



This histogram represents the randomization distribution of the difference between the two sample means,  $\bar{X}_1 - \bar{X}_2$ . This null distribution shows how this difference between the sample means would behave if there was no treatment (inoculation) effect.

The observed difference in the sample means is here.

This is quite far away from the center of the null distribution giving evidence that inoculation does have an effect on mean fresh root weight. The P-value is below.

## Histogram of Null Distribution -- Paspalum example

The vertical line marks the observed value of the statistic. The P-value is nondirectional. The second row gives the t-test P-value as an approximation of the randomization P-value

obsdiff	pvalue
-4.516667	0.0187

t-test pvalue as an approximation of randomization pvalue

obsdiff	sediff	df	tcalc	tpvalue
-4.516667	1.7724569	22	-2.548252	0.0183233

The observed difference in the means is  $\bar{X}_{1} - \bar{X}_{2} = -4.5167$

The randomization P-value .0187 shows that 1.87% of the 10,000 random assignments of the observations to the two groups yielded a difference at least 4.5167 units away from 0, that is, a difference less than or equal to -4.5167 or greater than or equal to 4.5167.

The Student's t P-value .0183 can be viewed as an approximation of the randomization P-value.