

## How Ann Analyzed the Data

Ann was preparing to write the research plan for her project and she realized she needed to do some research. She needed to find out the best type of data she should use and how to analyze it. She first identified the Quantitative Data and Qualitative Data she was going to use. She did all of this in her logbook.

Quantitative data - based upon measurements collected using a scale with equal intervals. (height of a plant in centimeters, the weight of a mouse in grams, and the temperature of a liquid in Celsius)

Qualitative data - collected using non-standard scales with unequal intervals or discrete categories. (male or female, 1-5-star movie rating)

**Directions:** List Ann's Data under each heading.

Quantitative data:

1. The number of peppers and when they were picked.
2. The number of peppers per flat in 10-day intervals will be collected along with the number produced by individual plants.

Qualitative data:

1. The overall health of the plant using healthy or thriving. If a plant dies a value of 0 will be given.
2. The quality of the peppers will be measured on a 1-3 scale.

Now that the type of data has been identified Ann needs to decide how to analyze it. She can do this by analyzing how the data is alike and how it is different.

1. Measures of Central Tendency-these measures tell us how the data is alike. The 3 measures of central tendency are mean, median and mode.
  - A. Mode - The value of the variable that occurs most often.
  - B. Median - The middle value of the variable after all of the individuals have been rank ordered from highest to lowest.
  - C. Mean - The average or sum of the individual values divided by the number of cases. The mean is the most significant measure of central tendency.

Ann realized just because you can take the Mean, Median and Mode of the data not all

of these measures are significant. In some cases, knowing the middle number or the most common number will not matter.

2. **Measures of Variation** – These measures tell us how the data is different.
  - A. Range – The range is computed by finding the difference between the smallest and the largest measures of the dependent variable. This is used in quantitative data.
  - B. Frequency Distribution – Tells the number of cases falling into each category of the variable. (number of healthy plants versus unhealthy).

Ann decided that the best place to work with her data was in her log book. Before she started her experiment, she set up data tables, so she could fill them in as she collected the information. Before she started filling in data she checked with her teacher to make sure she set them up the best way.

She did the same thing with her graphs. She drew the X and Y axis of the graphs and labeled them just to make sure she had them identified correctly. She also had to decide if the graph will be a line or bar graph.

**Directions:** Complete the data page before you fill in the data tables and graphs.

She remembered the words **DRY MIX** that will help her label her graph.

D-Dependent Variable

R-Responding Variable

Y-Axis

M- Manipulated Variable

I-Independent Variable

X-X-axis.

Questions

1. Which sets of data would you want to take the mean? Go ahead and do it and write the results below. **Number of peppers per plant. Flat 1-7.7, Flat 2 8.9, Flat 3-10.7 and Flat 4- 15.1**
2. Which sets of data would you want to take the mode? Go ahead and do it and write the results below. **The health of the plants-healthy or thriving. Flat 1-10 healthy, Flat 2-10 healthy, Flat 3-5 healthy and 5 thriving, Flat 4- 10 thriving.**
3. Which sets of data would you want to take the median? Go ahead and do it and write the results below. **Pepper quality. Flat 1-2, Flat 2-2, Flat 3-3 and Flat 4-4**
4. Fill out data tables 1-3 and complete the graphs.

Use Ann's data and fill in the data tables that can be used in data analysis.

1. Calculate the mean, range, and number for each concentration of the soil enhancer. This will be used only on the quantitative data. Use the information from the Ann's Data handout.

Table 1: The Effect of Various Concentrations of Soil Enhancer on the number of Peppers produced per plant.

Concentrations of Soil Enhancer				
Information	0	10%	20%	30%
Mean	7.7	8.9	10.7	15.1
Range (peppers per plant)				
Maximum	10	12	14	16
Minimum	6	6	8	13
Number	10 plants	10 plants	10 plants	10 plants

2. Because the data on pepper numbers are quantitative and continuous, a line graph can be drawn. Construct the line graph of the data table 1.

Graph 1: Mean Number of Peppers Produced by Various Concentrations of Soil Enhancer.

X axis label: Days

Y axis label: Number of peppers



3. Because the health of the plant was reported as qualitative data the mode is the appropriate measure of central tendency. Knowing how many were thriving as compared to just healthy could tell Ann how effective the soil enhancer is. Variation is reported through a frequency distribution.

Use the data on the handout of construct Data Table 2.

Table 2: The Effect of Various Concentration of Soil Enhancer on Plant Health per Plant

Descriptive Information	0	10%	20%	30%
Mode	H	H	H/T	T
Frequency Distribution				
Healthy	10	10	5	8
Thriving	0	0	5	2
Number	10 plants	10 plants	10 plants	10 plants

4. The data is categorical and non-continuous, therefore, a bar graph is appropriate. Construct the bar graph of Data Table 2. Be sure and label each axis.

Graph 2: Frequency Distribution for Plant Health at Various Concentrations of Soil Enhancer



5. Ann used a 3-point scale for rating pepper quality. Since the scale involved non-standard measurements and placement into categories that could be ordered, the median is the appropriate measure of central tendency. Variation is reported through a frequency of distribution. Use the raw data from the handout to calculate the median and frequency of distribution on Data Table 3.

Graph 3: Frequency Distribution for Pepper Quality at Various Concentrations of Soil Enhancer

Descriptive Information	0	10%	20%	30%
Median	2	2	3	4
Pepper quality per plant.				
Frequency Distribution				
Quality 4	0	0	6	10
Quality 3	6	6	3	0
Quality 2	6	4	1	0
Quality 1	1	0	0	0
Number	10 plants	10 plants	10 plants	10 plants

6. Pepper quality represents categorical data; thus, a bar graph is appropriate. Construct one below. Be sure and label each axis.

Graph 3: Median Pepper Quality for Plants Exposed to Various Concentrations of Soil Enhancer

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Helping Ann Analyze Her Data

Ann needs to analyze her data before she writes her conclusions. Here are some questions she can ask that will help her.

**Enhancing Jalapeno Pepper Production**

Number of peppers per plant				Health of Plants				Pepper quality			
Concentration of Soil Enhancer				Concentration of Soil Enhancer				Concentration of Soil Enhancer			
0%	10%	20%	30%	0%	10%	20%	30%	0%	10%	20%	30%
7	10	12	16	H	H	H	T	2	3	4	4
8	9	10	16	H	H	H	T	3	2	3	4
7	12	14	16	H	H	H	T	3	2	3	4
9	8	10	14	H	H	T	H	2	3	4	4
8	6	8	15	H	H	H	T	2	3	4	4
6	6	8	14	H	H	T	T	2	2	2	4
8	9	10	16	H	H	T	H	2	3	4	4
7	8	10	13	H	H	T	T	3	3	4	4
10	10	11	15	H	H	T	T	1	3	4	4
7	11	12	16	H	H	H	T	2	2	3	4

**Peppers Harvested per Flat by Days of Growth**

Days Numbers	Flat 1	Flat 2	Flat 3	Flat 4
Days 1-10	0	0	0	0
Days 11-20	0	0	0	0
Days 21-30	0	0	0	0
Days 31-40	0	0	1	3
Days 41-50	5	4	10	13
Days 51-60	72	85	96	135
Total	77	89	107	151

### Quality of Pepper

Rating	Description
Rating of 3	Green color to red color fleshy and firm larger size
Rating of 2:	Green color medium size firm and somewhat fleshy
Rating of 1:	Green color small pepper not fleshy

Ann has to write some inferences based on her results. Use the data tables 1-3 and write some inferences she can make.

#### Data Table 1:

This table tells Ann the average number of peppers per plant in each flat. Flat 4 had the greatest average number of peppers, 15, with a range of 13-16. This flat had the highest concentration of soil enhancer (30%) and the results showed the highest concentration of soil enhancer worked. The control performed poorly compared to the other flats. It had an average of 7 peppers with a range of 7-10. Flat 2 (10%) and Flat 3 (20%) had means of 8 and 10. This showed that the soil enhancer helped and as the concentration increased so did pepper production.

#### Data Table 2:

This table describes the health of the plants. This is important because it reflects how the plants react to the soil enhancer. Overall, the plants were healthy. None of the plants died. The plants were rated healthy to thriving. The higher the concentration of soil enhancer the more the plants thrived compared to the control. The plants that had the highest concentration were all thriving in size, pepper production and leaf quality.

#### Data Table 3:

This table describes the pepper quality. A scale of 1-3 was made with the peppers scoring 3 being the firmest, fleshiest and having the best color. Compared to the control and other groups the data showed that the highest concentration of soil enhancer produced all category 3 peppers. This shows that it does improve the quality of the pepper.

After reviewing all of her data analysis would conclusions can Ann make?

The control had no soil enhancer added. It did the poorest in pepper number, and pepper quality. Flat 2 had 10% and was only slightly better than the control. Flat 3 had 20% soil enhancer and it did very well with a higher production number and quality of peppers than Flats 1 and 2. Flat 3 had the recommended concentration of soil enhancer added. It produced the highest number of peppers and the best quality. The results show that adding the recommended amount of soil enhancer will greatly increase



pepper quality and amounts. This would make it cost effective when growing pepper plants in containers.