

# The Effects of Depressants and Stimulants on Plants

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## Introduction

- The effects of pollution on the health of organisms are an important subject, especially with the increase in industrial and agricultural runoff. A number of incidents associated with water pollution have occurred in recent years, such as the 2014 Elk River chemical spill. The effects of pollution can be replicated in experiments to demonstrate the influences of chemicals on the health and wellbeing of organisms living in water systems. Our experiment focuses on the effects of substances such as Nyquil, Benadryl, caffeine, isopropanol, and ibuprofen on mung beans to simulate the effects of water pollution on plants. The plants were subject to various dosages of the above substances, which showed deleterious effects on their growth and mortality.

## Materials

Materials (detailed list)	Quantity
Mung Beans	8 seeds/pot
1% Isopropanol	50 mL
2.5% Caffeine	50 mL
.5% Benadryl	50 mL
1% NyQuil	50 mL
.5% Ibuprofen	50 mL
Control (H2O)	50 mL

## Procedure

- In order to test our prediction, we obtained seven mung bean plants. Each pot was watered with 50mL of a particular concentration of either a stimulant, depressant or over-the-counter drug that was diluted in water. The plants were observed over a week span to measure their plant length, mass, root length, and percentage of sprouting. The six plants include:
  - 2.5% of Caffeine: Weighted and tarred 0.5g of powdered caffeine and dissolved in 200mL of water.
  - 0.5% of Benadryl: Added 1 tablet to 199mL of water
  - 0.5% of Ibuprofen: Added 1 tablet to 400mL of water
  - 1% of NyQuil: Measured and added 1mL of Nyquil to 99mL of water
  - 1% of Isopropanol: 1.5mL of isopropanol of solution added to 99mL of water
  - Control: Watered with 50mL of water

## Data / Observations



Figure 1: Isopropanol Plants

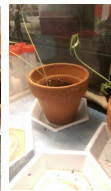


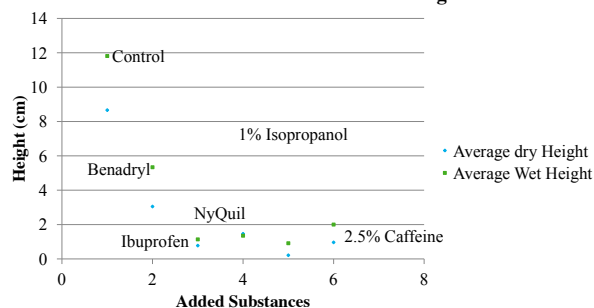
Figure 2,3,4: Control Plant



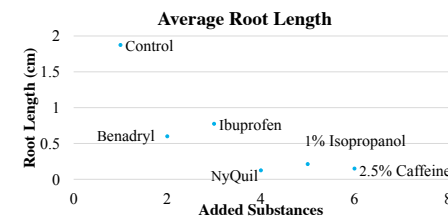
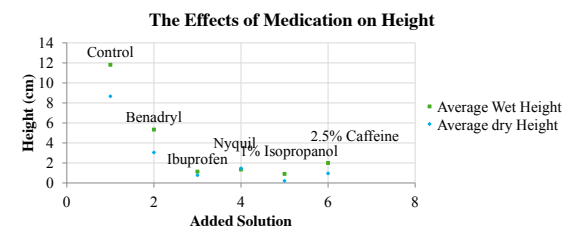
Figure 5: Benadryl Plant

## Results

### Effects of Medication on Plant Height



Solutions	Amt. Sprouting	%
Control	8/8	100
Benadryl	8/8	100
Ibuprofen	6/8	75
NyQuil	5/8	62.5
1% Isopropanol	2/8	25
2.5% Caffeine	4/8	50



## Conclusion

- From this experiment, it can be concluded that chemical runoff from medications does have a detrimental effect on the environment, with the intensity varying depending on the drug. In this test, we discovered that 1% Isopropanol alcohol had the greatest effect on the bean sprouts with only 25% growth. While 2.5% caffeine, NyQuil and Ibuprofen all fell in the upper- middle range, with 50%, 62.5% and 70% growth respectively. Therefore, the presence of these drugs did not stop the growth of the bean plants, but definitely set them back from the control plants, which had 100% growth. Surprisingly, the plants that we exposed to Benadryl experience almost equal growth to the control plants, proving that Benadryl at this concentration has little effect on the environment.

## Works Cited

Smith C and Reynard A. 1995. Essentials of pharmacology. Philadelphia, Pennsylvania: W.B Saunders Company.