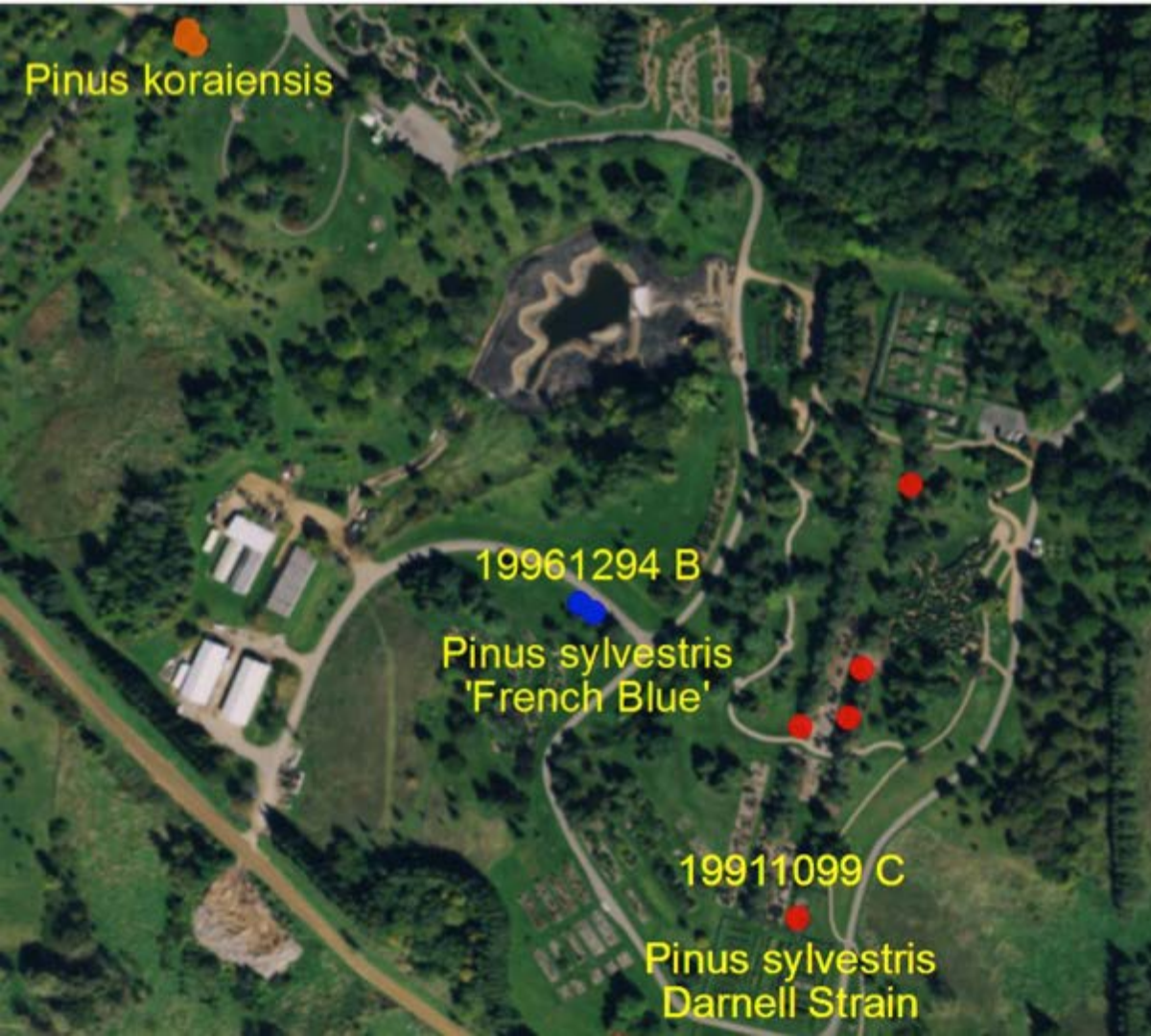


# Comparative Evaluation of Scots Pine and Korean Pine 2014 - 2017

A Checklist for Determining Plant Health  
Andrew Heiserman

# Project Goals

- To better understand diseases that threaten the Arboretum's pine collection
- Compare the health of 7 scots pines and 3 korean pines to a 2014 assessment
- This health evaluation consists of three major steps
  - Evaluating each individual tree for signs and symptoms of disease
  - If a disease is found, attempt to identify it through research and diagnostic testing of samples
  - Once tests are completed, compile an assessment of the current condition of the trees



## Locations of Arboretum Pine Trees

- Orange - 3 *Pinus koraiensis*
- Blue - 2 *Pinus sylvestris* 'French Blue'
- Red - 5 *Pinus sylvestris* 'Darnell Strain'

# Reasons for Pine Species Sample Selection

- Species Selection
  - Each variety or species has an individual tree that died quickly and unexpectedly this year
- Sample Selection Process
  - Verify that the surviving trees were not suffering from similar conditions
  - Use the surviving trees as a basis of comparison for the dying trees

# Evaluation Details

- How to evaluate pine trees
  - Start by standing far enough away to see the whole tree
  - Evaluate areas for closer inspection
  - Examine the trunk of the tree for pinholes and sap
  - Examine needles for curls on new growth

# Pine Wilt

- Pine wilt is caused by the pinewood nematode
- The pinewood nematode uses adult sawyer beetle as a vector
- Once the pinewood nematode infects the host they feed on resin ducts
- Overpopulation of these nematodes will eventually kill the tree

# Pine Wilt

- An all-encompassing disease making proper treatment almost impossible
- Disease is very destructive to non-native pines (scots pines and korean pines)
- The end result is the complete death of the tree
- Trees usually reach this stage by late August or September



# IPS Beetles and Blue Stain Fungus

- IPS beetles target stressed and dying pine trees
- Adult beetles burrow into the bark of the tree to feed on xylem and phloem
- Can eventually kill the tree when beetle populations exceed capacity
- IPS beetles act as a vector for blue stain fungus, which can disrupt vascular function





# Zimmerman Pine Moth

- Larva of the pine moth burrow into the bark and feed on the phloem
- Easy to identify, as the larvae leave frass and pitch outside their burrow
- Causes dieback in nearby branches
- Feeding of the larva can stress the tree
- Austrian and scots pines are the preferred hosts



# Diplodia

- A fungal disease most commonly occurs in pines that have bundles of 2 to 3 needles
- Kills new growth, leaving it straw like in color
- Symptoms typically appear on the lower branches of the tree
- Typically a problem for younger trees

# 2014 Data

Accession #	Ext	Variety	GenSpec	D.B.H. (in)	Height (ft)	Canopy Ratio	Tree Health	Health 1-10
19961294	A	French Blue'	<i>Pinus sylvestris</i>	5.7	16	90%	VG; Bent trunk	7
19961294	B	French Blue'	<i>Pinus sylvestris</i>	10	23	95%	VG-EX	8
19911099	A	Darnell Strain'	<i>Pinus sylvestris</i>	9.4	18	40%	F-G; Diplodia, needles falling off	4
19911099	B	Darnell Strain'	<i>Pinus sylvestris</i>	9.6, 8.7	24	85%	VG; Codominant	7
19911099	C	Darnell Strain'	<i>Pinus sylvestris</i>	10.4	20	80%	Dothistroma	5
19911099	D	Darnell Strain'	<i>Pinus sylvestris</i>	9.3	18	50%	G; Diplodia	5
19911099	E	Darnell Strain'	<i>Pinus sylvestris</i>	12.7	34	65%	G; some Diplodia	5

# 2017 Data

Accession #	Ext	Variety	GenSpec	D.B.H. (in)	Height (ft)	Canopy Ratio	Tree Health	Health 1-10
19961294	A	French Blue'	<i>Pinus sylvestris</i>	6.2	17	80%	minor diplodia	6
19961294	B	French Blue'	<i>Pinus sylvestris</i>	6.8	16	20%	dead; pine wilt ,IPS beetles	0
19911099	A	Darnell Strain'	<i>Pinus sylvestris</i>	9.5	22	50%	minor diplodia	6
19911099	B	Darnell Strain'	<i>Pinus sylvestris</i>	9.7,10.6	25	70%	minor diplodia	7
19911099	C	Darnell Strain'	<i>Pinus sylvestris</i>	12.5	21	60%	minor diplodia	7
19911099	D	Darnell Strain'	<i>Pinus sylvestris</i>	9.6	21	50%	dead; IPS beetles, moth	0
19911099	E	Darnell Strain'	<i>Pinus sylvestris</i>	13.9	35	50%	minor diplodia	6
19600141	E		<i>Pinus koraiensis</i>	13.8	40	80%	healthy	9
19600141	F		<i>Pinus koraiensis</i>	16	40	75%	dead; pine wilt	0
19600141	G		<i>Pinus koraiensis</i>	17.5	42	80%	healthy	9



## Major Findings

- Samples of the needles and cookies were sent to the university plant pathologist
- The korean pine sample 19600141 F was found to have pine wilt
- The scots pine 'French Blue' 19961294 B was found to have pine wilt and blue stained fungus



## Major Findings

- The scots pine 'Darnell Strain' 19911099 D samples were identified to have only blue stain fungus
- A combination of zimmerman pine moth and IPS beetles were the cause of death

# Minor Findings

- Low levels of Diplodia was found in the scots pine 'Darnell Strain'
- Diplodia contamination was not at high enough levels to be of any harm to the hosts

# Special Thanks!

- Dan Miller
- Jan Malysza
- David Stevenson
- Mike Walters

## Resources

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