

Biological Question (depends on your hypothesis):

**Is there a statistically significant difference in sub-canopy DBH between Unburned and Burned plots?**

Data			
Treatment	Transect	Category	DBH (cm)
Unburned	1	subcanopy	1
Unburned	2	subcanopy	2
Unburned	3	subcanopy	5
Unburned	4	subcanopy	5
Unburned	5	subcanopy	9
Unburned	6	subcanopy	10
Burned	1	subcanopy	1
Burned	2	subcanopy	2
Burned	3	subcanopy	3
Burned	4	subcanopy	3
Burned	5	subcanopy	3
Burned	6	subcanopy	5

To answer that, we need to compare the **mean DBH** of Burned and Unburned plots

Find a statistical test that compares the means of two populations.

**A Student's t-test**  
does exactly that!

But, wait, there are two types of t-tests:

1. Assuming **equal variances**
2. Assuming **unequal variances**

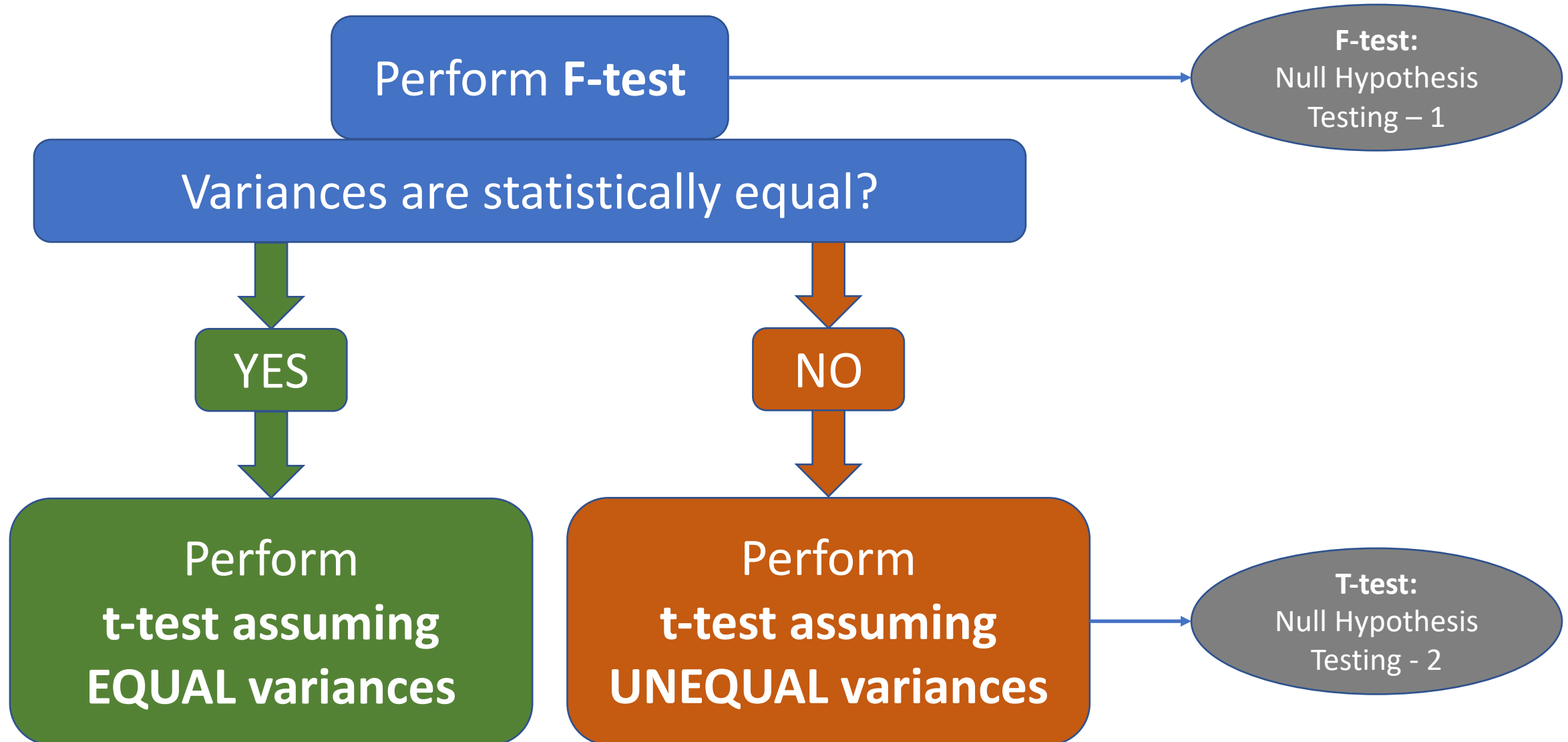
Which one can you use?

Need a statistical test to check if the variances of the two populations (Unburned and Burned) are significantly different or not!

**F-test**  
to the rescue!

Remember your Biological Question

**Is there a statistically significant difference in sub-canopy DBH between Unburned and Burned plots?**



# Null Hypothesis Testing

**Step 1: What is your null hypothesis? Write it down.**

$H_0$  (Null): There is **no difference** in the mean (or variance, etc) between Pop 1 or Pop 2

**Step 2: Do your test (using a program like Excel, or by hand) [think f-test or t-test]**  
Be careful, Select the appropriate test for your hypothesis.

**Step 3: Compare your p-value with the threshold p-value of 0.05**

if, your p-value < 0.05  
you **REJECT** the null hypothesis ( $H_0$ )

Statistically, there is a difference!

else if, your p-value > 0.05  
you **FAIL to REJECT** the null hypothesis ( $H_0$ )

Statistically, there is no difference!

F-test and T-test, both, are statistical tests that uses null hypothesis testing.

# F-TEST: Null Hypothesis Testing

**Step 1: What is your null hypothesis? Write it down.**

$H_0$  (Null): There is **no difference** in the *variances* of Pop 1 (Unburned) and Pop 2 (Burned)  
or in other words, Variance (Unburned DBH) = Variance (Burned DBH)

**Step 2: Do a F-test (using excel or by hand)**

**Step 3: Compare your p-value with the threshold p-value of 0.05**

if, your p-value < 0.05  
you **REJECT** the null hypothesis ( $H_0$ )

Statistically, **there is a difference!**  
Or, DBH data collected in Burned and  
Unburned units have **UNEQUAL** variances.

else if, your p-value > 0.05  
you **FAIL to REJECT** the null hypothesis ( $H_0$ )

Statistically, **there is no difference!**  
Or, DBH data collected in Burned and  
Unburned units have **EQUAL** variances.

F-test asks, “Are the variances significantly different or not?”

# T-TEST: Null Hypothesis Testing

**Step 1: What is your null hypothesis? Write it down.**

$H_0$  (Null): There is **no difference** in the *mean* of Pop 1 (Unburned DBH) and Pop 2 (Burned DBH)  
or in other words, Mean (Unburned DBH) = Mean (Burned DBH)

**Step 2: Do a t-test (assuming either equal variances or unequal variances)**

But before that, Decide: one-tailed t-test or two-tailed t-test?

**Step 3: Compare your p-value with the threshold p-value of 0.05**

if, your p-value < 0.05  
you **REJECT** the null hypothesis ( $H_0$ )

Statistically, **there is a difference!**  
Or, There is a **significant difference** in the mean  
DBH between Burned and Unburned units.

else if, your p-value > 0.05  
you **FAIL to REJECT** the null hypothesis ( $H_0$ )

Statistically, **there is no difference!**  
Or, There is **NO significant difference** in the mean  
DBH between Burned and Unburned units.

T-test asks, “Are the means significantly different or not?”

When you never expected to learn stats in an Ecology lab but you finally understand what a t-test does.

