**Abstract**

Cancer is a well-known, fatal disease that dictates the lives of so many across the U.S., and across the world. Antioxidants are one form of alternative medicine that can be used in helping to treat or prevent cancer without subjecting patients to the agonizing side effects of standard therapy alone. One common antioxidant found in the seeds of vine grapes, Proanthocyanidin, has been found to significantly reduce the results cancer has on its victims and in some cases, even cure them of the sickness altogether. We know cancer cells multiply unsystematically and incredibly fast. We also know the cells in the tips of a vegetable root do the same, since that is where they are going through rapid cell division (mitosis). Therefore, we decided to investigate the effects that grape seed extract would have on the lengths of the radish roots, in hopes that the higher concentration of the dilution would retard the growth of the root cells, and in turn, make the roots shorter in length. If this were to occur, we could conclude that cancer victims would have a greater potential in surviving if they were to begin a recommended and balanced grape diet along with other nutritional food, since the grape seed extract would retard the growth of the cancer cells as well.

We had 5 categories of planters in our experiment beginning with Control group 1 as a comparison to what the actual length of the radish roots should be. Control group 1 planters had the environment itself, 5 radish seeds and diluted water on top of those 5 seeds. The environment consisted of a plastic cup filled with gravel/sand on the bottom to hold in the moisture, vermiculite, which is a soil free of chemicals, so as to not affect our results, the radish seeds on top and another plastic cup upside down on top of the first planter cup. Each group had 10 planter cups with 5 seeds each, adding up to 50 seeds per group and a total of 250 seeds for our experiment. Each planter was the same besides the varying concentrations of grape seed extract for each group. To make the dilutions for Groups 2-5, we measured the total amount of grape seed extract using a scale and made 16g our 100%solution, which we mixed with 750ml of water on a hot plate to disperse the powder (grape seed extract). Once we had the 100%solution mixed, we poured 75ml (the amount of diluted water poured into Group 1 planters as well) into each planter cup in group 5. Then we made a 75%solution, which we mixed in a different 750ml of water on a hot plate, (less extract-same amount of water), and poured 75ml again into each planter cup in group 4. We repeated the same thing with the 50% solution using 8g of grape seed extract and poured the 75ml into group 3. We again repeated the same thing with the 25% solution using 4g of grape seed extract and poured the 75ml into group 2. Once the solutions were poured into each planter we pushed down the seeds so they would be a little deeper in the vermiculite to help growth.

After 3 weeks of growth in the greenhouse, we took the planters and began recording the root lengths, as well as number of lateral roots on each seed. Then we made graphs of the averages and did statistics to find that:

1) group 3 was an artifact-meaning some kind of accident in the experiment occurred and no data was received for that group

2) our average profile of the 4 treatments compared to that of the control showed visually that groups 2 and 4 ( 25% solution and 75% solution respectively) had a significantly reduced length of root in total.

We also used the ANOVA test ?Analysis of Variance? which compares the mean of each group to another with the addition of a few other tricks. The purpose of this test was to see whether the treatment had an effect compare to a control group. In both groups 2 and 4, the length was significantly reduced compared to the control group. The p-value, indicating that results were or were not by chance or a random probability, was less than 0.0002. This means there is less than 0.02% probability that this could happen by random chance. Group 5 (the 100% concentration) showed little difference from that of the control group and a slightly longer root length than the control group in the petri dish experiment. This implies that after a certain amount of grape seed extract is used, it no longer has a significant effect on cells. We can now assume there is an optimal range for the grape seed extract which would be a 25% concentration to a 75% concentration each time it is taken for an alternative medicine. Most likely, the 50% concentration would be included in this range but due to the artifact, as previously mentioned, we cannot be sure would it would result in.

Grape seed extract would be most effective if taken in this concentration range along with regular cancer treatments. Natural substances help to significantly reduce the disease but regular treatments are still important to a certain extent.

1