What is the complete guide for interpreting t-test results in Excel?

Authored by

stats writer

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The complete guide for interpreting t-test results in Excel is a comprehensive resource that explains the process of analyzing and interpreting t-test results using Microsoft Excel. It provides step-by-step instructions on how to input data, run the t-test, and interpret the output, including understanding the significance levels and confidence intervals. It also covers how to determine if the results are statistically significant and how to interpret the p-value. Additionally, the guide offers tips and best practices for effectively utilizing the t-test in Excel for various types of data analysis. Overall, this guide serves as a valuable tool for understanding and making informed decisions based on t-test results in Excel.

Complete Guide: Interpret t-test Results in Excel

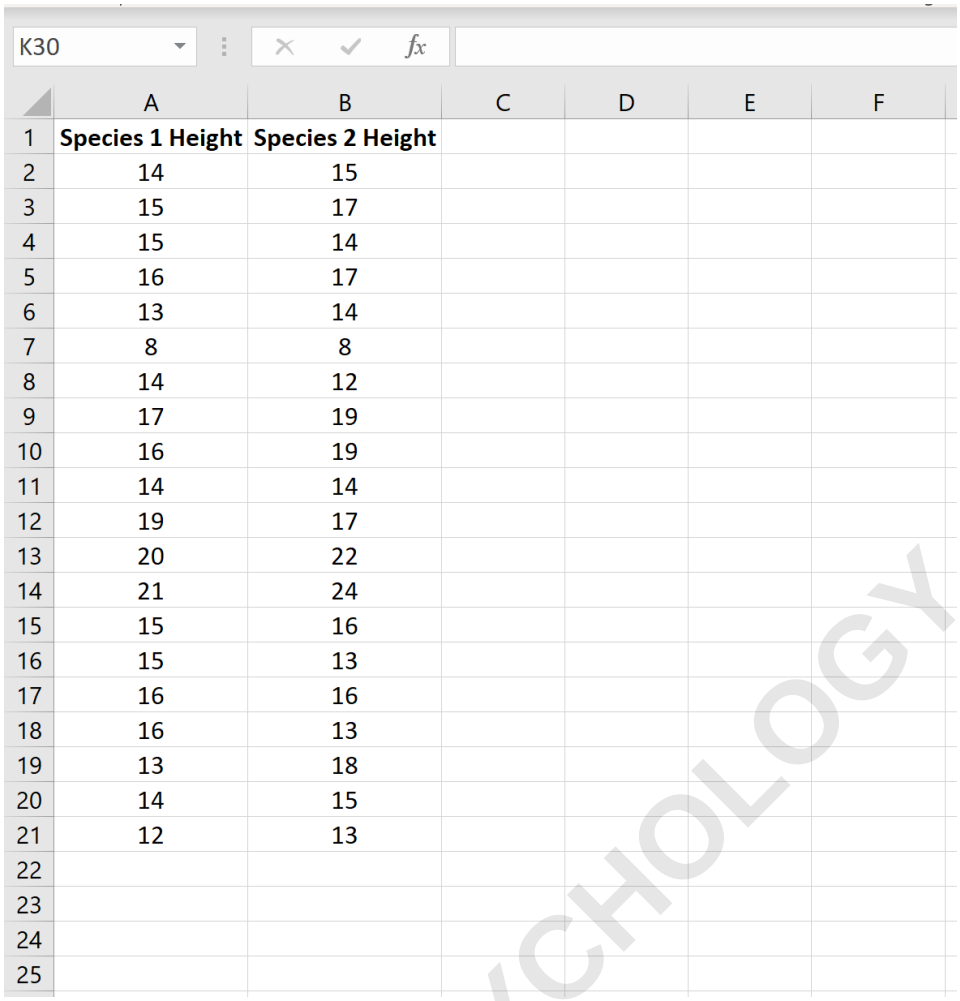
A is used to test whether or not the means of two populations are equal.

This tutorial provides a complete guide on how to interpret the results of a two sample t-test in Excel.

Step 1: Create the Data

Suppose a biologist want to know whether or not two different species of plants have the same mean height.

To test this, she collects a **simple random sample** of 20 plants from each species:



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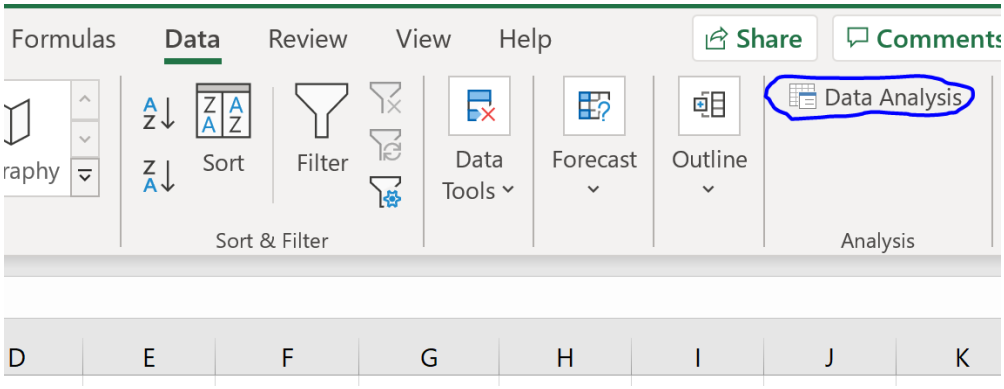
	A	B	C	D	E	F
1	**Species 1 Height**	**Species 2 Height**				
2	14	15				
3	15	17				
4	15	14				
5	16	17				
6	13	14				
7	8	8				
8	14	12				
9	17	19				
10	16	19				
11	14	14				
12	19	17				
13	20	22				
14	21	24				
15	15	16				
16	15	13				
17	16	16				
18	16	13				
19	13	18				
20	14	15				
21	12	13				
22						
23						
24						
25						

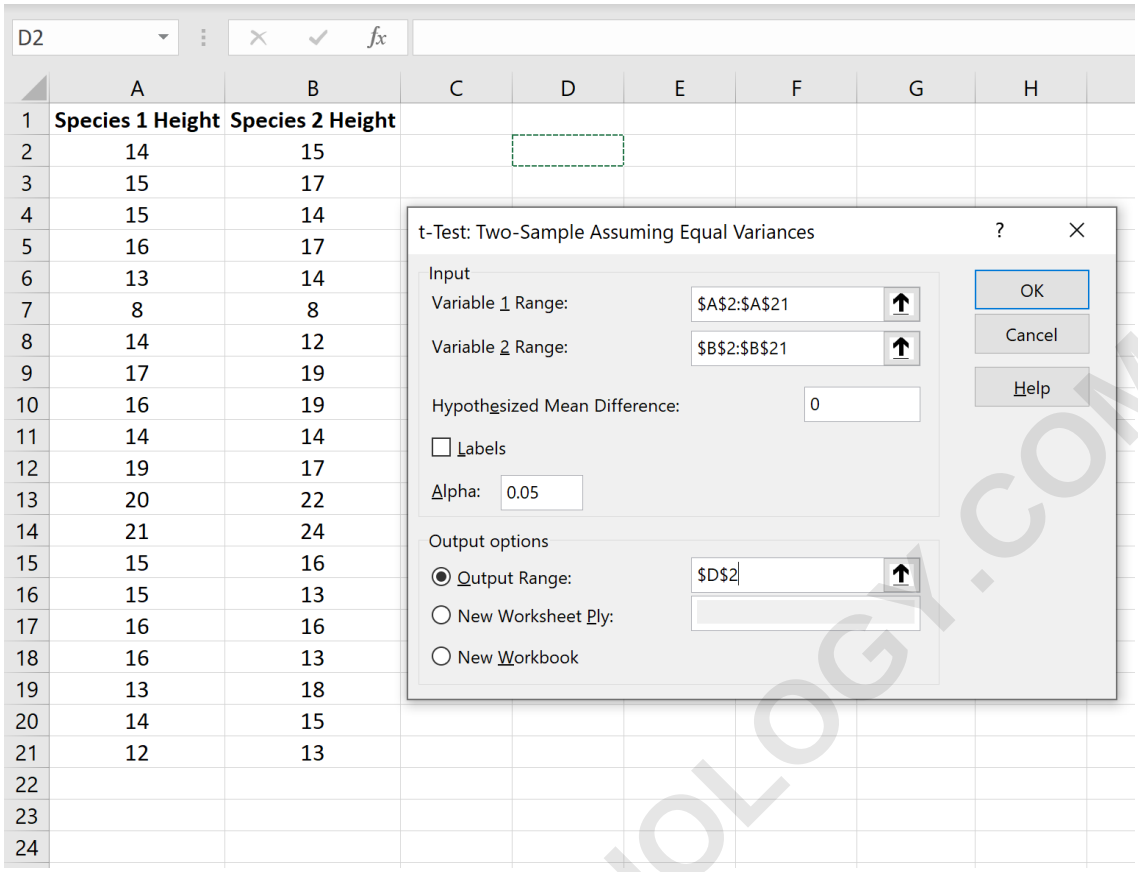
Step 2: Perform the Two Sample t-test

To perform a two sample t-test in Excel, click the Data tab along the top ribbon and then click Data Analysis:

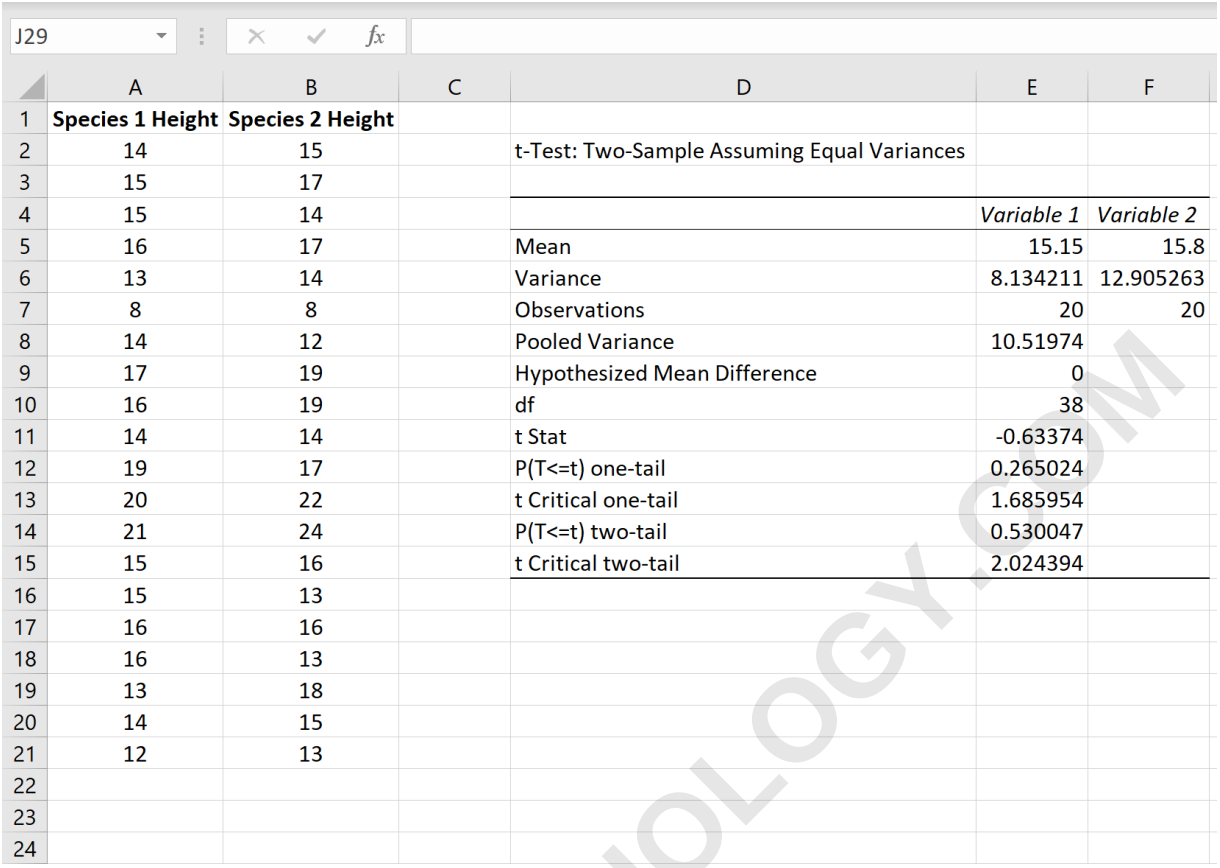


If you don't see this option to click on, you need to first .

In the window that appears, click the option titled t-Test: Two-Sample Assuming Equal Variances and then click OK. Then enter the following information:



Once you click OK, the results of the t-test will be displayed:



	A	B	C	D	E	F
1	**Species 1 Height**	**Species 2 Height**				
2	14	15		t-Test: Two-Sample Assuming Equal Variances		
3	15	17				
4	15	14			*Variable 1*	*Variable 2*
5	16	17		Mean	15.15	15.8
6	13	14		Variance	8.134211	12.905263
7	8	8		Observations	20	20
8	14	12		Pooled Variance	10.51974	
9	17	19		Hypothesized Mean Difference	0	
10	16	19		df	38	
11	14	14		t Stat	-0.63374	
12	19	17		P(T<=t) one-tail	0.265024	
13	20	22		t Critical one-tail	1.685954	
14	21	24		P(T<=t) two-tail	0.530047	
15	15	16		t Critical two-tail	2.024394	
16	15	13				
17	16	16				
18	16	13				
19	13	18				
20	14	15				
21	12	13				
22						
23						
24						

Step 3: Interpret the Results

Here is how to interpret each line in the results:

Mean: The mean of each sample.

Sample 1 Mean: 15.15Sample 2 Mean: 15.8

Variance: The variance of each sample.

Sample 1 Variance: 8.13Sample 2 Variance: 12.9

Observations: The number of observations in each

sample.

Sample 1 Observations: 20Sample 2 Observations: 20

Pooled Variance: The average variance of the samples, calculated by "pooling" the variances of each sample together using the following formula:

s2p = ((n1-1)s21 + (n2-1)s22) / (n1+n2-2)s2p = ((20-1)8.13 + (20-1)12.9) / (20+20-2)s2p = 10.51974

Hypothesized mean difference: The number that we "hypothesize" is the difference between the two population means. In this case, we chose 0 because we want to test whether or not the difference between the two populations means is 0.

df: The degrees of freedom for the t-test, calculated as:

df = n1 + n2 - 2df = 20 + 20 - 2df = 38

t Stat: The test statistic *t*, calculated as:

***t* = (x1 - x2) / √s2p(1/n1 + 1/n2)*t* = (15.15-15.8) / √10.51974(1/20+1/20)*t* = -0.63374**

P(T<=t) two-tail: The p-value for a two-tailed t-test. This

value can be found by using any using t = -0.63374 with 38 degrees of freedom.

In this case, p = 0.530047. This is larger than 0.05, so we fail to reject the null hypothesis. This means we do not have sufficient evidence to say that the two population means are different.

t Critical two-tail: This is the critical value of the test. This value can be found by using a with 38 degrees of freedom and a 95% confidence level.

In this case, the critical value turns out to be 2.024394. Since our test statistic *t* is less than this value, we fail to reject the null hypothesis. Once again, this means we do not have sufficient evidence to say that the two population means are different.

Note #1: You will arrive at the same conclusion whether you use the p-value method or the critical value method.

Note #2: If you are performing a , you will instead use the values for P(T<=t) one-tail and t Critical one-tail.

Additional Resources

The following tutorials provide step-by-step examples of how to perform various t-tests in Excel: