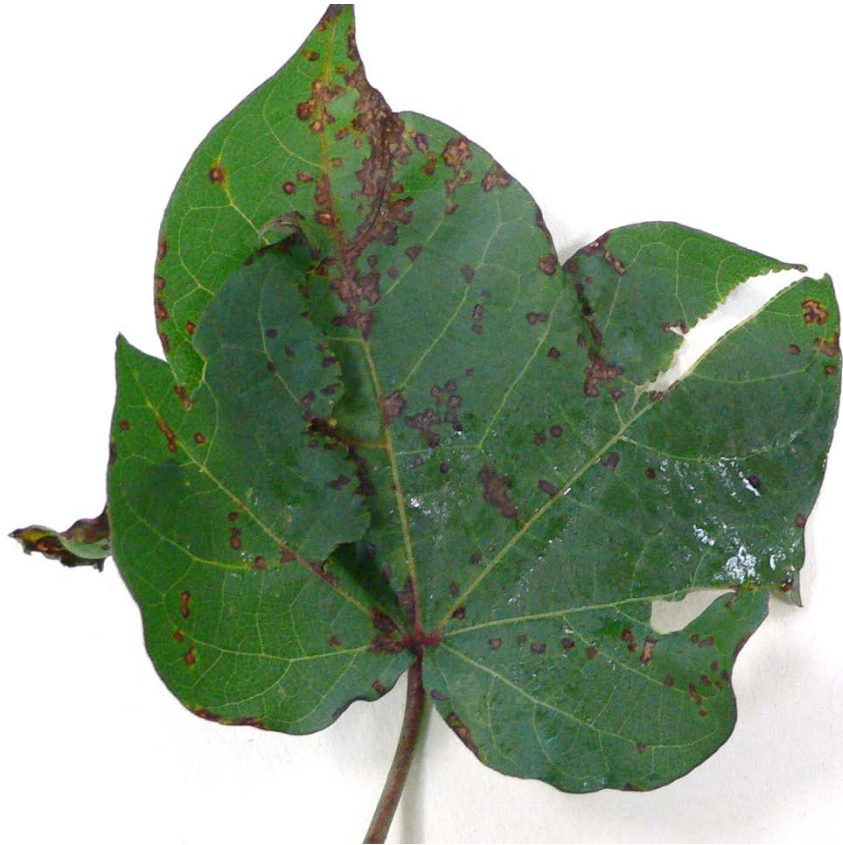
Verticillium Wilt

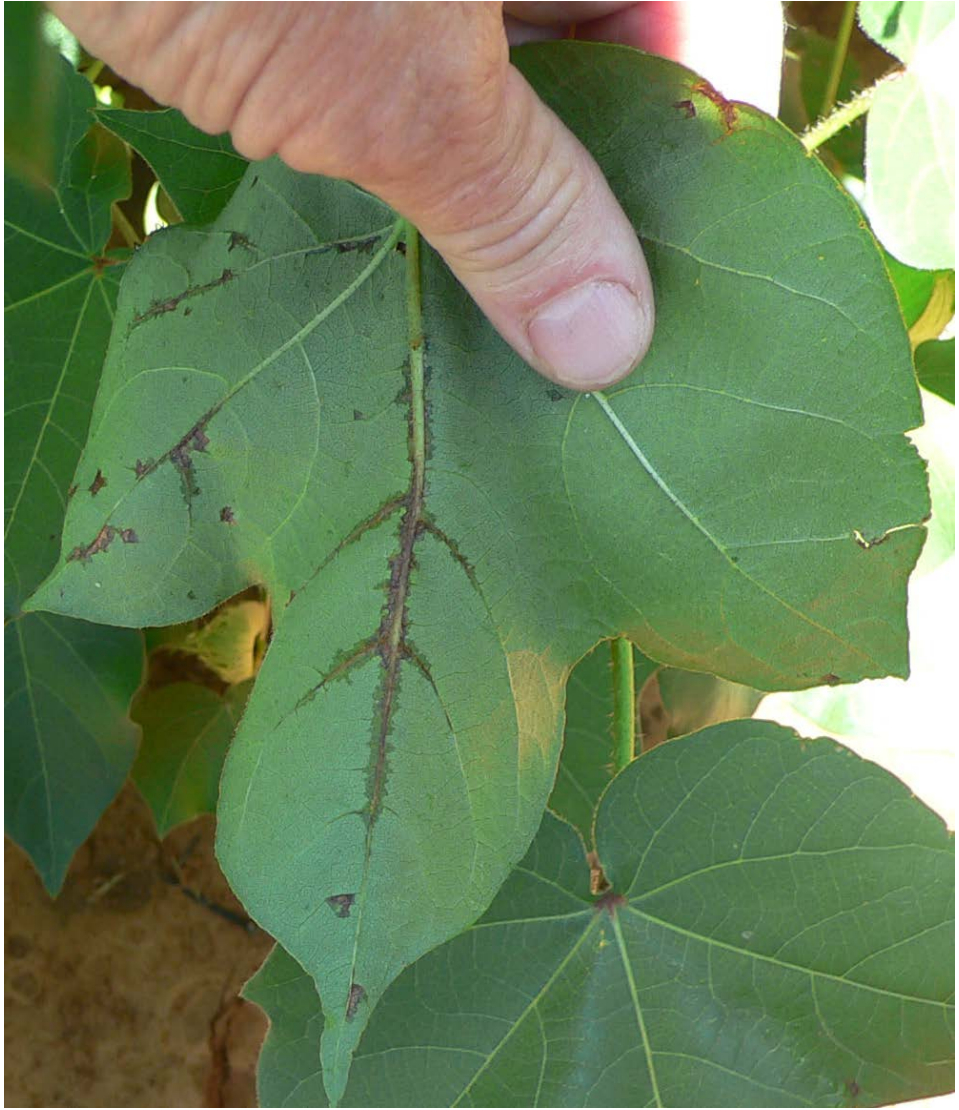


%Wilt on 27 August at Plainview

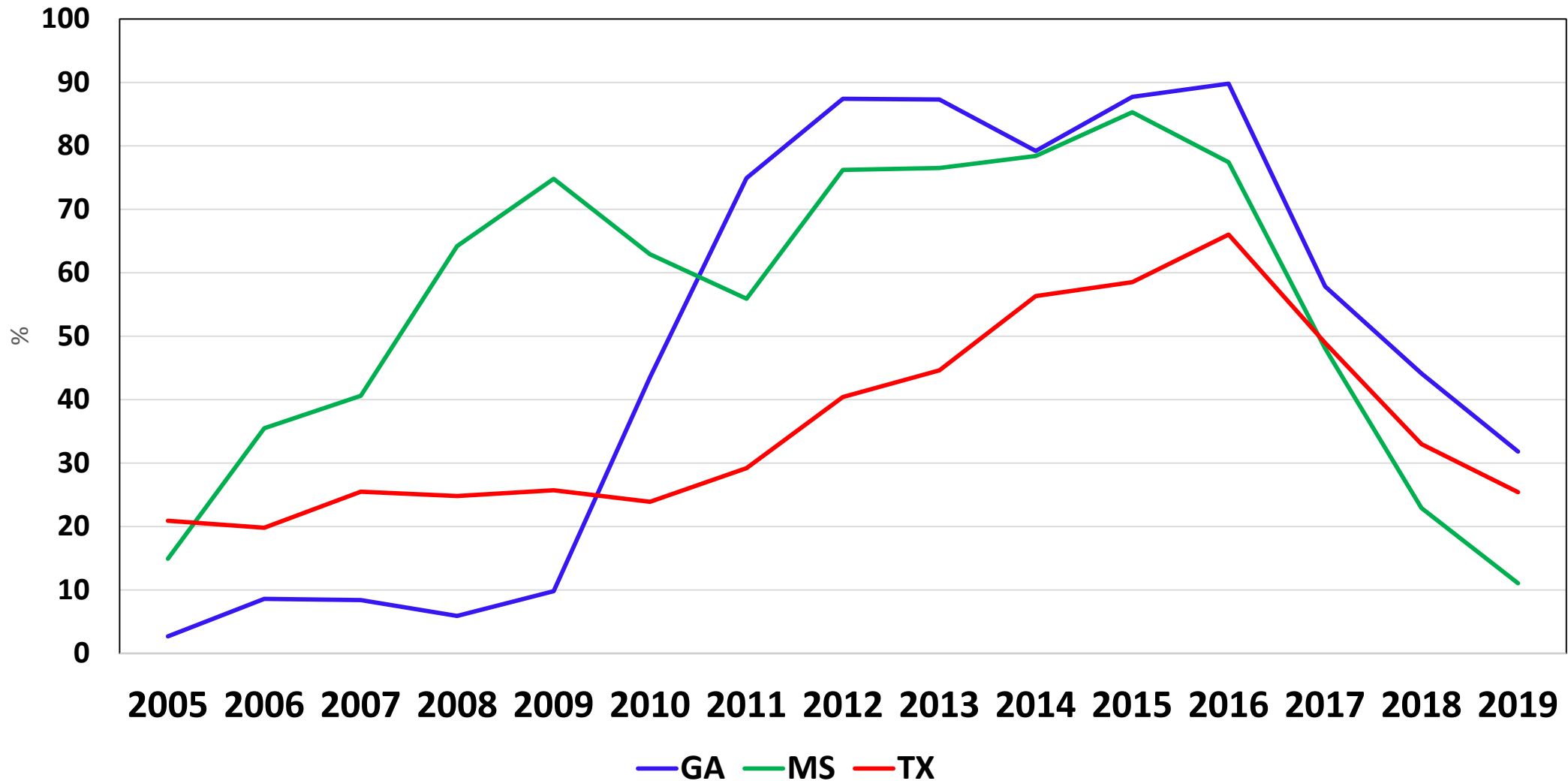


Bacterial Blight





Cotton Varieties (%) planted that are susceptible to Bacterial Blight.



Conclusions

- 1) Many different fungicide choices for *Rhizoctonia solani* protection, but only one type of chemistry for Pythium (and old chemistry as well).
- 2) Some products also list *Thielaviopsis basicola* and *Fusarium* protection. However, it is difficult to protect roots, even when products are systemic.
- 3) Some new nematicides are on the horizon.
- 4) 2-gene resistance in Phytogen cotton varieties improved yield 17% over root-knot nematode susceptible varieties from 2016 to 2019. Root-knot populations were reduced by 94% by these varieties.
- 5) Reniform resistant Phytogen varieties averaged 983 lbs of lint/acre while susceptible varieties averaged 489 lbs of lint/acre. The resistant varieties averaged 360 reniform nematodes/100 cm³ soil, while susceptible varieties averaged 849 reniform nematodes/100 cm³ soil.