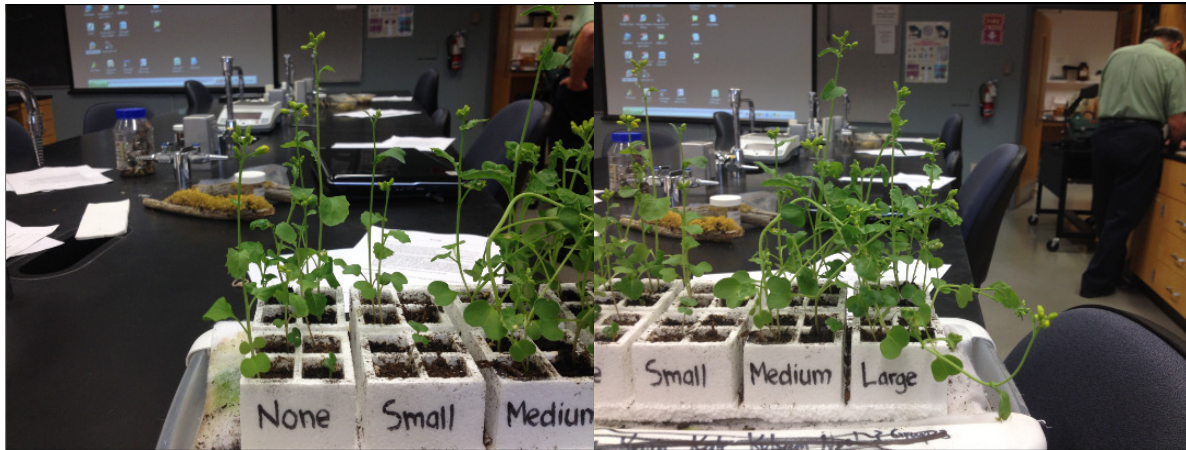


# The Effects of Monosodium Glutamate (MSG) on Plant Growth

By: xxx



## **Abstract**

Monosodium glutamate (MSG) is known as an “unhealthy” ingredient in most human foods if present in excess, but in plants, it has actually been used in many fertilizers. Many farms today now spray their crops with MSG to enrich growth and to ward off insects (Fassa, par. 8). But is it really the MSG in the fertilizers making the plants grow, or is the MSG an inactive ingredient that just happens to be there? In this experiment, mustard seed plants were placed in soil, ranging in amounts of MSG content, so that the effects of this single compound could be accurately traced. There were four different plots - one containing no MSG, and the other three containing 10, 20, and 30 grains per square. After letting the plants grow in the various amounts of MSG-concentration, the plants were observed for health in the form of height, overall plot growth, and leaf length. The group with the small amount of MSG (10 grains) grew significantly poor compared to the other groups, while the group with 20 grains grew the best. Clearly, there is a maximum point where growth is at its peak, where adding extra would actually begin to inhibit health again.

## **Introduction**

It was hypothesized that adding MSG to the soil of the mustard plants would improve the growth of the plants. Studies show that salts are usually detrimental to the growth of plants but there has been significant research demonstrating that MSG-rich fertilizers enhance plant growth. In a similar experiment to this one, Singh, Rekha, Arun, and Young found that “plants were healthy and showed no signs of toxicity” when MSG was added. (2013, p. 3).

Depending on the results of the experiment, we can determine if the MSG is helping the plants or just aiding the other ingredients in the fertilizer. This experiment had isolated MSG as an individual compound and independent variable in order to learn and understand its effects on the mustard plants and accurately research them.

## **Methods and Materials**

### **Materials:**

- plastic container with a specialized pre-cut lid
- 32 wicks
- styrofoam tray with 8 quads (32 compartments)
- fertilizer pellets
- soil
- algae prevention squares
- large absorption strip
- 64 seeds
- pipettes
- beaker of deionized water
- lamp
- Monosodium glutamate

**Methods:**

During the first week of the experiment, soil was placed into the 32 styrofoam compartments with two seeds, one fertilizer pellet, and one wicke per compartment. The wicks were utilized to absorb water from the large absorption strip that was half immersed in water and the other half placed under the styrofoam compartments. The styrofoam tray was placed on top of the empty plastic container with its lid closed. The four plots (each with eight compartments) were labeled with the amounts of MSG (none, small, medium, large). Each of these four plots were given different amounts of MSG:

None - 0 grains MSG (to serve as control)

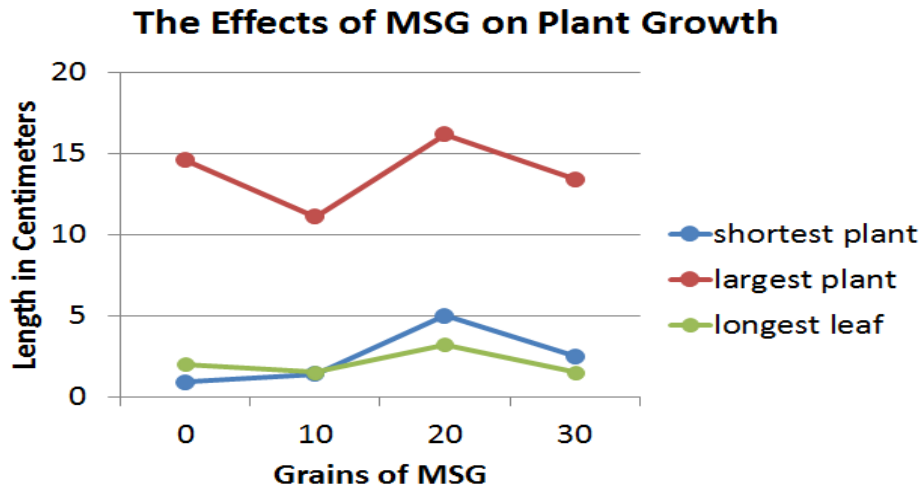
Small - 10 grains MSG

Medium - 20 grains MSG

Large - 30 grains MSG

For the first few days, each compartment was watered by hand with pipettes (to allow MSG to properly dissolve), then the container was filled halfway with water at the beginning of week two, allowing the absorption strip to provide the plants with a moderate amount of water. The plants were hand watered every Monday, Wednesday, and Friday, due to the dryness caused by the lamp. Measurements of the plants took place only on Wednesdays and Fridays. If one of the compartment's soil was observed to be dry then watering by hand was essential. The measurements taken were of the smallest plant (excluding the compartments of no growth) and of the tallest plant. At the end for comparison, leaf length measurements and "no growth" compartments were used to indicate health, as well. For the third week, only observation and measurement were necessary.

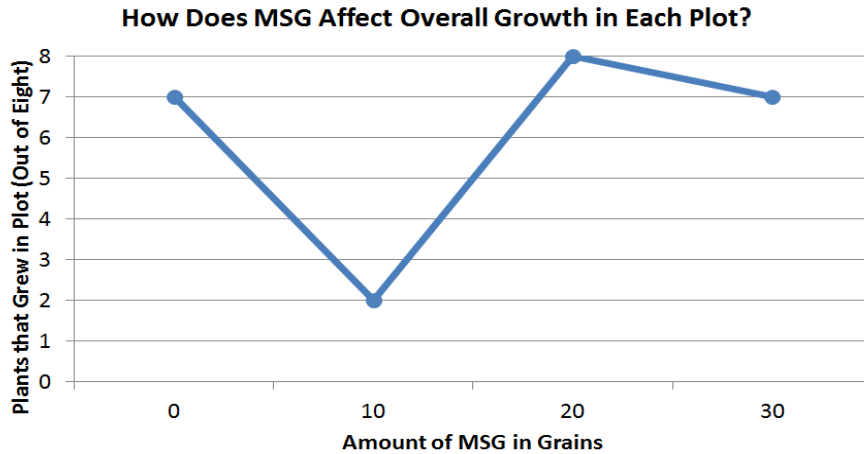
## Results



*Figure 1.1*

*How different amounts of MSG correlate to plant height and leaf length*

Each amount of MSG produced different plant heights. Looking at both the shortest plant and largest plant in each plot, one can clearly see that the medium amount of MSG (20 grains) produced the tallest plants overall. These plants grew taller than the plots with both less and more MSG. The second tallest plot was the constant. This graph also measured leaf length, and this correlated with the lines regarding plant height. Once again, the medium amount produced the longest leaves.



*Figure 1.2*

*How varying amounts of MSG impacted overall plot growth (how many plants grew out of the eight in each plot)?*

## **Discussion**

Our results proved that a medium amount of MSG (20 grains) resulted in the healthiest plant growth. A medium amount of MSG actually produced healthier plants than a large amount of it, indicating that there is a peak point where adding more MSG is counterproductive. The “healthiness” of the plants was measured by plant height, leaf length, and the total amount of growth (or lack of growth) in each plot. All three categories followed a similar pattern, starting fairly high with the control, dipping very low with a small amount of MSG, peaking at a medium amount of MSG, and starting to go back down at a high level of MSG. The medium amount of MSG produced the tallest plants with the longest leaves, with 100% growth shown in the plot. Using this data, it was concluded that this amount had created the healthiest plants.

Before the experiment was performed, it was questioned whether or not MSG was even an effective ingredient to the MSG fertilizers often used by farmers. By looking at the results of this experiment, it proves that the medium amounts of MSG were beneficial, and that it is likely MSG contributes to the quality of growth in crops.

Compared to the experiment performed by Singh and the other ecological scientists, these results were accurate. In their experiment, plants growing in MSG-contaminated water had higher germination rates (Singh et al (2008)). In another experiment, by Richmond Tan, part of a home garden was treated with MSG, while some parts of the garden were not, and the MSG-treated plants had more successful growth. Once again, MSG resulted in greater growth. The results of these two outside experiments fit with this experiments results, but also varied due to the fact that one was no laboratory based, and observations were not precise, and the other tested MSG in polluted water, rather than in pure soil.

## **Conclusion**

As a result of this experiment, the hypothesis declared was proven to be true and confirmed that MSG aids plant growth. It also demonstrated how a fair amount of MSG was beneficial in plant growth and should be used more in fertilizers. A small or large amount of MSG added to plants are not as beneficial for growth according to the results received because the plot with small amount did not grow and large amount did not grow as well. In addition, the using of cloth and wicks to water of the plants was found to be less effective than hand watering the plants, as the wicks did not carry water as efficiently as they should have. As Another improvement to this experiment might include growing additional plants, to provide further accuracy to the results. Overall though, this experiment was an efficient way to better learn and understand the effects of varying amounts of MSG in supporting plant growth.



### Works Cited

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