Request for laboratory space and equipment to test the efficacy of new organic vegetable and herb plant food formula

To: Bruce Banner, Scotts Miracle-Gro Lab Manager

From: Jacob Hy, Bridgette Smith, Rebecca Hull
R&D Biology Specialists for Scotts Miracle-Gro

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Executive Summary

Our team is requesting laboratory space and materials to test a newly developed organic plant food formula on Italian parsley plant seedlings. Our team's goal is to determine the efficacy of the new formula.

Our team will acquire 16 parsley plants from the Miracle-Gro greenhouse and transplant them into potting soil. The plants will be divided into a control group and an experiment group, with eight plants in each group. Under the controlled conditions of the lab, the team will measure and record the growth of the plants daily.

Our timeline will be three and a half weeks and the total cost of the project is $1,857. Our team consists of three R&D Biology Specialists: Bridgette Smith, Jacob Hy, and Rebecca Hull.

Background

Since 2016, Scotts Miracle-Gro has experienced an increase in sales of organic forms of plant food (see Figure 1). In an attempt to create more efficacious organic products, our team has developed a new organic plant food formula targeted toward edible plants such as herbs and vegetables.

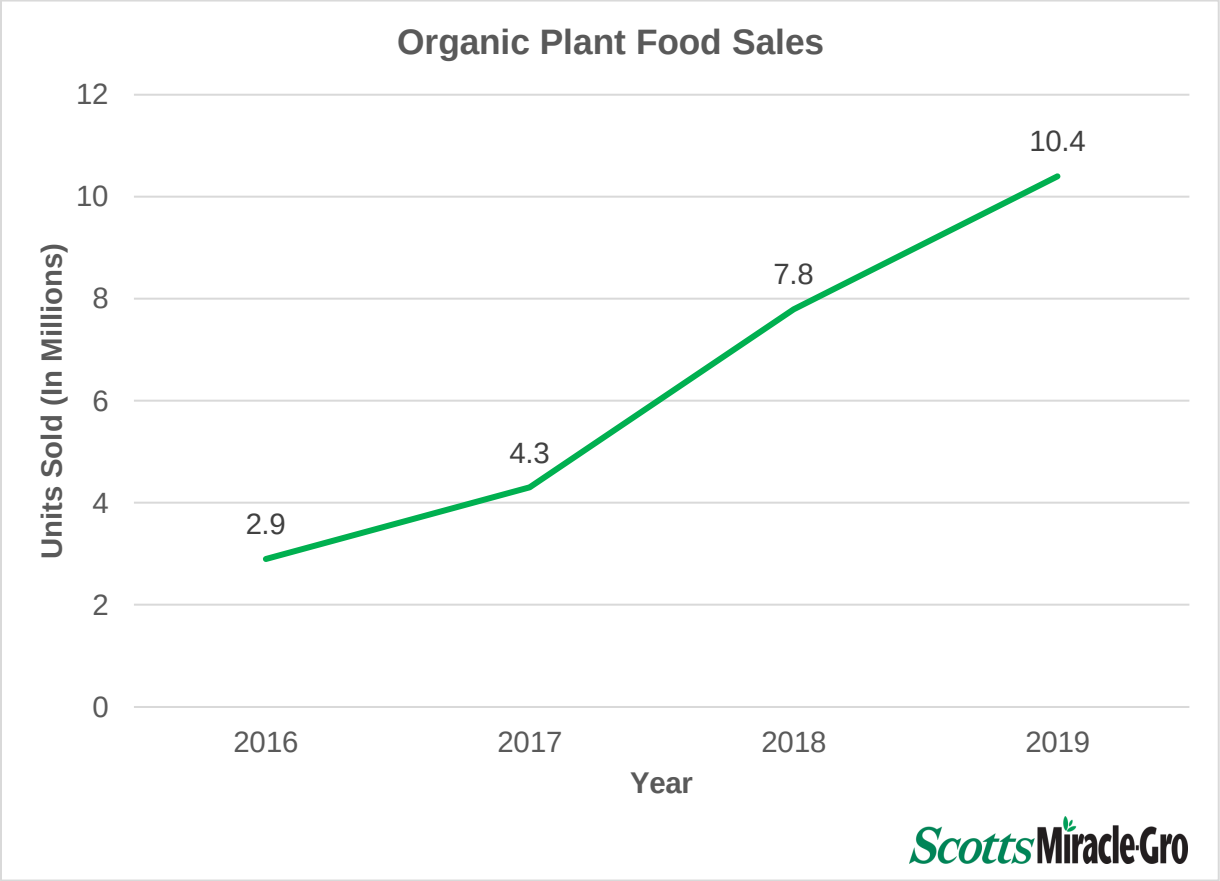

Figure 1. Organic Plant Food Sales Over Time

We propose to conduct an experiment to study the effects of the newly developed organic plant food formula on parsley plant seedlings. The resulting data will determine whether the new formula produces larger, healthier plants than water alone does.

Scotts Miracle-Gro is committed to providing an effective product. We embrace our responsibility to meet the needs of our gardeners and growers. Therefore, it is essential for us to thoroughly test all products before they are released to our customers.

Research Plan

This section describes the materials, procedure, and analysis methodology we will use to determine the efficacy of the new plant food formula when administered to parsley seedlings.

Materials

The following materials are required for this experiment:

- 16 Italian parsley seedlings
- 16 one-gallon plastic planters with drainage holes
- 48 quarts Miracle-Gro potting mix
- 16 tbsp experimental plant food formula
- 2 LED grow lamps
- 1 watering can

Procedure

The following procedure will be used to conduct the experiment:

- **Planter Preparation**
  First, we will label the sixteen planters according to their condition (eight in the experimental condition and eight in the control condition). We will fill each planter with 3 quarts of potting mix and use the watering can to water each planter until the potting mix is moist. We will mix 2 Tbsp of the plant food into the soil of the eight experimental planters only.
- **Seedling Transplantation**
  Next, we will create an indentation in the center of each planter's potting mix. We will then carefully extract 16 parsley seedlings from the Miracle Gro greenhouse and place each seedling into the indentation of one of the prepared planters. We will firmly pat down the soil around the seedling's base and use the watering can to water each seedling until the water begins to drain from the planter.
- **Plant Maintenance**
  We will place the plants approximately 400mm under the two LED grow lamps. The lamps will be set on a timer to turn on at 6AM each morning and turn off at 10PM each afternoon, providing 16 hours of light and 8 hours of darkness each day. We will water each plant at 8AM every day until the water begins to drain from the planter.
- **Data Collection**
  We will collect data on each plant every day before watering. We will measure the following data points for each plant:
    - Height in centimeters from the base of the plant to its highest point
    - Spread in centimeters from its widest part from leaf tip to leaf tip
    - Number of leaves larger than 3mm in diameter

Data Analysis

We will conduct a simple t-test to determine whether there is a statistically significant difference between the growth of the experimental plants and the growth of the control plants. If the plant food formula is efficacious, the experimental plants will show significantly more growth than the control plants.

Study Logistics

This section describes the study's proposed timeframe and budget.

Timeframe

We estimate this experiment will take three and a half weeks to complete. This includes one day of preparation work (i.e., material gathering and lab setup), three weeks of data collection, and one day of analysis after the data has been collected.

Budget

We estimate the total cost for this project will be $1,857 for materials and time. This accounts for three R&D Specialists, each compensated at an hourly rate of $25 per hour and performing 23 hours of work each. The cost breakdown, including only materials that are not currently available in the lab, is as follows:

Labor	$1,725
16 Parsley Seedlings	$100
48 quarts Miracle-Gro potting mix	$32
	Total Cost: $1,857

Research Team

Our team consists of three highly qualified R&D Biology Specialists: Jacob Hy, Bridgette Smith, and Rebecca Hull.

Jacob Hy

Jacob Hy has been a part of Miracle-Gro's R&D team for seven years. Mr. Hy was the lead researcher of the team that developed Miracle-Gro's popular Super Soil® that breaks up clay and improves sandy soils. This innovation improved produce quality and output for gardeners in dry and desert regions.

Bridgette Smith

Bridgette Smith joined Miracle-Gro's R&D team six years ago. Ms. Smith was the lead author and researcher for Miracle-Gro's Outdoor Water Savings Research Initiative, which provided statistics for successful approaches to reducing outdoor water use.

Rebecca Hull

Rebecca Hull has been a part of Miracle-Gro's R&D team for five years. Ms. Hull has spent her time in R&D researching safe and effective pesticide formulas. Most recently, Ms. Hull developed a new non-selective weed control product under the Ortho® GroundClear® line that relies on the active ingredient ammonium nonanoate instead of glyphosate.

Conclusion

In summary, we are requesting laboratory space and materials for three and a half weeks in order to study the efficacy of our newly developed organic plant food formula. This formula was developed in response to the increasing popularity of Miracle-Gro's organic products in recent years, and it must be tested in order to meet our commitment to providing gardeners and growers quality products.

This study will determine the effects of the formula on the height, spread, and number of leaves of Italian parsley seedlings. It will enable us to discover whether and to what degree the formula is more effective than just water at creating larger, healthier plants. Using the results of this study, we will suggest any necessary modifications to the formula in order to create the most effective solution for our customers.

We appreciate your consideration of this proposal. Upon your approval, we would begin the study on April 20th, 2020. Please contact any of our team members at the emails listed below with questions or concerns about the proposed study.

Respectfully,

Jacob Hy	**Bridgette Smith**	**Rebecca Hull**
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