DISEASE, DOGS AND DRONES

FIU Laurel wilt working group

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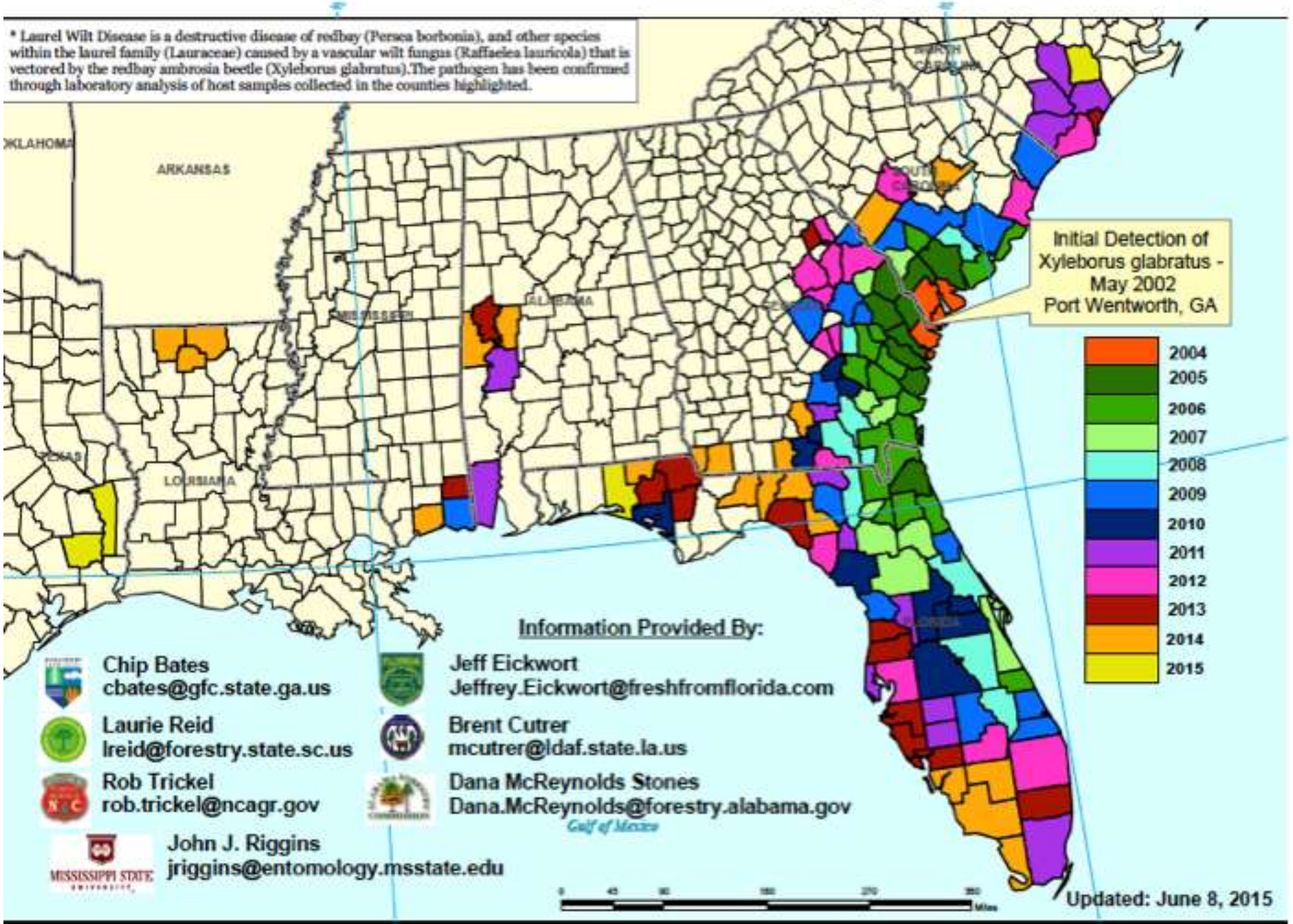
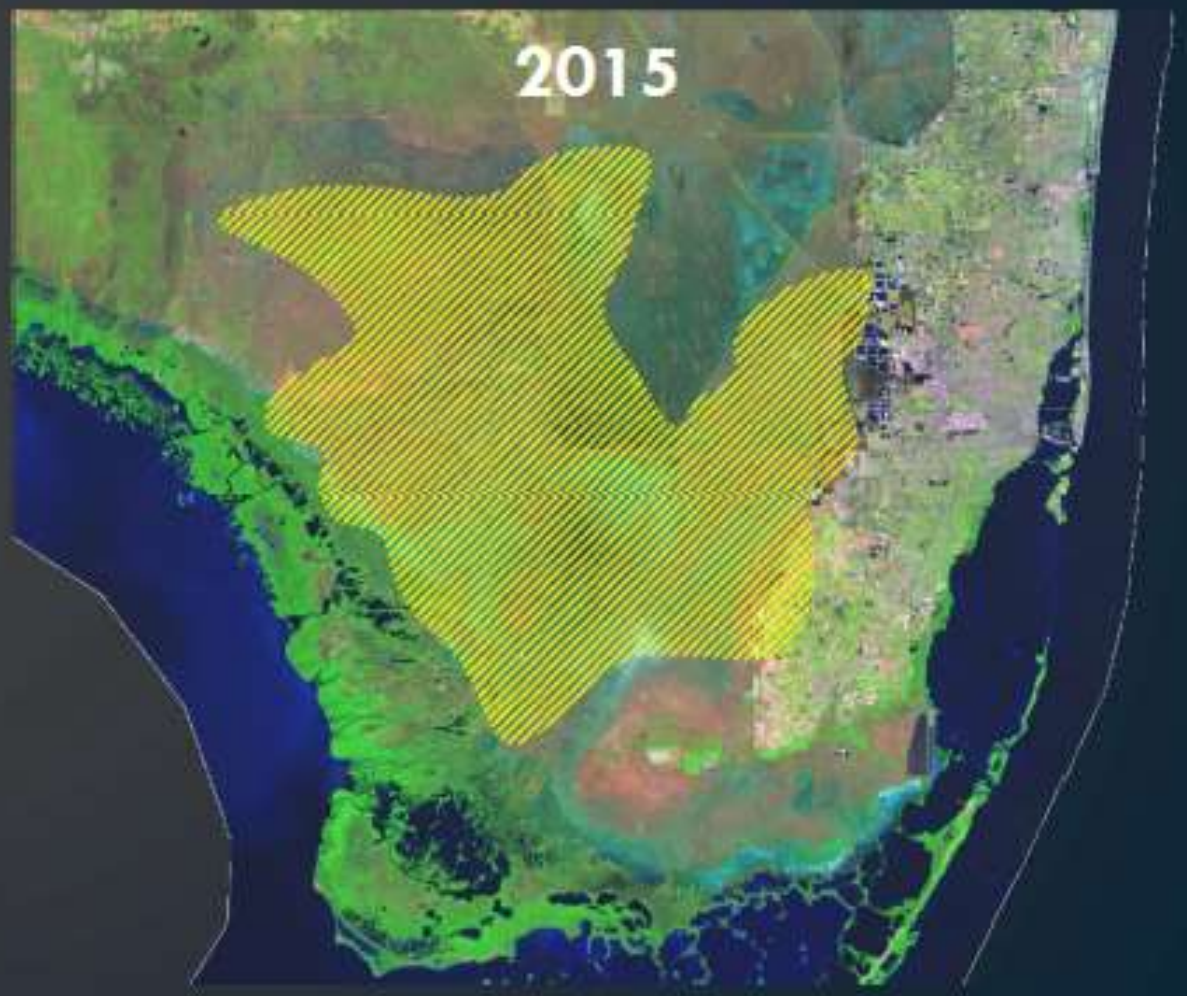
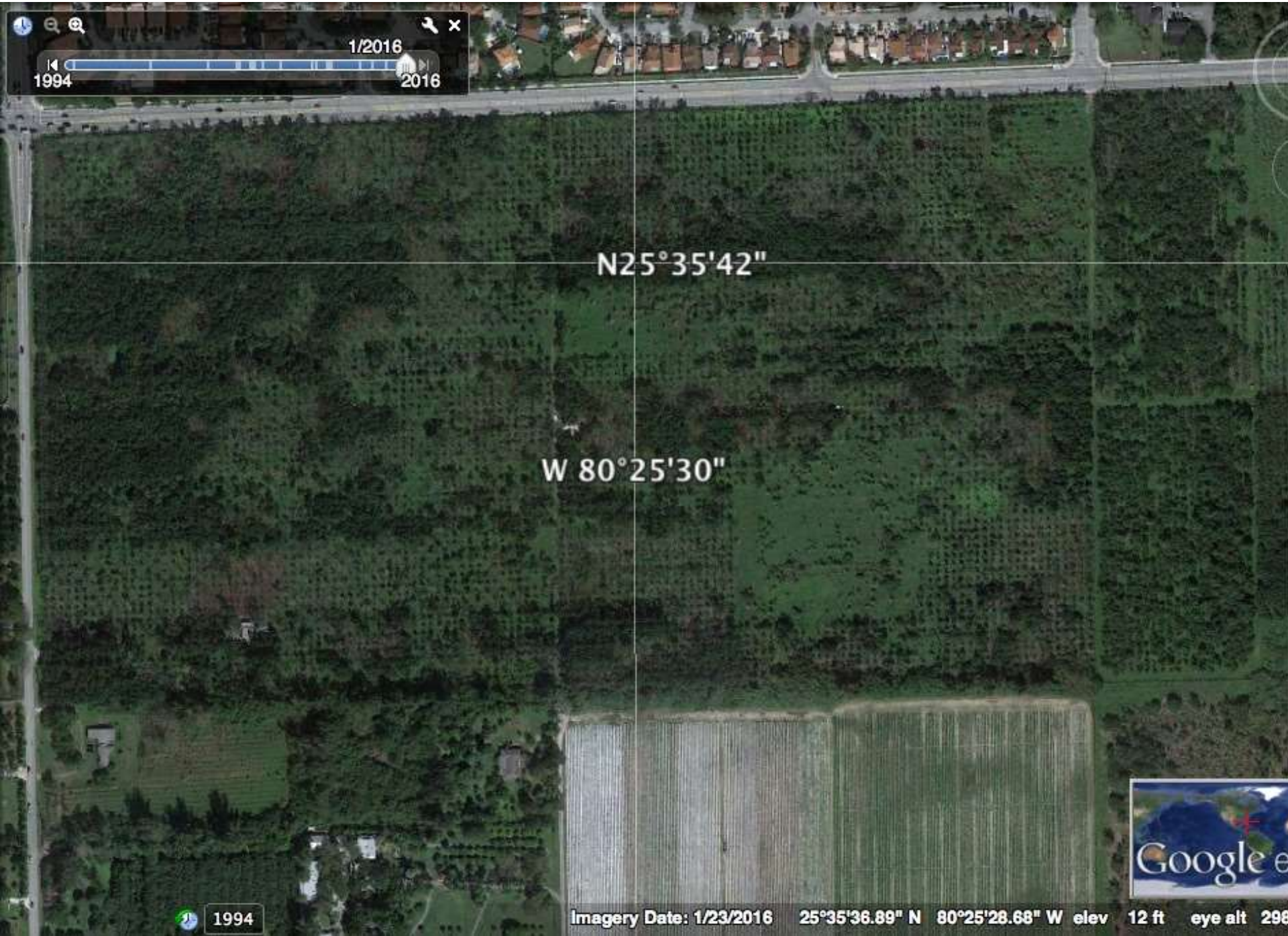
Distribution of Counties with Laurel Wilt Disease* by year of Initial Detection



Extent of Occurrence 2015

- 372,052 ha

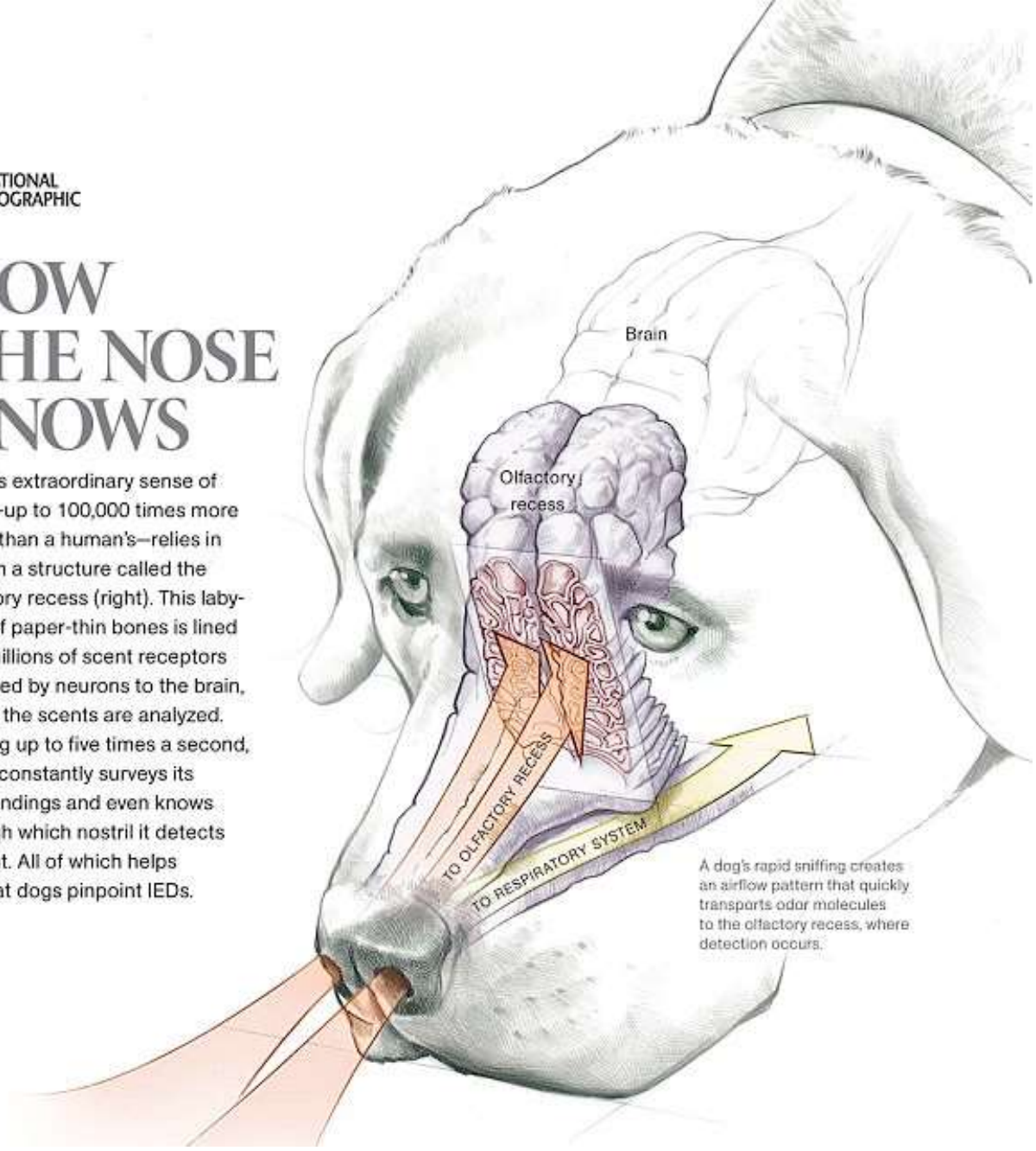



1/2016
1994
2016
N25°35'42"
W 80°25'30"
1994
Imagery Date: 1/23/2016 25°35'36.89" N 80°25'28.68" W elev 12 ft eye alt 298
Google e

NATIONAL GEOGRAPHIC

HOW THE NOSE KNOWS

A dog's extraordinary sense of smell—up to 100,000 times more acute than a human's—relies in part on a structure called the olfactory recess (right). This labyrinth of paper-thin bones is lined with millions of scent receptors attached by neurons to the brain, where the scents are analyzed. Sniffing up to five times a second, a dog constantly surveys its surroundings and even knows through which nostril it detects a scent. All of which helps combat dogs pinpoint IEDs.



A dog's rapid sniffing creates an airflow pattern that quickly transports odor molecules to the olfactory recess, where detection occurs.

Same nose, different uses!!

Member of the U.S. Customs & Border Protection Beagle Brigade inspecting luggage for agriculture contraband. (Photo courtesy of Customs & Border Protection)

1st step: Selection of potential detector dogs

After screening 60!

Start with something they like = reward

Ask them to perform a task

Positive reinforcement


INJURED
VICTIM
SCENT CONE
SAR DOG
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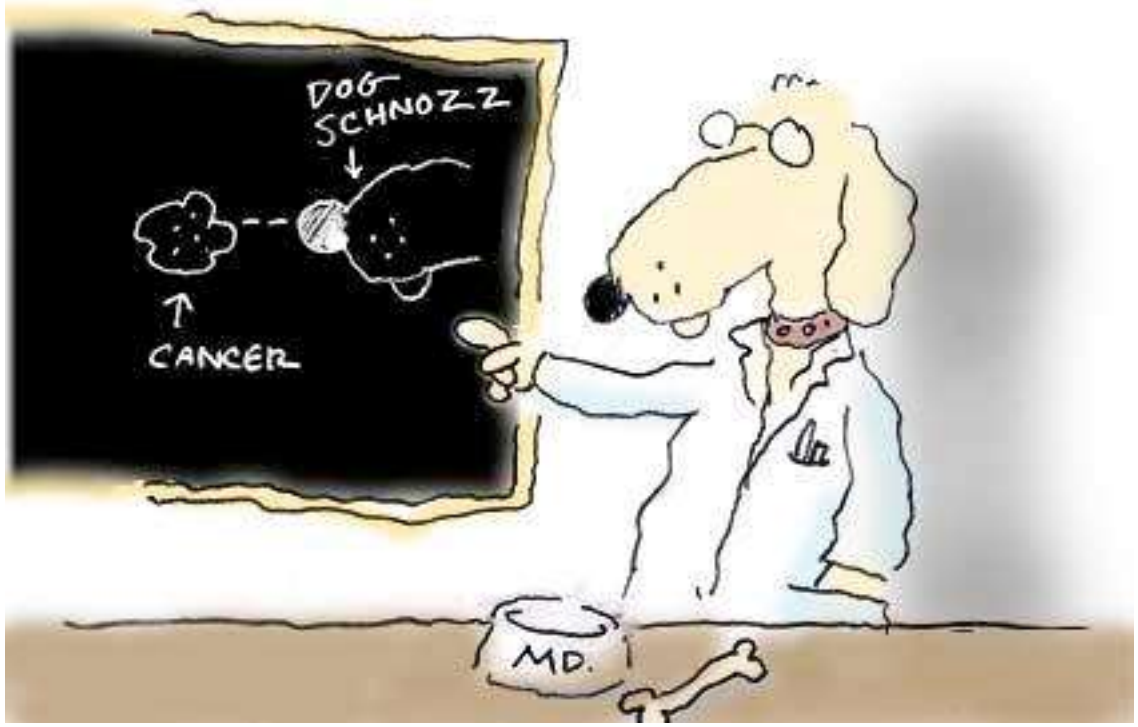
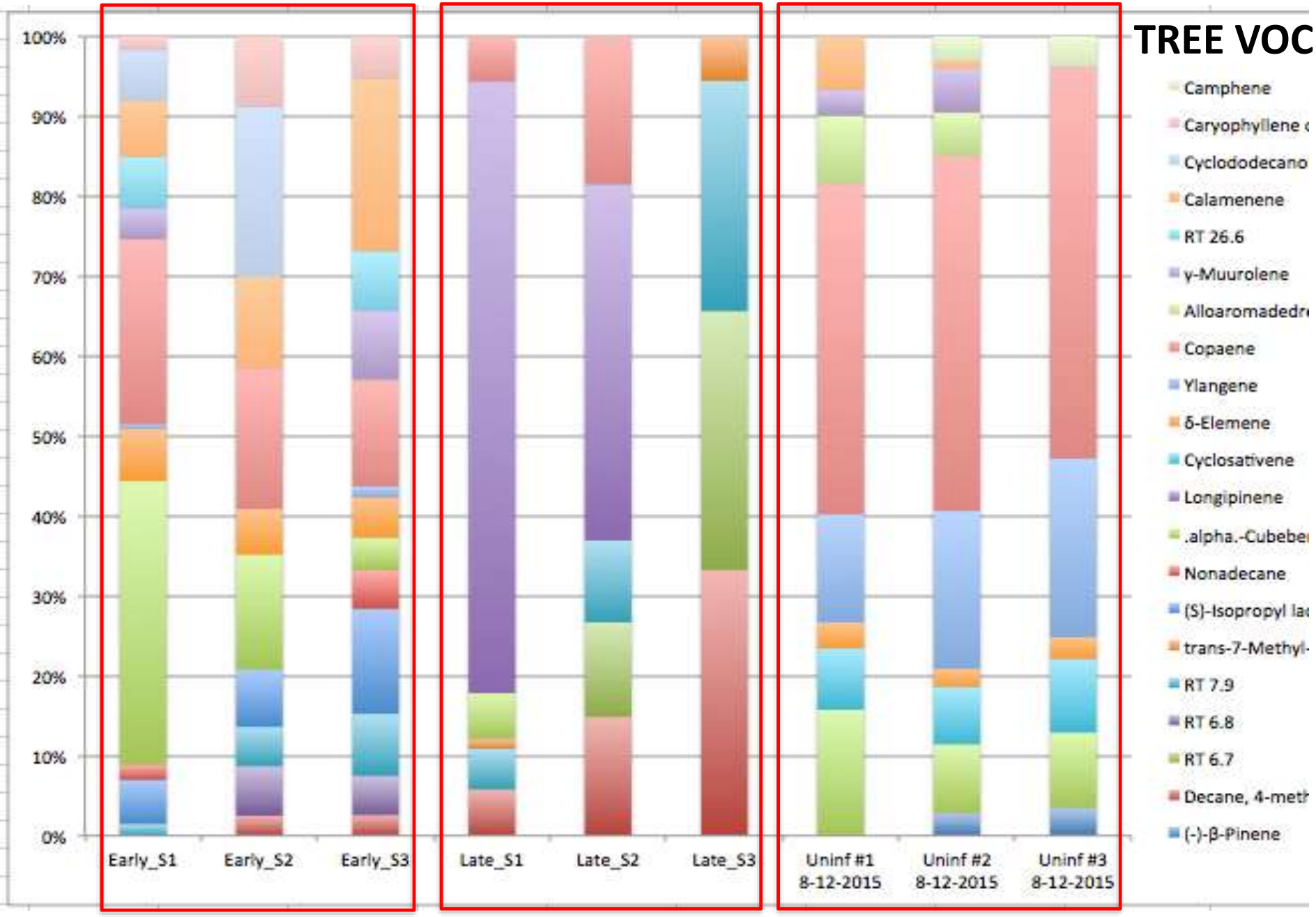
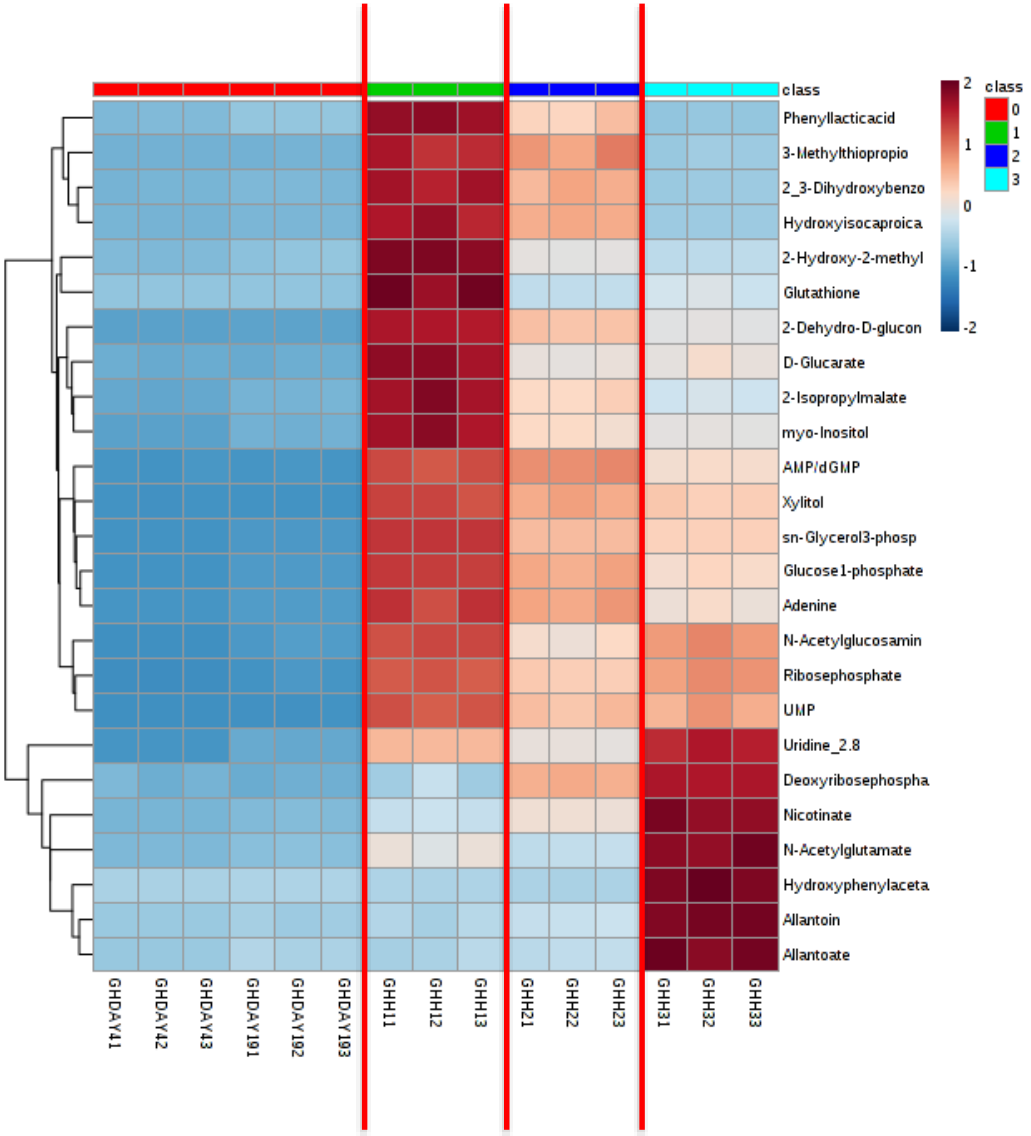
The science behind the detection!




TREE VOC
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Early_S1
Early_S2
Early_S3
Late_S1
Late_S2
Late_S3
Uninf #1 8-12-2015
Uninf #2 8-12-2015
Uninf #3 8-12-2015
Camphene
Caryophyllene
Cyclododecano
Calamenene
RT 26.6
γ-Muurolene
Alloaromadedr
Copaene
Ylangene
δ-Elemene
Cyclosativene
Longipinene
.alpha.-Cubebe
Nonadecane
(S)-Isopropyl la
trans-7-Methyl
RT 7.9
RT 6.8
RT 6.7
Decane, 4-meth
(-)-β-Pinene

Fungal Growth Dynamics

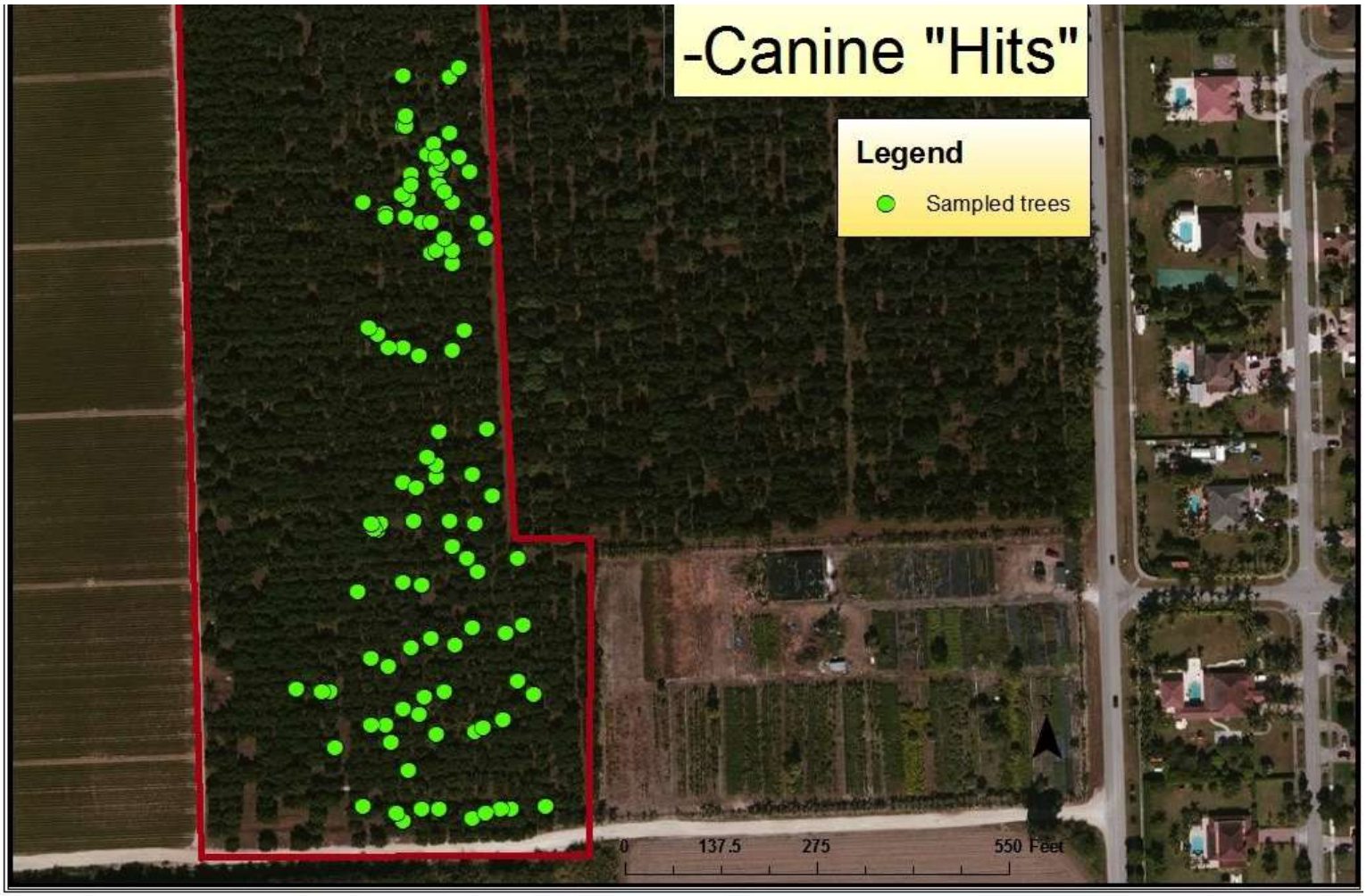


Deployment results in nine different groves affected with laurel wilt

	# Trees detected	# Trees still healthy	# Trees Progressed to wilt	Percentage progressed to wilt (%)
Treated	155	151	4	2.52
Untreated	10	3	7	70

- ~58% of root samples yielded positive DNA results
  - Non-invasive sampling
- Pre-symptomatic AND treated trees identified by canines had ~97% survival rate

Control grove: no treatment



TREE 56 Alerted to (A) 2-3 Weeks after detection (B&C)

A

B

C

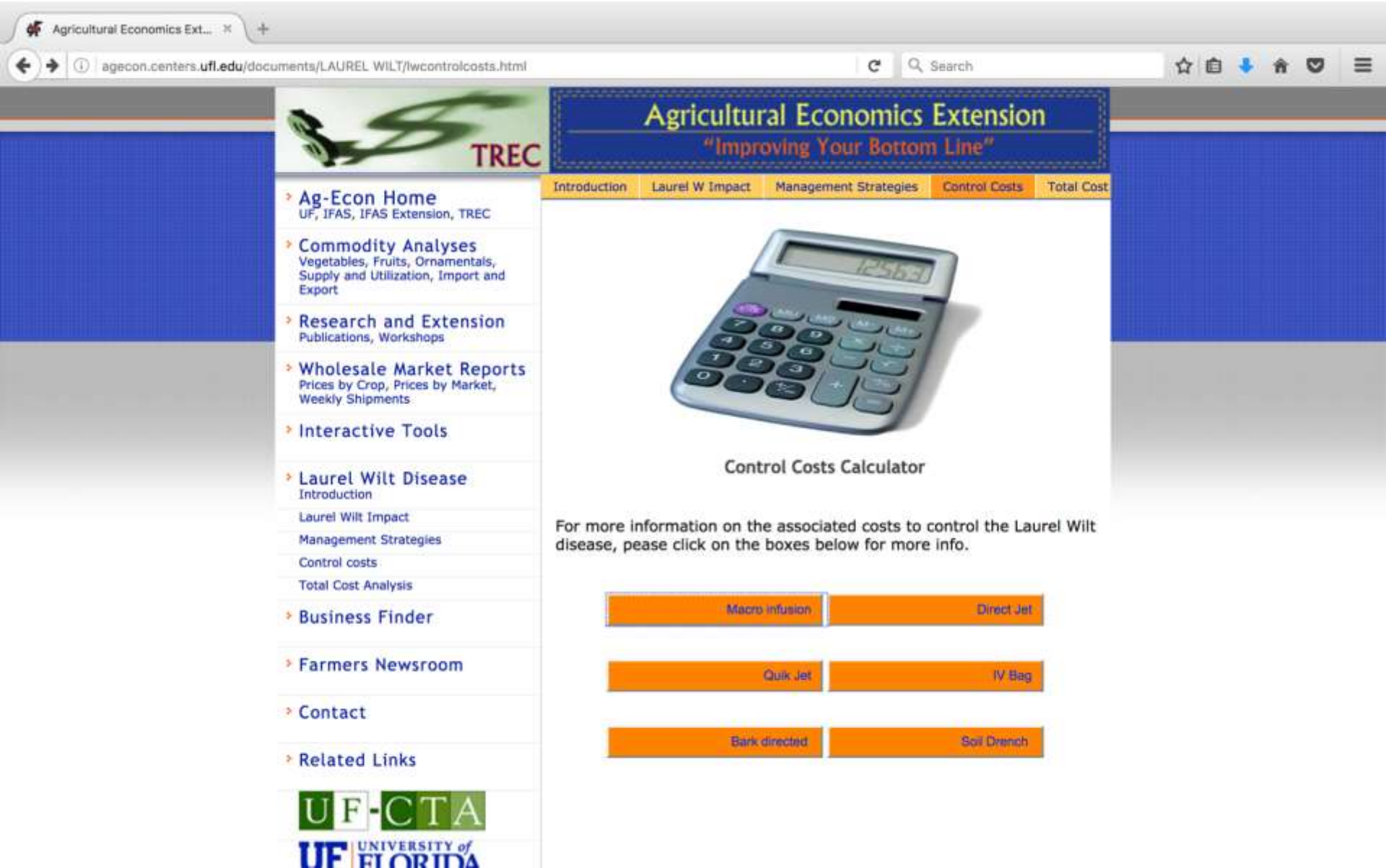
Results

# of pre-symptomatic trees w/canine alerts	# of trees visually progressed to Wilt	# of trees with Early/Possible wilt
100	22	9

NOTABLE FACTS:

- **All alerted trees were pre-symptomatic/non-symptomatic**
- **Trees showed signs at 2-3 weeks post alert, others 4-6 weeks post alert = 31**
- **Grove completely sanitized cutting study short, owners decision**

UF-TRECs interactive tools



Economics of canine detection -early intervention to save the trees

Activity	1 tree detected	2 trees detected	3 trees detected	4 trees detected	5 trees detected	10 trees detected
Canines deployed (5 acre grove)	$150	$150	$150	$150	$150	$150
TILT® treatment	$25	$50	$75	$100	$125	$250
Sum	$175	$200	$225	$250	$275	$400
Value saved	**$475**	**$950**	**$1425**	**$1900**	**$2375**	**$4750**

Funding sources

Florida Department of Agriculture and Consumer Services

iNNOVATIVE DETECTION CONCEPTS

Redland Ahead/Second Chance Canines

McNair, NIGMS-RISE Fellowships to students