



Ironwood Tree Decline  
on Guam



<b>DS</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>PD</b>	<b>0</b>	<b>13</b>	<b>43</b>	<b>66</b>	<b>95</b>
<b>PBB</b>	<b>0</b>	<b>9</b>	<b>49</b>	<b>67</b>	<b>100</b>



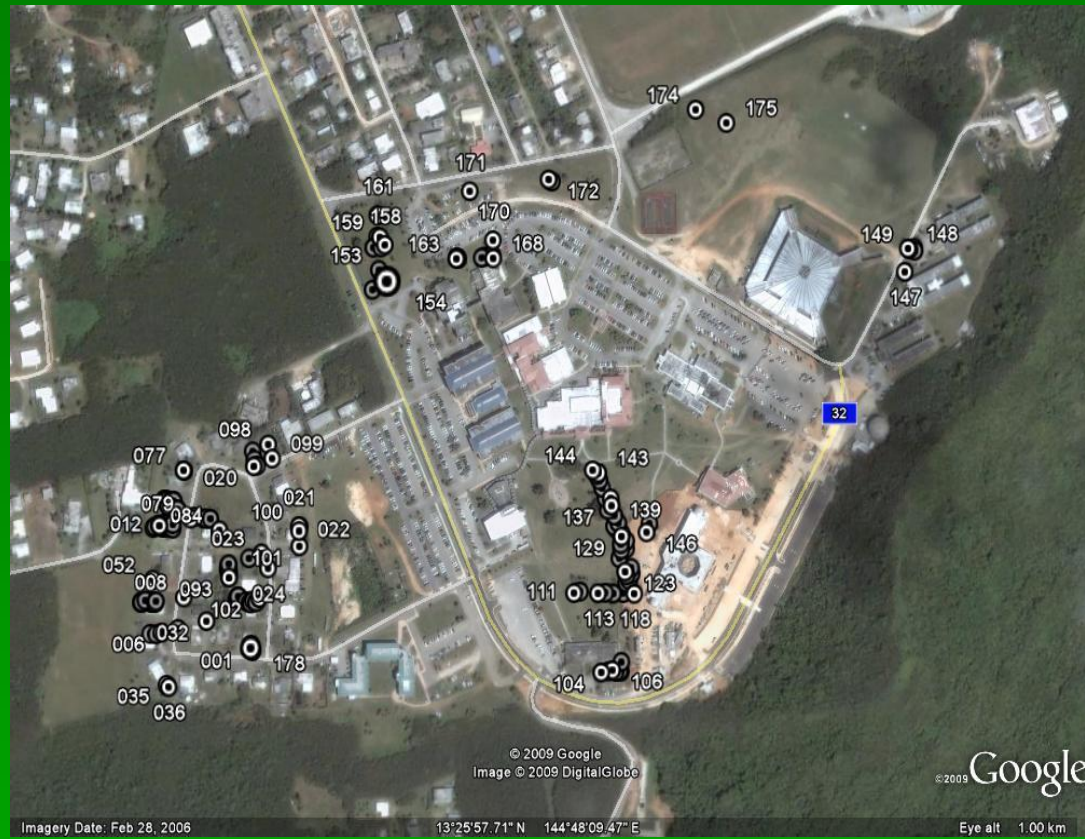
<b>DS</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>PD</b>	<b>0</b>	<b>20</b>	<b>52</b>	<b>73</b>	<b>93</b>
<b>PBB</b>	<b>0</b>	<b>13</b>	<b>51</b>	<b>79</b>	<b>96</b>

**Fig. 1.** Representative photographs of small (above) and large (below) solitary trees from across Guam depicting a five-level decline severity scale (DS), percent decline (PD), and percent bare branches (PBB).

Location: N13 25.904 E144 48.197  
CBH cm: 129  
Decline Severity: 2

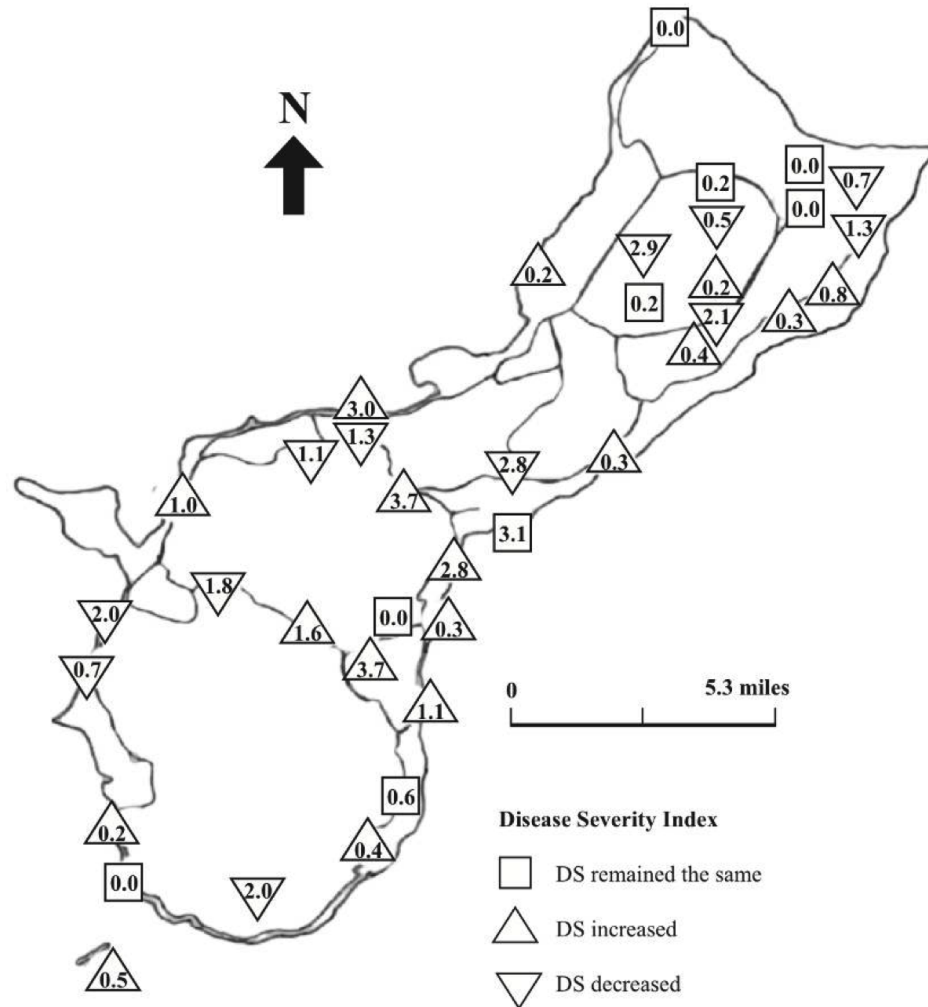


# GPS waypoints of ironwood trees



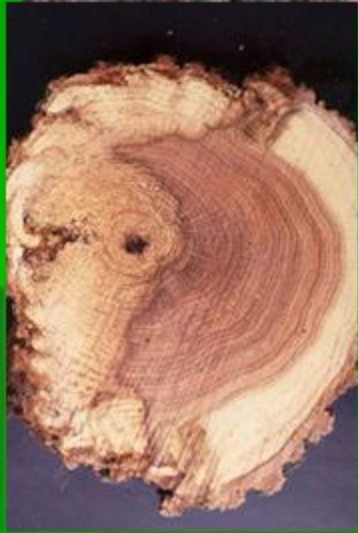
## Main conk types observed





**Fig.3.** Means of decline severity (DS) found at sites during Survey II (July to December 2009). Values in comparison to Survey I (October 2008 to June 2009) remained nearly the same (square), increased (up-triangle) or decreased (down-triangle).





Ironwood decline?  
or *Ganoderma*?

White rot of oak  
University of Minnesota



## Things isolated or indicated

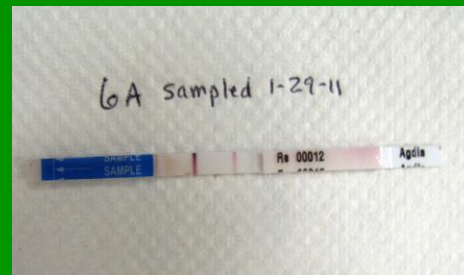
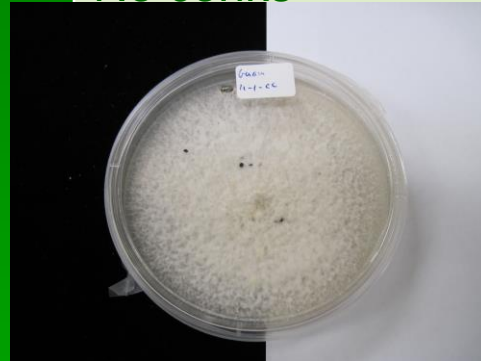
*Fusarium* sp. *equiseti* group

*Pestalotiopsis*

*Trichoderma*

Positive response for *Ralstonia solanacearum*  
on Agdia immunostrip

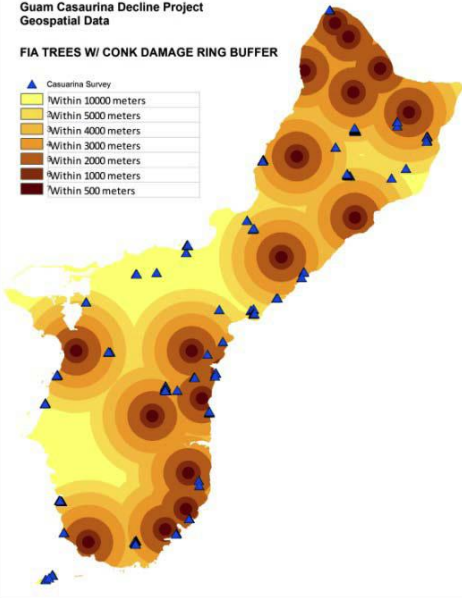
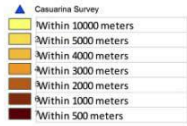
No conks





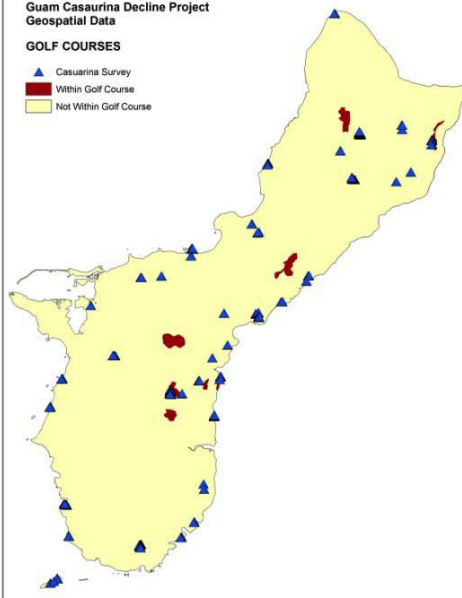
Guam Casuarina Decline Project  
Geospatial Data

FIA TREES W/ CONK DAMAGE RING BUFFER



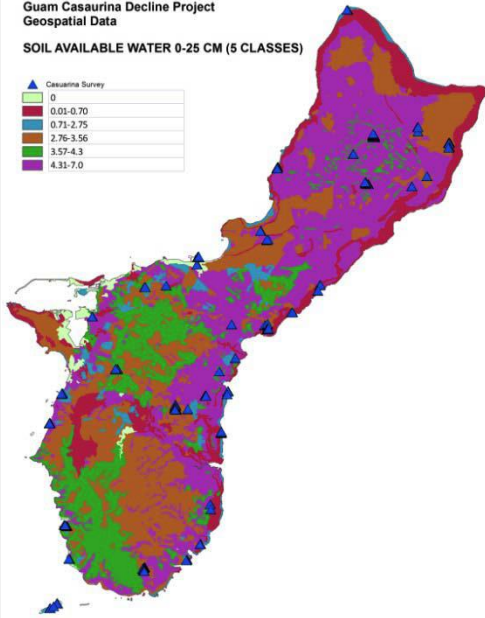
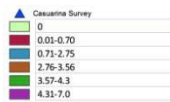
Guam Casuarina Decline Project  
Geospatial Data

GOLF COURSES



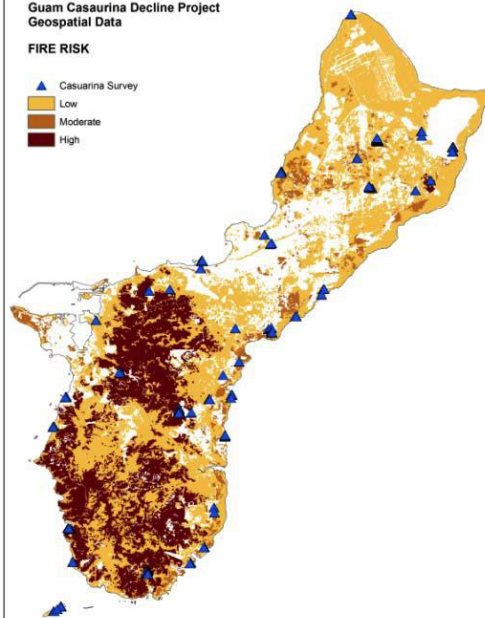
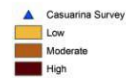
Guam Casuarina Decline Project  
Geospatial Data

SOIL AVAILABLE WATER 0-25 CM (5 CLASSES)



Guam Casuarina Decline Project  
Geospatial Data

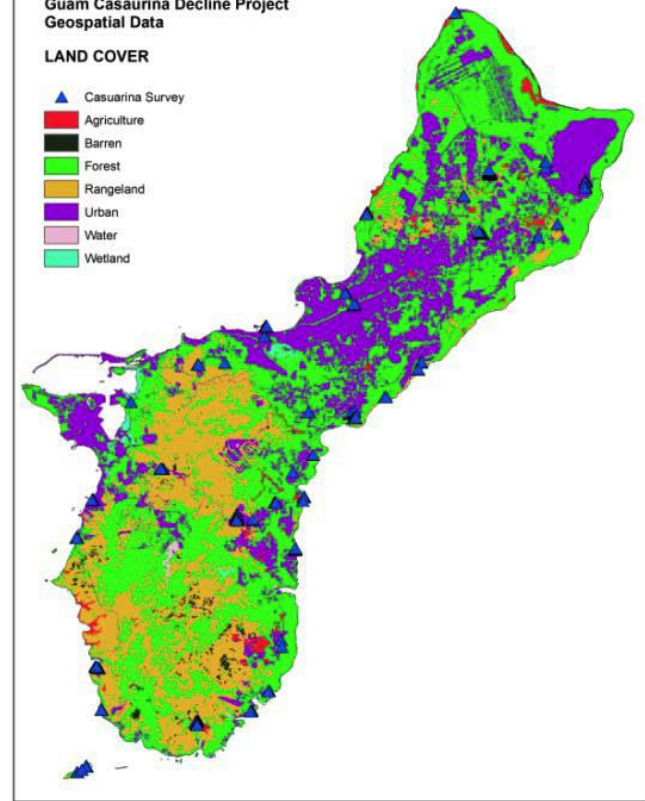
FIRE RISK



GIS Maps provided by  
Lisa F. Kennaway

Guam Casuarina Decline Project  
Geospatial Data

LAND COVER



# Bacterial wilt of Casuarina trees

- Bacterial wilt of Casuarina trees is caused by *Ralstonia solanacearum* and is one of the most serious pests and the most studied deeply among all the diseases and insects pests of Casuarina trees. It was firstly found out in 1964 at the Hailing island in Yangjiang county of Guangdong province, and then, it was also occurred in Hainan, Fujian and Guangxi provinces



Exterior Symptom  
Stream brown liquid



Inside Symptom of  
Bacterial wilt

transverse section overflow  
bacterial ooze

# Positive Decline Predictors

Variables	Estimate	Std. Error	z value	Pr (>   z  )	
Circumference	4.718e-03	1.605e-03	2.940	.003286	**
Altitude	8.018e-03	1.944e-03	4.126	3.70e-05	***
Conks	3.286e+00	2.94e-01	11.239	<2e-16	***
Termites	5.645e -01	1.940e-01	2.909	.003622	**
Propagated	1.292e+00	2.25e-01	5.630	1.81e-08	***
GIS urban	6.022e-01	2.390e-01	2.52	.011750	*

# Negative Decline Predictors

Variables	Estimate	Std. Error	z value	Pr (>  z )	
GIS Soil moisture	-4.228e-01	8.144e-02	-5.192	2.08e-07	***
GIS Golf course	-1.132e+00	2.915e-01	3.882	0.000104	***
GIS Forest	-9.335e-01	2.833e-01	-3.295	.000984	***

# Hainan China

