Brown Spot Needle Blight In Loblolly Pine

Observational Infection Patterns and Potential Resistance

Al Lyons

December 2, 2021

Manulife Investment Management

Brown Spot Needle Blight in Loblolly Pine

- Brown Spot Needle Blight (BSNB)
  - Scientific Name: *Lecanosticta acicola*
    - Other Scientific Name: *Scirrhia acicola*
- BSNB Has Been well Known in the Southeast U.S. Since 1900
- Primarily associated with longleaf pine but infects other pine:
  - Loblolly pine
  - Shortleaf pine
  - Virginia pine
  - Sondereggeri pine
  - Pitch pine
  - Eastern white pine
  - Ponderosa pine

Source: *Van Der Nest, Ariska et.al., Lecanostista acicula: A growing threat to expanding global pine forest and plantations (2019).*

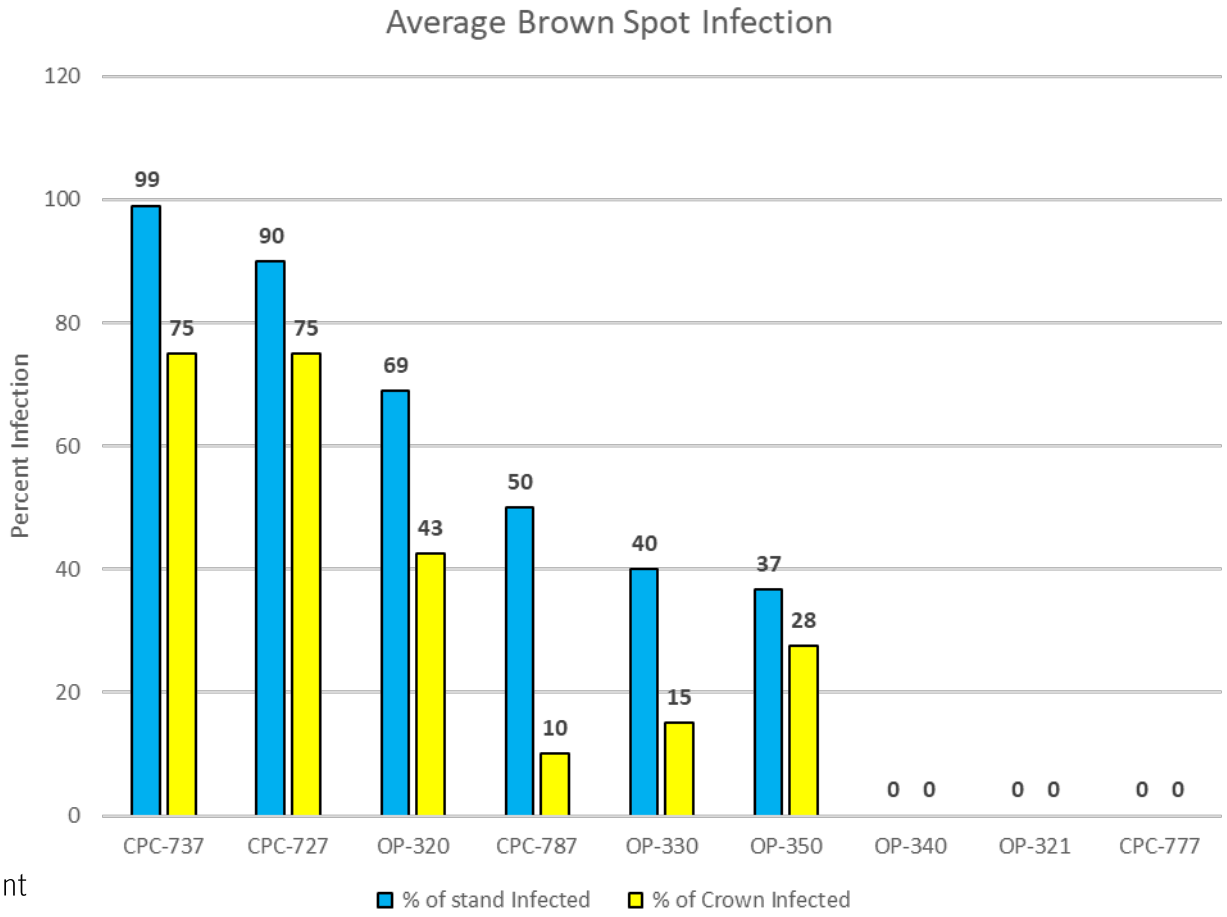
Brown Spot Needle Blight

- Symptoms
  - Small yellow irregular spots on needles that become brown
    - May be surrounded by a yellow halo
  - Brown spots form bands with needle death from infection to needle tip
  - Infection usually more severe on lower part of tree and progresses upwards
  - Identification based only on symptoms must be treated with caution and verified using molecular ID techniques
- Dissemination
  - Conidia and ascospores are released throughout the Year however, warm and wet weather is particularly conducive for development of BSNB
  - Conidia are dispersed predominantly by rain splash to adjacent trees
  - The main component that facilitates spread on conidia and ascospores is moisture
- Genetic Resistance – Literature Review
  - Breeding for resistance to L. acicula has been successfully used to reduce the impact of the disease on P. palustris in Alabama (*Van Der Nest et. Al*)
  - Not all loblolly pine families are equally susceptible to brown spot (*Alabama Extension)*

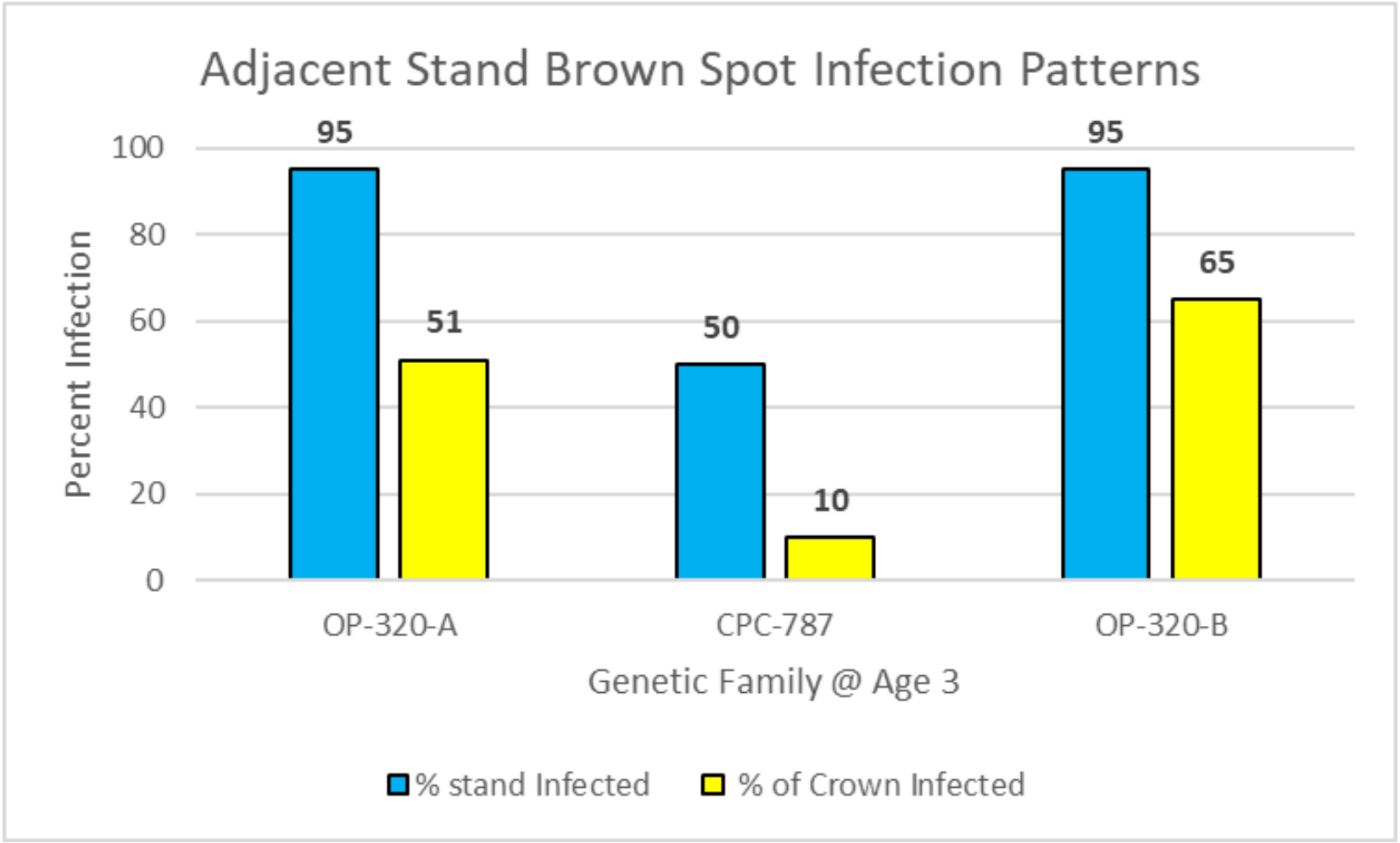
Observational Infection Patterns of BSNB

- Loblolly Pine BCNB Infection Investigation Provided Antidotal Patterns of Resistance (Limited Data)
  - Genetic Resistance by Family?
  - Nutritional Resistance Influence?
  - Age and/or Size Infection Pattern Difference?

- Genetic Families are coded to avoid misconceptions due to potential observational errors
  - CPC = Controlled Pollinated Cross
  - OP = Open Pollinated



Loblolly Pine Observational Genetic Resistance To Brown Spot



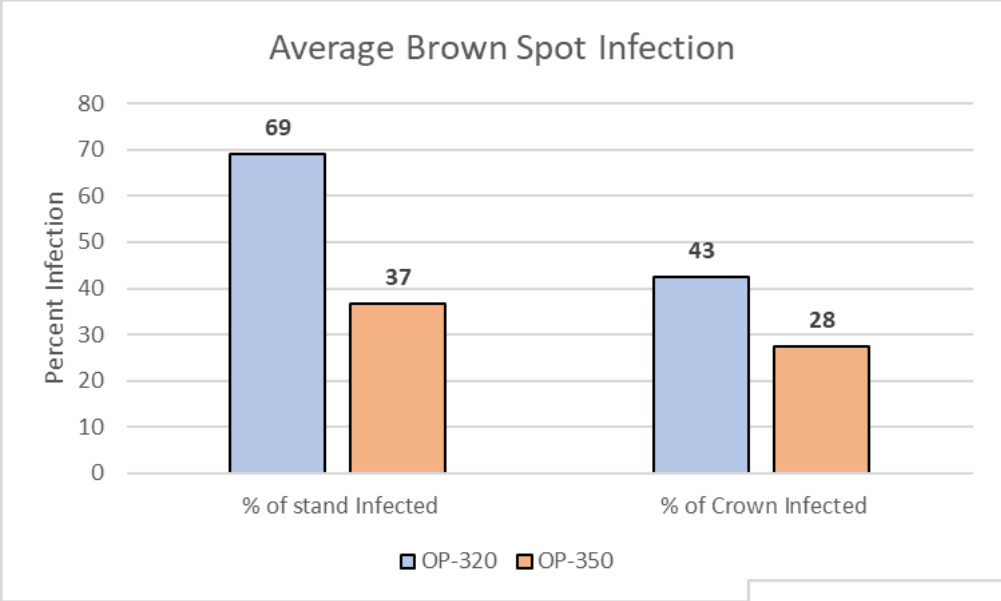
Genetic Resistance Patterns – Observational Evidence
Age 3 Loblolly Pine Plantation

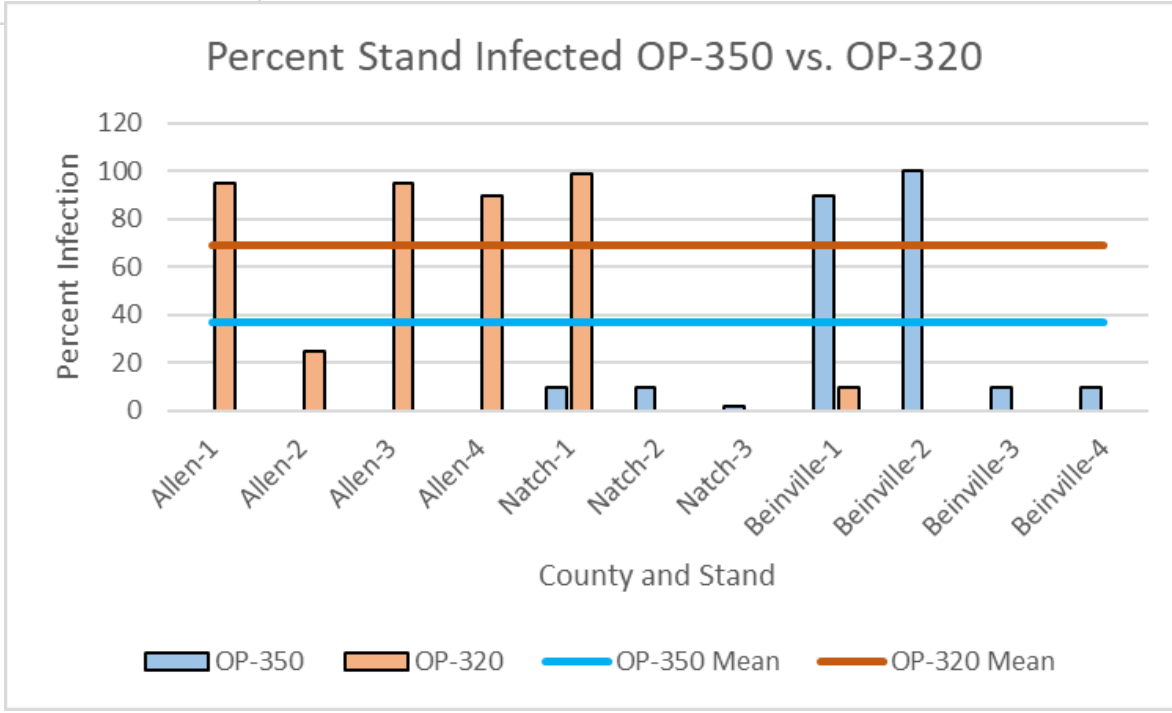
**Family OP-320,
Sub-stand A**

**Family CPC-787,
Sub-stand B**

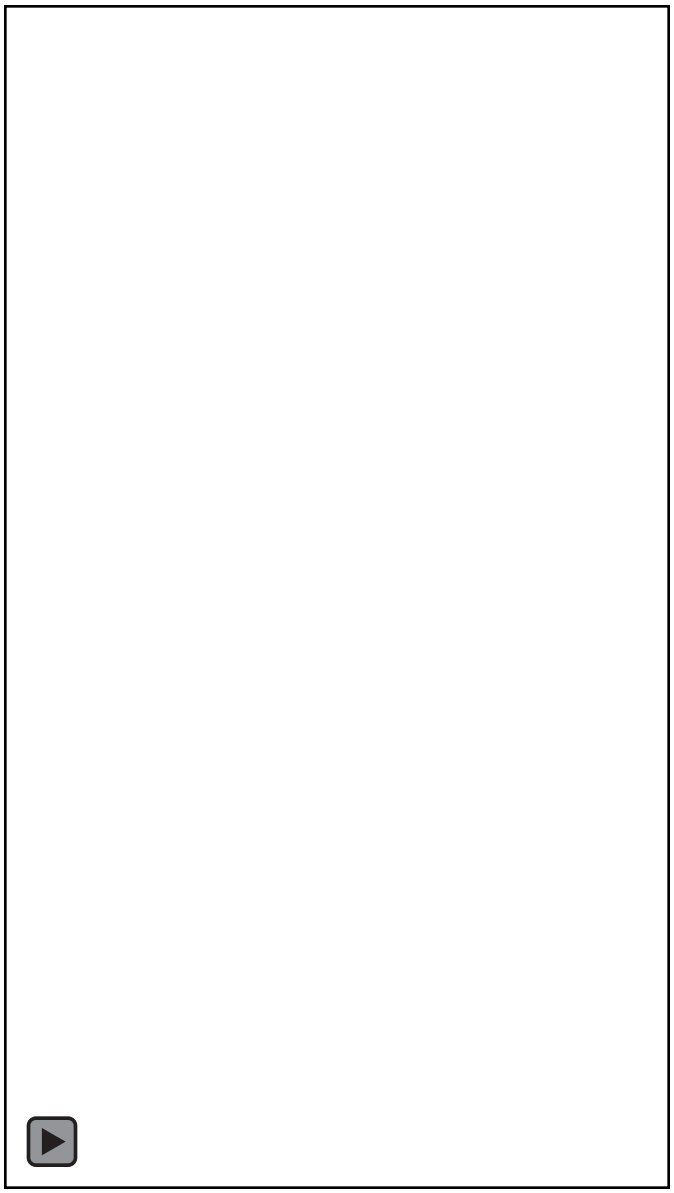
**Family OP-320,
Sub-stand C**

Genetic Resistance Pattern – Observational Evidence





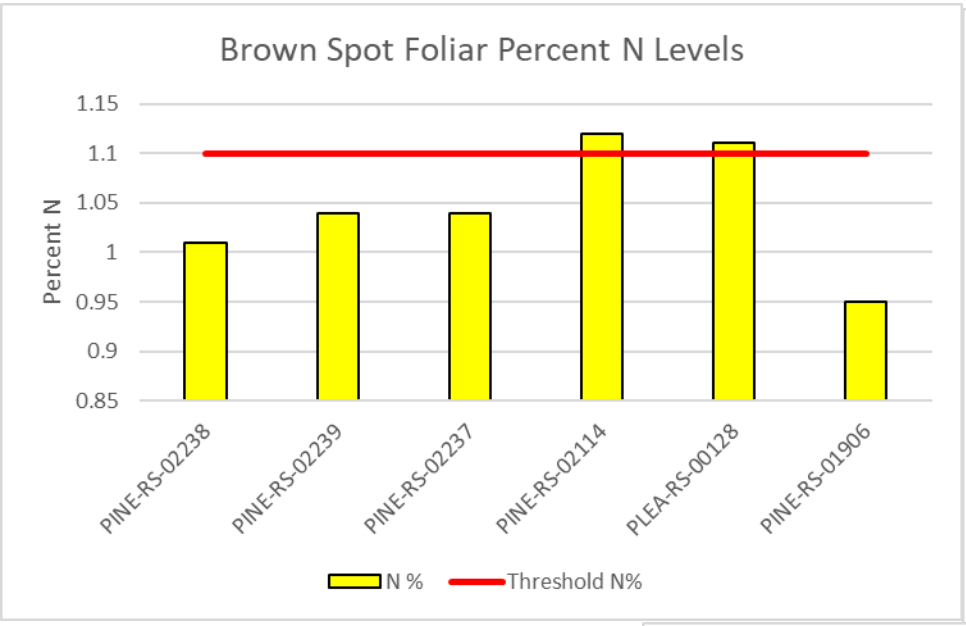
Nutritional or Age Resistance Pattern – Observational Evidence

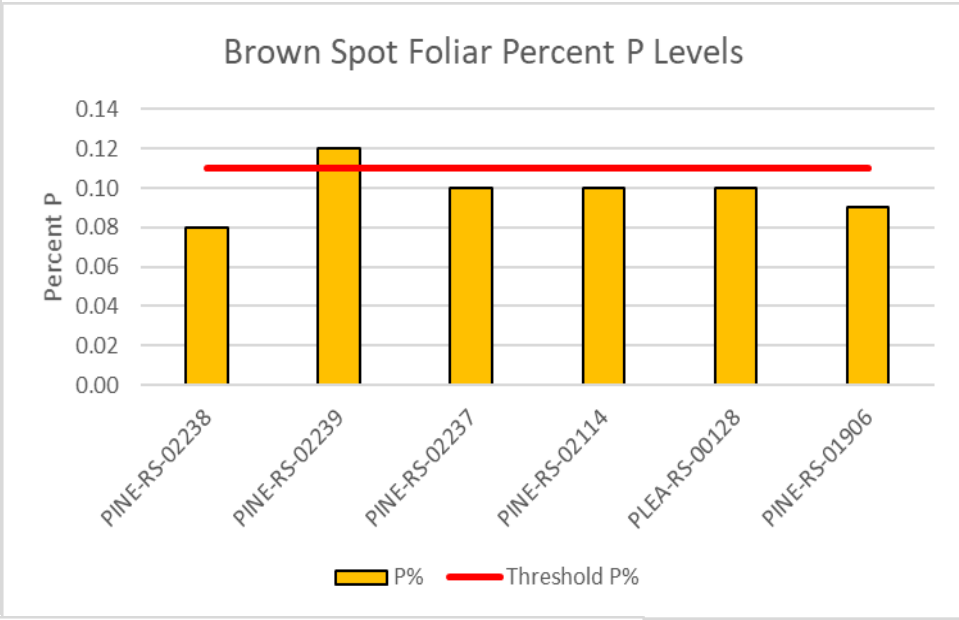


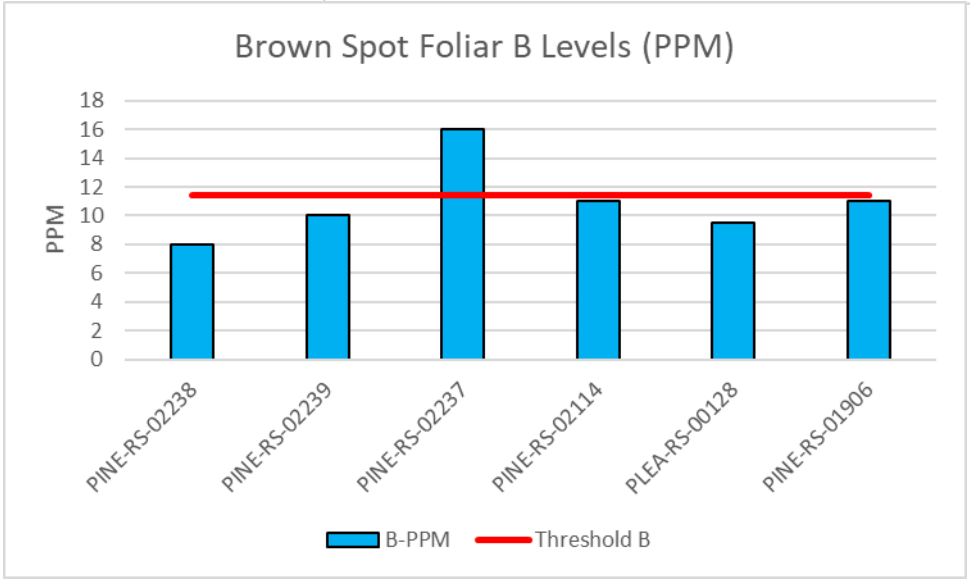
Brown Spot Foliar Nutrient Levels

Location											NITROGEN		PHOSPHOUS		BORON	
State	County	Tract/Stand	Infection % of Crown	% stand Infected	% Dead	Age	Family	SAMPLE ID	Needle Cast Symptoms	L. acicola LAMP	N %	N RATE	P %	P RATE	B ppm	B RATE
LA	Allen	PINE-RS-02238	51	95	1	3	OP-320	2238	Symptomatic	positive	1.01	L	0.08	L	8	D
LA	Allen	PINE-RS-02239	10	50	0	3	CPC-787	2239	Symptomatic	negative	1.04	L	0.12	S	10	D
LA	Allen	PINE-RS-02237	5	25	0	7	OP-320	2237	Asymptomatic	negative	1.04	L	0.1	S	16	S
LA	Allen	PINE-RS-02114	75	99	7	4	CPC-737	2114	Symptomatic	negative	1.12	S	0.1	S	11	D-L
LA	Natchitoches	PLEA-RS-00128	75	99	15	6	OP-320	00128A	Symptomatic	negative	1.23	S	0.17	S+	8	D
								00128B	Symptomatic	negative	1.19	S	0.09	S	8	D
								00128C	Symptomatic	positive	0.97	L	0.07	D-L	11	D-L
								00128D	Symptomatic	negative	1.03	L	0.08	L	11	D-L
LA	Natchitoches	PINE-RS-01906	15	10	0	1	OP-330	1906	Symptomatic	positive	0.95	L	0.09	S	11	D-L

Brown Spot Foliar Nutrient Levels







Brown Spot Needle Blight

- Discussion:
  - BSNB on loblolly pine has been reported across the Southeast
  - Is BSNB a big enough concern to have the Tree Improvement Co-Ops look at genetic resistance patterns?
  - Should the Tree Improvement Co-ops collaborate with Auburn and University of Georgia forest health programs to develop management strategies?

Manulife Investment Management