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| |  | | --- | | why do i need to know this?The pH results from this experiment can be compared to the pH of the soil in your backyard garden! | | hypothesis If the pH of the initial seed environment is varied, then the germination speed of the seed will be affected. proceduresStep 1: Seed Prep Gather ~15 bean seeds of the same type. Place the seeds in a clean paper towel. Fold the towel to fit in the baggie enclosing the seeds on the inside. Add enough tap water to thoroughly soak the paper towel but not excessively. Seal the baggie and label it ‘Control’. Allow the seeds to soak about 6 hours. Step 2: Solution Prep Combine in a cup 0.6 mL lemon juice and 118 mL tap water to create a pH solution of 4.3.  Keep 118 mL of the initial tap water as a control.  Combine in a cup 0.5 grams baking soda and 118 mL tap water to create a pH solution of 8.0.  **Step 3: Bean Prep**  Gather and label 2 new baggies as follows: Acid 4.3 and Base 8.0. Remove 2 sets of 5 seeds from the previously created ‘Control’ bag. Now dip a clean paper towel into the Acid solution thoroughly soaking it and enclose one set of 5 beans in it. Seal the bag. Repeat with the Basic solution.    **Step 4: Germination Observation**  Check all bean bags daily for signs of germination. Take pictures and record the results. Take care to notice the dryness of the paper towel in each. Add more of any solutions, as needed, to maintain a damp environment. |     *Run 1: Tap Water Run 2: Acid Run 3: Base*  DAY 2 | |  | | --- | | PurposeThe purpose of this investigation is to determine an optimum pH level for the germination of beans. | | |  |  | | --- | --- | | **MATERIALS:**  [Image result for green bean seed clip art](https://www.bing.com/images/search?q=green+bean+seed+clip+art&id=CC53A1DEB2DD53B4D2B7268F89200CD4B8449EBE&FORM=IQFRBA) | [Image result for baggie clip art](https://www.bing.com/images/search?view=detailV2&ccid=2Ui/XrQu&id=02CAB248215BB95570F88741D3BFB4FAC4AFC303&thid=OIP.2Ui_XrQuTI4hdwMB2_eJiACCCG&q=baggie+clip+art&simid=608004733213933711&selectedIndex=0) | | Green bean seeds | baggies | | Image result for paper towels clip art | [Image result for baking soda clip art](https://www.bing.com/images/search?view=detailV2&ccid=oiqhIt3C&id=D85579D845226221B5DA7A9A123FFD5FFFAD5260&thid=OIP.oiqhIt3CCcTw8binw0qWGgElEs&q=baking+soda+clip+art&simid=608036606146840618&selectedIndex=0) | | paper towels | baking soda | | pH indicator  water  cups | [Lemon Juice Bottle](https://www.bing.com/images/search?q=Lemon+Juice+Bottle&FORM=IRIBIP)  lemon juice | | | **Results**  **Observations Day 1:**  **Tap Water:** 3/ 5 were mildly cracked  1/5 beans were slightly opened  1 showed no evidence  **Base:** 4/5 showed some mild cracking  **Acid:** 2/5 of the beans were mildly opened  3/5 mildly cracked  **Observations Day 2:**  **Tap Water:** 2/5 showed white sprouts  2/5 mildly cracked  1 showed no evidence  **Base:** 1/5 of the beans had opened fully  4/5 of the beans were mildly cracked  **Acid:** 4/5 of the beans were fully opened 1/5 mildly cracked |   DAY 1 |

CONCLUSION

Seed germination is directly affected by the pH of the environment. After the seeds were saturated in various acid / base solutions for two days the results indicate that a mildly acidic environment is optimal for the process of germination in lima bean seeds. The investigation shows 1 of the 5 beans in the basic solution (pH 8.0) had opened fully and 4 were mildly cracked open. Two of the beans exposed to tap water (pH 6.3) showed signs of sprouting, although not green, 2 were mildly cracked open, and one showed no sign of germination. Four of the beans in the acidic solution (pH 4.5) were fully opened with the remaining bean mildly cracked open as well. This evidence clearly indicates that on average the mildly acidic environment is optimal for the successful germination of lima bean seeds.