

## Gravel Experiments

Geoagriculture or gravel gardening is a field with many questions. The what's and how's of gravel is still unknown. The fundamental is known (rocks can sustain plant life), but the effects of alternative configurations and management is unknown. To assist in the development of the gravel gardening process, we have developed five sets of simple experiments to compare basic adjustments in the configuration to assess the effects on crop output. Below you will find the experiment parameters, along with the initial test question, the standard and test configurations, seed recommendation and basic hypothesis. Five teams will each have two configurations to compare for a total of 10 individual gravel beds. Compare a standard configuration with the test question configuration adjustment.

#	Test Question	Standard Configuration	Test Configuration	Seeds	Hypothesis
1, 2	Does adding soil to gravel affect growth output?	2 inches of gravel 1 layer of fabric 1 inch of sand 1 foot by 1 foot Weekly watering	2 inches of gravel 1 inch of sand ½ inch of soil 1 foot by 1 foot Weekly watering	Lettuce or cucumbers or beans	Soil in small amounts in gravel can add to the growth output of lettuce.
3, 4	Does watering more frequently affect growth output?	2 inches of gravel 1 layer of fabric 1 inch of sand 1 foot by 1 foot Weekly watering	2 inches of gravel 1 inch of sand 1 foot by 1 foot Water every other day	Lettuce or cucumbers or beans	Watering more frequently can add to the growth output of lettuce grown in gravel.
5, 6	Does adding fertilizer to the gravel garden affect growth output?	2 inches of gravel 1 layer of fabric 1 inch of sand 1 foot by 1 foot Weekly watering	2 inches of gravel 1 inch of sand 1 foot by 1 foot Weekly watering Fertilize every 2 weeks	Lettuce or cucumbers or beans	Fertilizers added to gravel can improve growth output of lettuce.
7, 8	Does the presence of the cotton fabric have an effect?	2 inches of gravel 1 layer of fabric 1 inch of sand 1 foot by 1 foot Weekly watering Regular tomato seeds	2 inches of gravel 1 inch of sand 1 foot by 1 foot Weekly watering Cherry tomato cut and left	Tomato	Decayed seeds grow better than normal seeds.
9, 10	Is more better? Does adding soil and fertilizer affect growth output?	2 inches of gravel 1 inch of sand 1 foot by 1 foot Weekly watering	2 inches of gravel ½ inch of soil 1 inch of sand 1 foot by 1 foot Weekly watering Fertilize every 2 weeks	Lettuce or cucumbers or beans	More is better. Adding more elements to the gravel garden will improve growth output of lettuce.

## Monitoring

Students teams should monitor and test the configuration three times a week (Mon, Wed, Fri) with moisture meters, ph meters, as well as, visual inspections for height, color and overall health. If possible periodic water testing and nutrient testing is recommended. Student teams should chart results and track for the rest of the school year or through a growth cycle.

## Additional Considerations

- Students should read the manual prior to starting experiments.
- If experimenting indoors, be sure that the pot or container drains. Also, assess sand dampness regularly. Indoor, the sand tends to dry out quicker than when using gravel gardening techniques outdoors. We recommend using clear containers when indoors to better see what is happening with the roots and moisture in the gravel system. (see photos of sample planting experiments)
- Always be mindful of depth, too little and heat can burn up the vegetation.
- Never experiment on cement. Heat will turn the cement into an oven and cook the rock and sand from beneath.
- Additional questions and configuration testing examples can be found in the To Soil Less Geo Ag Academic Foundation 2013 document found online at [www.tosoilless.com](http://www.tosoilless.com)
- Feel free to run the same experiments using different seeds, gravel types, gravel depths, etc.
- Email all results to [graveleducation@tosoilless.com](mailto:graveleducation@tosoilless.com). We will feature your results in our annual report for 2014.