

gooo`二零二三年香港學生科學比賽

延伸摘要範本 (研究項目)

(字數上限：2,500 字 · 頁數上限：3 頁)

隊伍號碼：

作品名稱：

參賽類別：研究項目

就我們所知，坊間 有/沒有* 類似的作品；(如有，) 相關研究連結如下：

我們的作品所作出的改良 / 其不同之處為：

**請刪去不適用。本比賽重視作品的原創性，學生須於開始研究或發明前作足夠的文獻搜索以確保自己的作品具一定獨特性並列出相關參考資料。*

I. 前言

- 介紹研究項目的背景資料和/或現有需要應對的問題
 - 概述所參考的文獻並列出可靠的資料來源
 - 撰寫作品概要並指出項目嘗試填補的研究缺口

II. 目標

- 列出研究的目的

III. 假設

- 提出假設以解釋所關注的現象，並指出如何利用實驗以驗證假設

IV. 研究方法

- 列出所使用的材料
- 描述實驗設計和方案，包括對照實驗的設置（如有），重複實驗的次數（如有），及其科學理論
- 指出在研究中採用的分析方法並說明理由

V. 研究結果

- 運用圖形、表格或照片展示數據
- 數據分析（如有，並以統計為基礎以展示數據的可信度和重現性）

- 解釋研究結果及其實質意義
- 討論有關限制，並與現有相關研究作對比（如有）
- 探討研究結果的重要性和影響力，並闡述該研究如何適用於實際問題

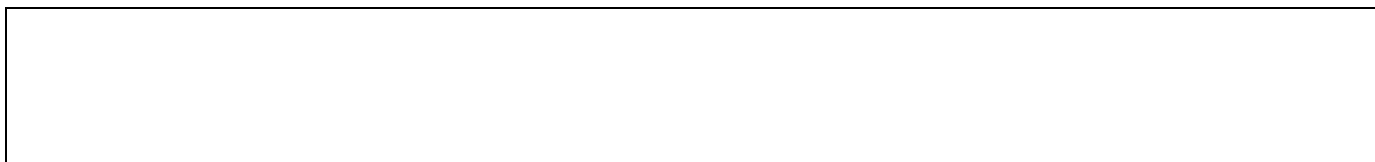
VI. 如研究項目將角逐可持續發展大賞，請列明作品與哪一個可持續發展目標有關，並說明參與競逐此獎項的原因。(字數上限：500字)

VII. 如研究項目將角逐社會創新大賞，請列明作品所針對的目標群組或社會議題，並說明參與競逐此獎項的原因。(字數上限：500字)

VIII. 結論

- 撰寫以數據為本的結論，及有關研究的後續安排
- 證明作品是否達到研究的目標

* 我們的作品是以之前的比賽作品為題進行了持續研習，有關改良如下：



Hong Kong Student Science Project Competition 2023

Template of Extended Abstract (Investigation)

(Word Limit: 1,600 words, Pages: 3 pages only)

Team Number: JBBC266

Project Title: Rebirth of an eggshell

Project Type: Investigation

*To our best knowledge, there are / are no * similar works in the field; (if there are,) related research links are as below:*

<https://youtu.be/mvRVdiLwXFY>

<https://youtu.be/x3JsG7RMKFc>

—> guiding video of making set up 4

The enhancement our project made / the difference with related research are:

<https://homeguides.sfgate.com/homemade-eggshell-plant-fertilizer-42947.html>

—> benefits of eggshell to plants as fertiliser

https://kmweb.coa.gov.tw/knowledge_view.php?id=407

—> decreasing the amount of leftover and kitchen waste while transforming them into fertiliser

<https://n.kinliu.hk/kinliunews/%E3%80%90%E7%92%B0%E4%BF%9D%E7%81%BD%E9%9B%A3%E3%80%91%E7%BC%88%E7%BC%89%E6%AF%8F%E6%97%A5%E4%B8%89%E5%8D%83%E5%85%AC%E5%99%B8%E5%BB%9A%E9%A4%98%E3%80%80%E5%9B%9E%E6%94%B6%E4%B8%8D%E5%88%B0%E3%80%80/>

—> the serious impact brings by large amount of kitchen waste and leftover in hong Kong nowadays

**Please delete if not applicable. The competition values the originality of works. Students must do enough literature research to ensure that their works are unique and list relevant reference materials before starting research or invention.*

I. Background

- Provide background information of project and/or state the problem to tackle
- Provide highlights of the **literature review** with the support of pertinent and reliable references
- Provide an overview of work and mention the **research gap that the project is trying to fill**

People always leave a lot of kitchen waste after eating and cooking. So we decided to get rid of the kitchen waste and make useful fertilizers with them. Moreover, people thought food waste like banana peels, orange peels and eggshells are useless, but actually they can be turned into useful fertilizers.

We took a few websites and YouTube videos as references for our project. Therefore, we can find different kinds of fertilizers to do experiments and understand how they work.

The research gap of our project is that the amount of soil used in each plant and the final growth of the seed may not be so accurate as we have limited resources in our school. Although it is not possible to find all seeds with the same growth rate for our project. We still tried our best to use the seeds with the most similar growth rate to be the specimen for our project.

II. Objectives

- State the **aim(s)** of project
- To reuse kitchen waste
- To raise public's awareness of food wasting
- To study the effect of food waste fertilizer on the growth of mung beans

III. Hypothesis

- Propose an explanation for a phenomenon and stating how the **hypothesis** can be tested by experiments

Plants with food-waste-made fertilizer will grow better than the plant without food-waste-fertilizers. We can measure the heights of the plants after a week we planted them to distinguish the ones which grow better.

IV. Methodology

- List out the materials used
- Describe the **experimental protocol** including the set-up of **control experiment** (if any), **repeated experiment** (if any), and its scientific theory
- Indicate with the support of reasons, the **analysis** used in the investigation

Materials used:

red sugar , white vinegar , egg shell, peanuts, water, tea leaves , orange peels , banana peels (all dried) , egg shell, whole egg , yeast, red sugar, soil, water , flower pot, mung beans

fertilizer 1 - red sugar + white vinegar + egg shell(one teaspoon of each is added, one egg shell)

fertilizer 2 - peanuts + water (half bowl of each is added)

fertilizer 3 - tea leaves + orange peels + banana peels + egg shell (6g of each is added)

fertilizer 4 - whole egg + yeast + red sugar (one teaspoon of yeast and red sugar is added)

each plants include 2 tablespoons of each type of fertilizers

Implantation :

1/3 of the soil is first added, then we add in the fertilizers, then we add in the rest of the soil.

Method of measuring the shoot : by using ruler to measure the shoot's length

overall time used for planting : one week

V. Results

- Present the **data** with figures, tables or photos
- **Data analysis** (if any, with emphasis on data reliability and the reproducibility based on statistics)
- Interpret the results and its implication
- Discuss **limitation** and compare with existing related works (if any)
- Discuss the importance or impact of the research and how it is applicable to real problems

Because of the limited time (only a week), we can't observe the final growth of plants accurately. Also, we accidentally put the plants in an unsuitable place to grow. Plants were over exposed to sunlight, so that the plants did not grow well overall. We should have put them in the science laboratory. Another limitation is that we don't have 15 pots with exactly the same size. The difference in size of the pots may affect the results of our experiment. The largest error of our experiment is that we can't ensure the growth rate of the green bean seeds. But we'd try our best to find the seeds with the most similar height to reduce the error.

It is important to get rid of kitchen waste. This method can reduce a large amount of food waste on our Earth. According to Greenly, 30% of food is lost or wasted each year. Food loss and waste also exacerbates the climate change crisis with its significant greenhouse gas footprint. We can obviously see the seriousness of the problem of kitchen/food waste. Making fertilizers with food waste have numerous advantages. Firstly, it gets rid of kitchen waste. This helps to reduce the amount of landfill. Secondly, it helps fasten the growth of plants (crops). In the future, humans will probably face the problem of lack of food and land. Our method helps to solve both problems efficiently. It is definitely a way to kill two birds in one stone. Our method may save the future of humans and extend the lifespan of Earth.

VI. If your team will compete the Sustainable Development Award, please indicate the specific sustainable development goal the project is related to, and provide justification for competing for this award. (Word limit: 300 words)

At present, most of Hong Kong's food waste is disposed of at landfills together with other municipal solid waste (MSW). In 2020, there were some 10,809 tonnes of MSW disposed of at landfills each day. Of these, about 3,255 tonnes (30%) were food waste, constituting the largest MSW category. Among the food waste disposed of at landfills daily, some 778 tonnes were generated from commercial and industrial (C&I) sources such as restaurants, hotels, wet markets, food production and processing industries.

https://www.epd.gov.hk/epd/english/environmentinhk/waste/prob_solutions/food_waste_challenge.html

Our team strives to show the significance of not squandering food, as much of the kitchen refuse is highly

moisture-laden and not combustible, in order to reduce the strain on the environment by recycling kitchen scraps. By using our product, households can do a better job in garbage classification and remove kitchen waste from garbage, which can help reduce the burden of the incinerator, reducing household waste by more than 50 percent. Kitchen waste compost can increase the organic matter of the soil and bring the earth back to life

The objective of our project is to be eco-friendly through reducing the amount of kitchen waste and leftovers, and to demonstrate the importance of not wasting food at the same time. As we can see, the landfill problem in Hong Kong nowadays is very serious, causing plenty of environmental pollutions. 30% of it is filled with food waste, 10809 tonnes of food wastes were recorded each day in 2020. According to the research done by The world wildlife organization (wwf), results show that while being in landfill, food waste produces methane— a greenhouse gas which is even more potent than carbon dioxide, aggravates global warming.

**VII. If your team will compete the Social Innovation Award, please list the target group or social issue the project focuses on, and provide justification for competing for this award.
(Word limit: 300 words)**

VIII. Conclusion

- Make a **data-driven** conclusion of the project and the way forward of the research
- Justify if the proposed project meets the objective(s)

According to our experiment result, fertilizer 4 (whole egg + yeast + red sugar) has the best result. It can be seen that using eggshells and other kitchen waste as fertilizer can indeed help plant growth. To conclude, food waste has a great effect, so we should not often dump leftover meals directly into the trash. Sometimes just do a little more, you can help to find their value. Making fertilizers with food waste have numerous advantages. Firstly, it gets rid of kitchen waste. This helps to reduce the amount of landfill. Secondly, it helps fasten the growth of plants (crops). In the future, humans will probably face the problem of lack of food and land. Our method helps to solve both problems efficiently. It is definitely a way to kill two birds in one stone. Our method may save the future of humans and extend the lifespan of Earth

*** Our project is developed based on previous project and the enhancement is below:**

