

# Comparison of Germination Rates of Crops and Wild Agricultural Species

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## Introduction

For thousands of years, wild species of plants were used by humans for food and medicine. Wild carrots were used by the Europeans for approximately 5,000 years before being domesticated in the Afghan region 1,100 years ago. It is suspected that lettuce was domesticated by the Egyptians around 2500 B.C.E. Corn was domesticated 10,000 years ago in Mexico by farmers who planted specific seeds to isolate desirable traits. Native Americans domesticated the sunflower 4000 years ago in Eastern North America.

Due to their genetic uniformity, crops are at risk for wide-spread failures from disease and other threats. In the 1890s, farmers began crossing crops with their crop-wild relatives in order to increase genetic diversity and improve their survival rate. In the case of failure, the impact can be deadly. The Philippines and Indonesia suffered rice losses, which impacted their country significantly as rice is a staple food in those countries. Thus, efficiency is important when growing crops. My hypothesis is that the crops will have more uniform germination rates than their wild relatives and germinate more rapidly.

## Materials and Methods

Crop seeds of carrot, corn, lettuce, and sunflower were obtained from Seeds of Change and wild seeds of those same plants were obtained from the USDA. There was 1 variety of crop seeds and 3 varieties of wild seeds for each plant. These seeds were planted in an 8 x 16 flat with soil and placed on the mist bench. Over the next week, the plants were monitored daily for signs of germination. As the days progressed, the germination rates were tracked on an Excel sheet.



## Results

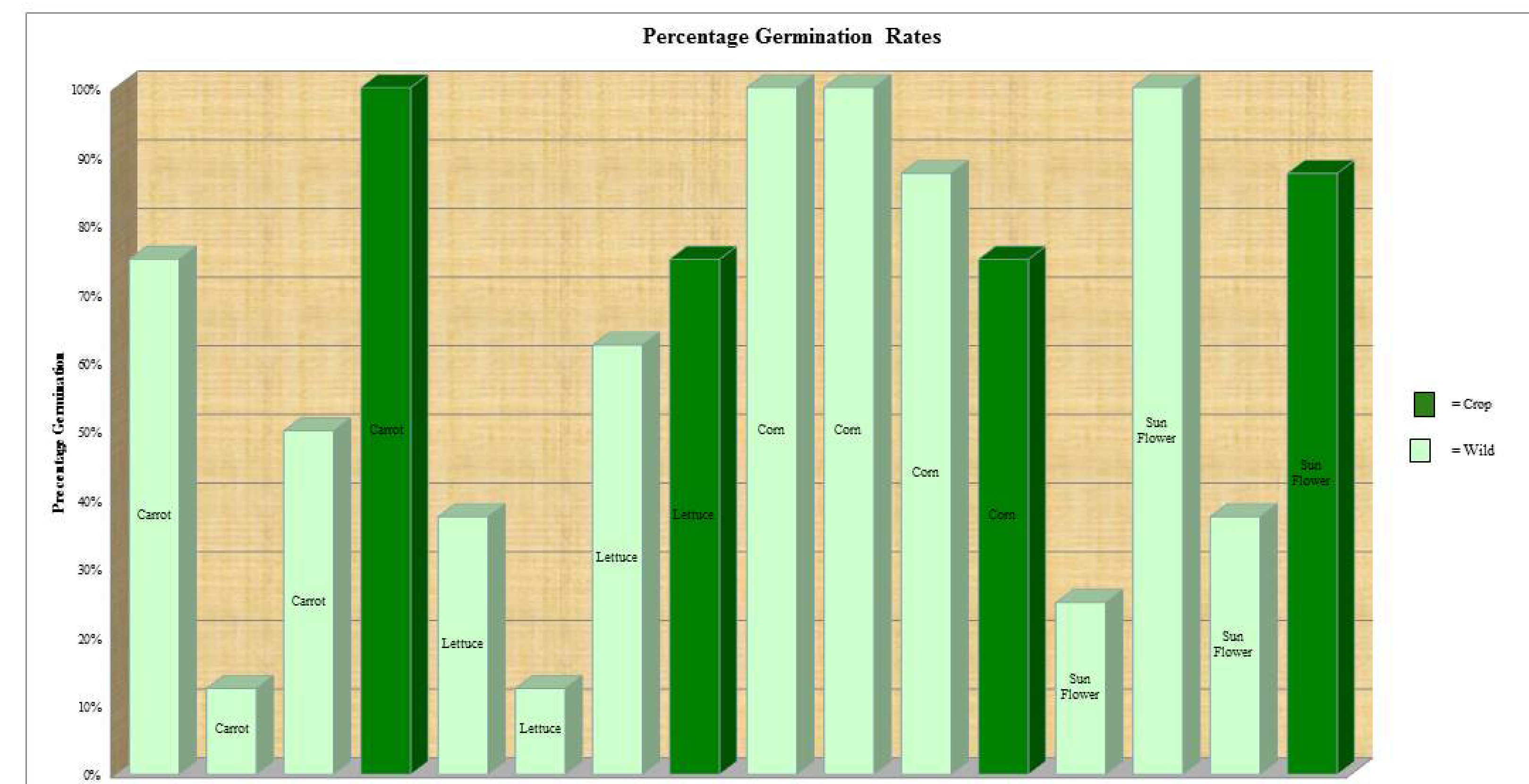


Figure1: Germination Rates

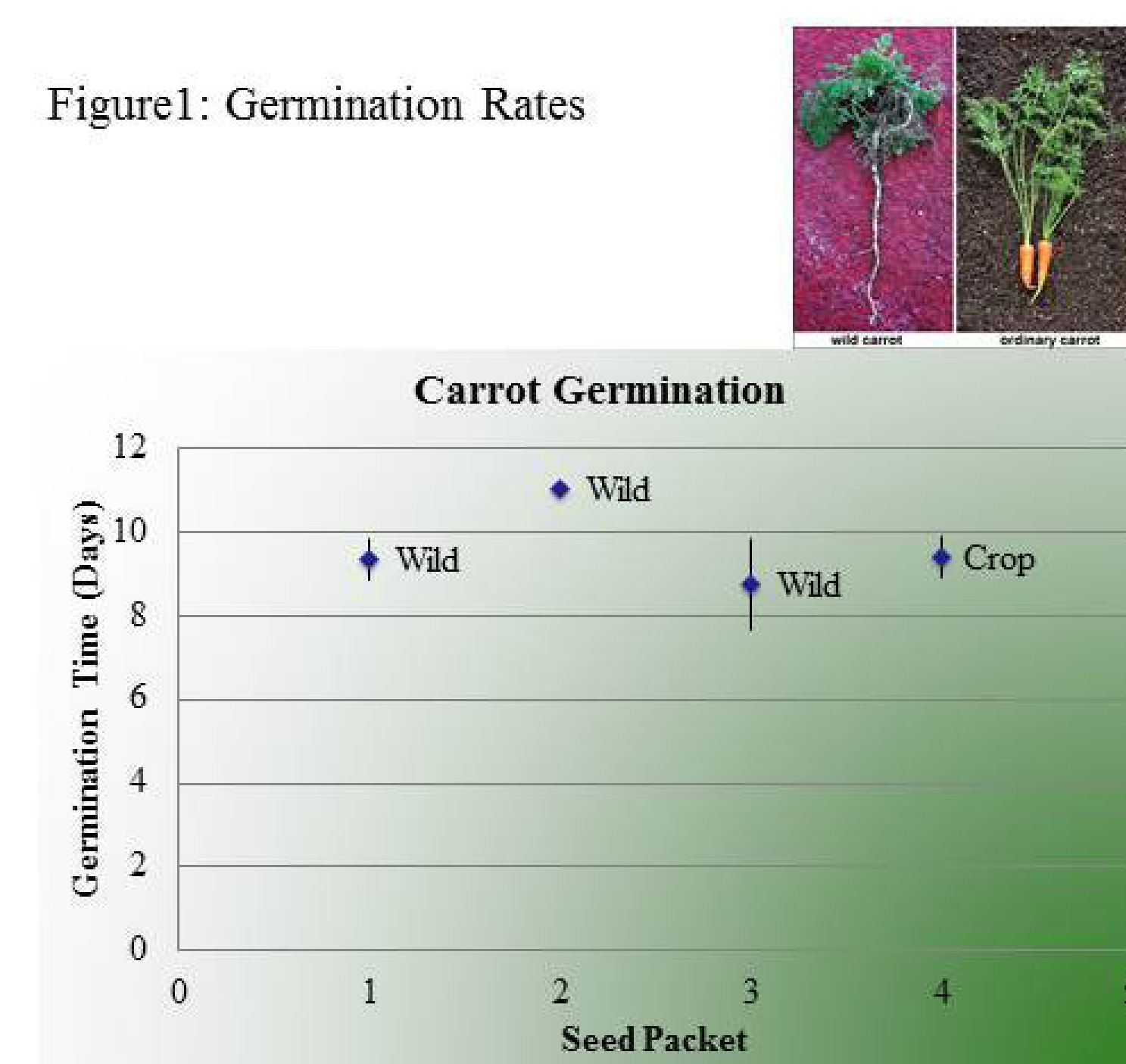


Figure 2: Germination Time

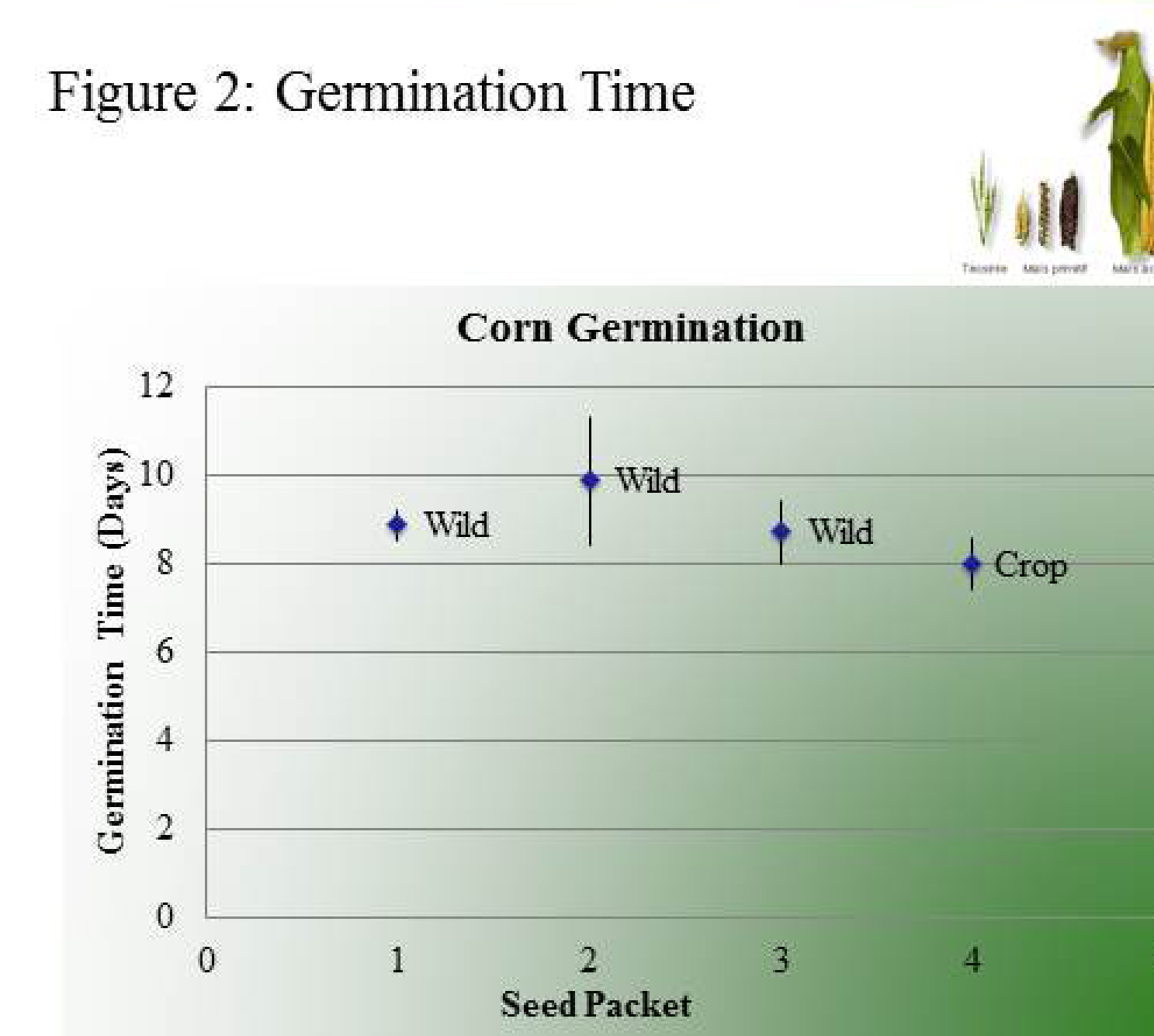


Figure 4: Germination Time

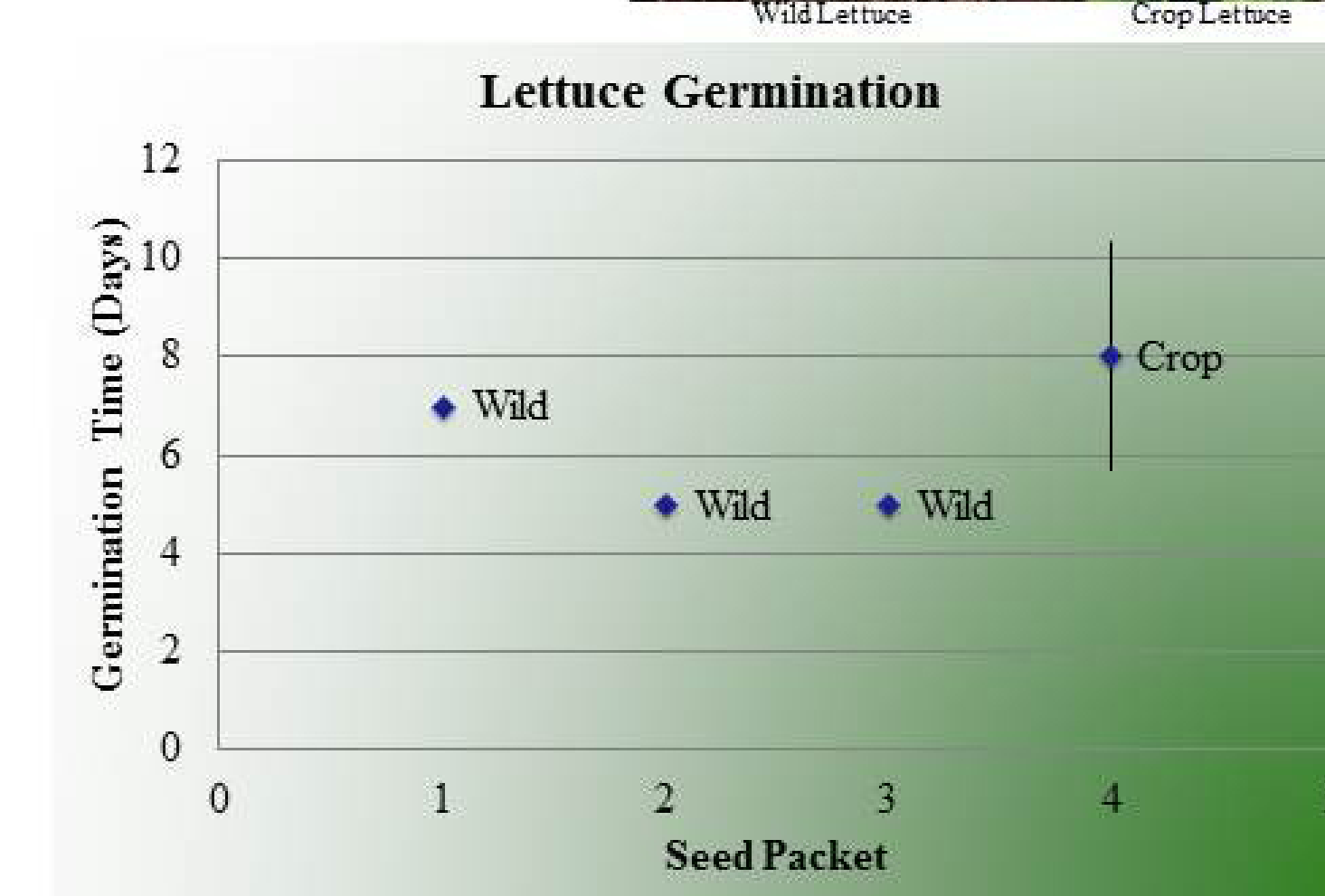
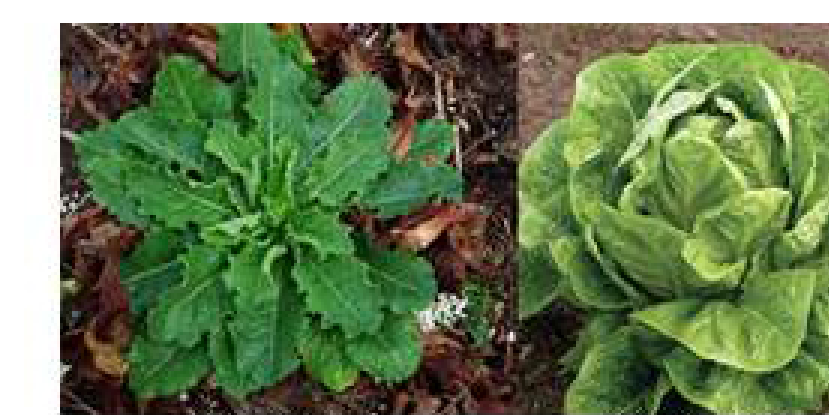


Figure 3: Germination Time

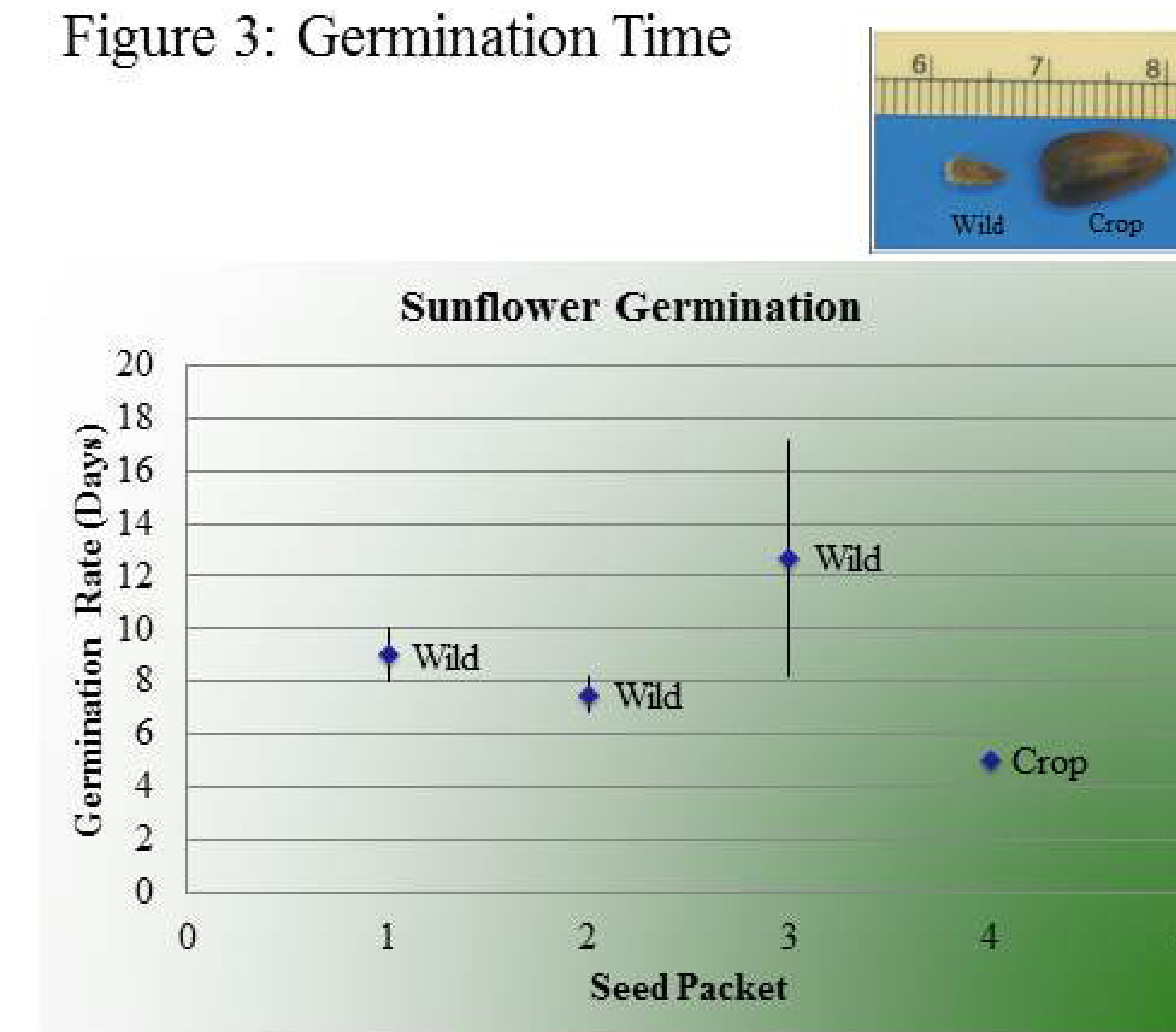


Figure 5: Germination Time

## Results

Figure 1 shows the germination rates of the crops and their crop-wild relatives. Corn had the highest germination rate while lettuce had the lowest germination rate. A variety of factors such as bad seeds, excess light, or not enough water could have contributed to the lower germination rates of some of the plants.

Figure 2 indicates that the crop and crop-wild varieties germinate around the same time. In the lettuce species, shown in Figure 3, it is evident that the crop-wild variety germinates significantly quicker than the crop. Figures 4 and 5, corn and sunflower respectively, demonstrate that the crop germinates more quickly than their crop-wild relatives. Figures 4 and 5 provide evidence for my hypothesis. However, Figures 2 and 3 do not. It is possible that the species of lettuce and carrot with the most desirable traits germinate slower.

## Future Implications

This research is important primarily for educational purposes. Since crops originated from their crop-wild relatives, it is vital to conserve the crop-wild relatives. Crop-wild relatives have the potential to strengthen crops and contribute to taste, nutritional content, etc. Factors such as climate change, habitat destruction, and pollution threaten the crop-wild relatives. Without the crop-wild relatives, it would be a difficult endeavor to preserve the crops due to their genetic uniformity.

As the world population increases, the demand for similar foods will also increase. A wide-spread failure of crops would produce massive devastation. This signifies the importance of learning about the crop-wild relatives and their environment in order to ensure the health and welfare of this generation and the ones to come.

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## Acknowledgement

Funding for this project was supported by a National Institute of Food and Agriculture award 2014-33522-21826. Additional thanks to Dr. Jennifer Mandel and Rob Coleman.