

## Agricultural Statistics, Least Significant Differences (LSD)

The term “least significance difference” or LSD is often mentioned at Extension meetings where research information is discussed. It also shows up in University publications this time of year especially in variety trial reports, like those for the Ohio corn, soybean and forage trials that provide summaries of field research. The question is “what does the LSD number mean”?

Least significant difference is used to compare means of different treatments that have an equal number of replications. What exactly does that mean? Let’s take a look at an example of two scenarios, each with two treatments:

Scenario 1:

Treatment 1	Treatment 2	LSD 0.1
50	44	
59	57	
50	49	
Avg. 53	Avg. 50	7.4

Scenario 2:

Treatment 1	Treatment 2	LSD 0.1
54	50	
53	52	
52	48	
Avg. 53	Avg. 50	2.0

Each of the different values below each treatment represents replications, and each treatment is replicated 3 times.

The value below the replications is the average of each treatment. Note that the average for the two scenarios is the same for each treatment, even though the replication values are different for each.

For scenario 1, at a significance level of 0.1, the LSD value would be 7.4. For treatment 1 to be different than treatment 2, they must differ by at least 7.4 (which they do not). A significance level is the level of probability that the researcher is using. For this example, if treatment 1 were different than treatment 2 by 7.4 or greater, we would be 90% certain that the treatments were indeed different and not just due to random chance. Since the averages for treatment 1 and treatment 2 differ by less than 7.4, we cannot conclude that the treatments are different from each other.

For scenario 2, at a significance level of 0.1 the LSD value would be 2.0. Since the differences between the treatments are greater than 2.0, we can say that we are confident (>90%) that treatment 1 performed better than treatment 2.

We hope that this will help you understand whether two treatments are different the next time you are sitting in an Extension meeting or reading a research summary. Remember, research studies should be conducted over multiple locations and under different environmental conditions to prove their robustness.