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# A PRELIMINARY STUDY ON THE EFFECTS OF RICE WATER ON CAPSICUM ANNUM L. PLANT GROWTH

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## ABSTRACT

In Malaysia, chilies are intensively used in the food industry, mainly as a dipping sauce and food preparation. Synthetic fertilizers are commonly used to boost the production of chilies to fulfill market demands. However, synthetic fertilizers have a long-term impact on the environment. Alternatively, natural fertilizers such as rice water and animal wastes provide a better solution compared to commercial fertilizers. Rice water was traditionally used as one of the methods to promote plant growth. However, there is a lack of scientific evidence to prove rice water potential as natural fertilizers to date. Therefore, this study aims to determine the effect of rice water on chili plant growth. In this study, the plant was watered with rice water twice a day and was placed directly under sunlight within seven weeks. The final height of the plants was compared with the control and chili plant with synthetic fertilizers. Hence, this study revealed that plant watered with rice water gives the highest growth rate (58%), control (39%), and synthetic fertilizers (49%). It can be concluded that rice water is suitable to substitute synthetic fertilizers, as it is safe, cost-effective, and environmentally friendly.

**Keywords:** *capsicum annum L.*, rice water, growth rate

## 1. INTRODUCTION

In 2019, there were over 400 varieties of chilies available across the globe. The plant characteristic differs by their size, colors, pungency, shape, and spiciness. Few types of chilies were well-known worldwide, such as bell peppers, jalapeno, cayenne peppers, thai chilies, and habanero peppers [1]. Throughout the year, Malaysia's hot and humid climate makes chili plants suit to grow as its optimal temperature is between 21-32 °C [2]. According to Miller, exposing the chilies' growing plants to cooler temperatures inhibit flower production and impedes proper fruit symmetry [3]. Rice, *Oryza sativa* (scientific name for Asian rice) is the typical staple food for a large part of the human population, especially in Asia. Rice water used in this study is water or a suspension starch obtained after washing the rice. Interestingly, women of Southeast Asia, China, and Japan have been using rice water as part of their beauty routine, using them as daily skin treatment and hair rinse [4]. Another investigation done by Marto et al. reported that gel formulation containing 96% rice water was biocompatible with the human skin and can be considered an anti-aging ingredient used as raw material for skincare applications [5]. Fertilizer is defined as any organic or inorganic material added to the soil to supply one or more plant nutrients to grow the plants to the maximum potential [6]. It is well known that the extensive application of synthetic (inorganic) fertilizers is found giving harm to the environment [2]. Ammonia (NH<sub>3</sub>) is the primary input for the majority of worldwide nitrogen fertilizer production. Due to the production of ammonia itself, it is causing the greenhouse effect on the atmosphere. This study aimed to examine and determine the effect of easy found waste, cheap, and environmentally friendly rice fertilizer on Chili plant growth.

## 2. MATERIALS AND METHOD

Three weeks old chili plants with a height range of 11.5 cm to 17 cm purchased from a nursery in Trolak, Perak was labeled with C1-C9. Each treatment was done in triplicates. Chili plants C1-C3 act as control while C4-C6 was treated with rice water, and C7-C9 was treated with five grams of inorganic fertilizers. The rice water was taken from the first wash of three cups of rice with 500 ml of water. Each of the chili plants was watered with the same amount of water twice daily. All the plants were exposed to direct sunlight, whereas rice water (80 ml) and inorganic fertilizers (5 g) were applied every two weeks onto the soil. The pH and plant height were recorded every week, using pH meter and measuring tape, respectively. Plant growth percentage was determined by calculating the difference between the plant's initial and final height after seven weeks and the formula shown below.

$$\text{Growth Percentage} = \frac{\text{Final Height} - \text{initial height}}{\text{Final height}} \times 100\%$$

## 3. RESULTS AND DISCUSSION

The average growth percentage and pH soil recorded after seven weeks of treatment were summarized in Table 1. The rice water in the soil discovered provides a suitable pH for the chili plant with average pH 6.64. According to Volin et al., chili plant best growth in soil medium with pH range of 6.5 to 7.5 [7].

Table 1. Growth Percentage of Chili Plants Under Different Treatments

Chili Plant	Average height difference (cm)	Average pH soil	Growth Percentage (%)
C1-C3 (Control)	11.3	6.8	39
C4-C6 (rice water)	16.0	6.64	58
C7-C9 (inorganic fertilizer)	15.2	6.70	49

The growth percentage results revealed that C4-C6 chili plant treated with rice water gave the most significant growth percentage at 58%, compared to control (39%) and inorganic fertilizer (49%). Scientific study conducted by Teh discover that after rice wash, rice losses 7% protein, 30% crude fiber, 15% free amino acids, 25% calcium (Ca), 47% total phosphorus (P), 47% iron (Fe), 11% zinc (Zn), 41% potassium (K), 59% thiamine, 26% riboflavin, and 60% niacin. These leaching nutrients were gained by the rice water that may beneficial to plant growth [8]. The highest plant growth obtained in this study supported by previous research done on water spinach, which reported rice water supplies essential nutrients such as nitrogen (N) and potassium (K) for the plant growth [8]. The rice water also contains various vitamins and nutrients such as amino acids, vitamin B, minerals and antioxidants [9]. In Japan, the rice water used on women's hair believed that the nutrients released from the rice wash exhibited hair care effects, such as reducing surface friction and increasing hair elasticity [4].

#### 4. CONCLUSION AND RECOMMENDATIONS

Thereby from this study, the rice water was found significant as natural fertilizers, as the plant growth show the highest rate, 58% compared to control and commercial fertilizers, 39% and 49%, respectively. This result suggested that rice water is beneficial for houseplant and can save water resources and cost-efficiency compared to inorganic fertilizer. Further scientific research on rice water's potential to promote flowers and fruits can be conducted towards other suitable plants in the future.

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