



The Effect of Dosage and Frequency of Leri Water Spraying on *Phalaenopsis Fuller's Pink Stripe* Orchid Growth during Acclimatization

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Abstract

Rice washing water (leri) is a residue that is usually thrown away; it is actually rich in various organic and mineral compounds which can be used as nutrients for the growth of orchid plants. This research was conducted to study the effect of dose and frequency of leri water spraying on the growth of *Phalaenopsis Fuller's Pink Stripe* orchid at the vegetative stage. This study consisted of 10 treatments, 5 ml of Leri water every 2 days, 10 ml every 2 days, 15 ml every 2 days, 5 ml every 4 days, 10 ml every 4 days, 15 ml every 4 days, 5 ml every 6 days, 10 ml every 6 days, 15 ml every 6 days, and control treatment. This study concluded that the application of leri water to the *Phalaenopsis Fuller's Pink Stripe* during acclimatization phase increased the length of leaf, length of root and the number of roots. The treatment of 10 ml leri water every 4 days resulted in the longest leaf length, 6.9 cm, significantly different from control plants which was 4.6 ± 0.5 cm. The treatment of 6 ml every 5 days produced the longest root length, 17.3 cm, while the highest number of roots was found in the treatment of 15 ml applied every 2 days as many as 9 roots.

Keywords: *Phalaenopsis Fuller's Pink Stripe*; rice wash water; vegetative growth.

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Introduction

The increase in orchid market circulation and trade has forced breeders to use different methods to develop varieties with different characteristics, including color, shape, and flower hardness (1). Orchidaceae is one of the two largest plant families, with 736 to 899 genera, 27,800 common species names, and more than 100,000 artificially pollinated hybrids (2). In terms of plants and ecology, orchids also participate in existing growth systems. The state-of-the-art gardens grown under conditions have good climate control, especially the temperature, making it free from seasonal restrictions. The

highly competitive global flower market (3). The growth of *Phalaenopsis* depends on the plant's location, water conditions, and nutrients provided by fertilization (4).

Phalaenopsis is an interspecific cross between progeny/parts and has great potential to extend qualitative and quantitative characteristics (such as flower color and size) to existing varieties (5). Orchid growers have managed to create significant genetic variations to select thousands of horticultural cultivars in *Phalaenopsis*. The *Phalaenopsis* hybrid has become an economically important pot and cut flower in the horticultural market because

Phalaenopsis plants can be easily programmed to flower all year round and the flowering time is typically 3 until 4 months (6). The vegetative stage of Phalaenopsis is the longest stage, with an average duration of 50 to 70 weeks, measured from the moment the plant is brought into the greenhouse after being cultivated in the laboratory (7).

Phalaenopsis Fuller's Pink Stripe Orchid is a hybrid orchid resulting from a cross between *Phalaenopsis Fuller's Pink Swallow* and *Phalaenopsis Fullers Black Stripe*. On 7 March 2012, this orchid was registered in the UK through the plantation charity RHS (Royal Horticultural Society). *Phalaenopsis Fuller's Pink Stripe* orchid flower can measure about 9-12 cm with a plant height of about 50-70 cm. Like its two parents, *Phalaenopsis Fuller's Pink Stripe* can only be propagated by tissue culture. Phalaenopsis is difficult to propagate vegetatively because it is a monopodial epiphyte, propagation by tissue culture is the most desirable method of propagation (8). Based on its uniqueness, the *Phalaenopsis Fuller's Pink Stripe* orchid is in great demand by the public.

Rice washing water or often called leri (Javanese) has a milky white color. According to (9), this shows eroded protein and contains abundant vitamin B1. Vitamin B1 is a B vitamin group that has a role in plant metabolism, which is the process of converting carbohydrates into energy for power plants. Leri water contains various nutrients, such as nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, and iron.

Leri water is the sludge produced during rice washing. This residue is typically discarded, despite the fact that it contains a variety of organic and mineral components (10), 0.043 percent vitamin B1, 16.306 percent phosphorus, and 0.015 percent nitrogen, potassium 0.02 percent, calcium 2.944 percent, magnesium 14.252 percent, sulfur 0.027 percent, and iron 0.0427 percent (11). When rice is prepared for cooking, it is panned three times to clean the floor; the washing water (leri) is turbid, indicating that protein and vitamin B1 levels are lowered. As a result, Leri water is high in protein and vitamin B. Vitamins may transform carbs into energy, enhancing plant life.

Cultural ecosystem services must show a significant connection between the structure and function of the ecosystem defined in the biophysical area and the satisfaction of human

needs and desires defined in the medical / psychological / social area (12). Further considered, cultural services are often characterized as “immaterial”, “subjective” and difficult to measure biophysically or monetarily (13). Waste that is wasted in vain can be used as nutrients for the growth of orchid plants. This research was conducted to study the effect of dose and frequency of leri water spraying on the growth of *Phalaenopsis Fuller's Pink Stripe* orchid at the vegetative stage.

Research methods

This research was conducted in a paranet house located in Anggrek Village, Plosorejo Village, Matesih District, Karanganyar Regency, Central Java from September – December 2020.

The tools used in this study included a paranet house, small pots, sprayers, measuring instruments, rulers, and stationery. The materials used included *Phalaenopsis Fuller's Pink Stripe* orchid seeds, sphagnum, wood charcoal, Dithane fungicide and rice washing water (Leri).

This study was conducted in a Completely Randomized Design with 10 treatments, namely application of 5 ml of Leri water every 2 days (L1), 10 ml every 2 days (L2), 15 ml every 2 days (L3), 5 ml every 4 days (L4), a dose of 10 ml every 4 days (L5), a dose of 15 ml every 4 days (L6), a dose of 5 ml every 6 days (L7), a dose of 10 ml every 6 days (L8), a dose of 15 ml every 6 days (L9), and just water as a control treatment (L0). Each treatments had three replications, so in total there were 30 pots of *Phalaenopsis Fuller pink striped* orchids were prepared.

Leri water was made by preparing 500 g of rice with 500 ml of water, then the rice is squeezed and stirred until the color of the water becomes milky white. Leri water taken was the first rice washing water, then filtered into a measuring cup to get the desired dose.

The growth variables observed in this study were plant height, leaf number, leaf length, leaf width, root number and root length. Measure from bottom to tip every week. The length of the root is measured from the root to the tip of the longest root. The number and length of roots were counted from the beginning and the end of the study. The collected data were then analyzed statistically using Analysis of Variance and Duncan Multiple Range Test.

Results and Discussion

The results of the treatment effect of leri water dose and spraying frequency on the growth of *Phalaenopsis Fuller's Pink Stripe* orchid in Table 1.

Phalaenopsis vegetative growth is critical, and sufficient vegetative plant size is required to

create high-quality flowering plants (14). The quantity of leaves and plant biomass can be as indicators of sufficient vegetative plant growth. The observation period is determined by the age of the plants and the concentration of washing water used, resulting in greater accumulation of shoot and root biomass (Table 1).

Table 1. Effect of the treatment of Leri Water Dosage and Spraying Frequency on the Growth of *Phalaenopsis Fuller's Pink Stripe*

No	Plants Number	Mean					
		¹ PH (cm)	LN	LL (cm)	LW (cm)	RN	RL (cm)
1	Control	1.9 ± 0.2a ²	5±0.58a	4.6±0.5a	3.2±0.17a	6±1a	17±1.17c
2	L1 (2days 5ml)	1.8±0.07a	6±0.58a	5.6±1.14ab	3.2±0.5a	8±1.53b	14.5±0.87b
3	L2 (2days - 10ml)	1.4±0.22a	6±2.31a	5.1±0.92a	2.9±0.26a	8±1.15b	15.6±0.55b
4	L3 (2days - 15ml)	1.6±0.32a	5±0.58a	6±0.41b	3.1±0.36a	9±2.52c	12.4±2.12a
5	L4 (4days - 5ml)	2.1±0.3a	5±1.15a	5.1±0.66a	3±0.6a	8±2.65b	14.7±1.16b
6	L5 (4days - 10ml)	1.5±0.5a	4±0.58a	6.9±1.92b	3±0.32a	7±1.15ab	12.7±3.21a
7	L6 (4days - 15ml)	1.8±0.2a	6±1.73a	4.8±0.53a	2.8±0.35a	8±2.65b	12.7±2.52a
8	L7 (6days - 5ml)	1.5±0.5a	6±0.58a	5.5±0.61ab	3.1±0.29a	7±3.06ab	17.3±1.53c
9	L8 (6days - 10ml)	1.5±0.17a	5±1.73a	6±0.77b	3.7±0.35a	7±1ab	12.5±2.69a
10	L9 (6days - 15ml)	1.7±0.58a	5±0a	5.2±1.52a	2.7±0.35a	7±3.06ab	15.1±9.3b

¹PH = Plant Height, LN = Number of Leaves, LL = Leaf Length, LW = Leaf Width,

RN = Number of Roots, RL = Root Length.

³/Mean values within a column followed by the same letters are not significantly different at $p < 0.05$ according to Honesty Significant Difference.

Phalaenopsis does not have storage organs like pseudobulbs, but it can store assimilation for a long time and can be used during flowering later. It is not clear how the treatments applied to the vegetative stage affect the number of flowers, but there is a strong correlation between vegetative growth and flowering characteristics. This shows that the treatment of plants at the vegetative stage is important.

The results showed that the highest plant height was found in plants with L2 treatment (10ml dose with watering every 2 days), 6±2.31 cm, while the height of control plants was 1.9 ± 0.2 cm. The highest number of leaves was found in plants treated with L2 (10ml dose with watering every 2 days), 6±2.3 leaves, while the average leaves number in control plants was 5±0.58 leaves. Orchid plants with a dose of L5 (10ml with watering every 4 days) had the longest leaf length compared to other plants, which was 6.9±1.92 cm, significantly different from control plants which was 4.6±0.5 cm. The widest leaves were found in plants treated with L8 (10ml dose with watering every 6 days) of

3.7±0.35 cm. Orchid plants with the treatment of L7 (6ml dose with watering every 5 days) had the longest root length, 17.3±1.53, compared to the other treatment, while the highest number of roots was found in plants with L3 treatment (15ml with watering every 2 days) as many as 9±2.52.

The results showed that the observed plant growth variables did not show a significant effect on plant height, leaf number and leaf length. This may be due to insufficient rice washing water or insufficient amount of orchids. N, P, and ZPT (growth regulating substances) are nutrients found in rice water. Demand of the plant then reduces its nutrient supply, so this affects the growth and productivity of the plant. (15) say that as long as the plants appear healthy, one should not apply too high levels of certain nutrients to the media as they can severely interfere with the absorption of other nutrients.

Plant height growth is an indicator of plant growth and development, which impacts plant production; when essential elements exist in an easily digestible form, plants will grow (16);

This is due to cell division and an increase in the number of cells that demand energy in the form of ATP (17).

The activity of meristem cells at the growth point is related to the increase in leaf number. This activity is through the division of apical meristem cells to produce new cells (including phosphorus, nitrogen, and potassium) and promotion (18) According to (19) Leaves are used as organs in the process of photosynthesis, and the photosynthesis rate of plants is reduced, nutrients play a function in the metabolic activities of plants in addition to photosynthesis. Photosynthesis is the process of using light energy to convert CO₂ and H₂O into carbohydrates and O₂. Leaves are the main place for this process, because green chlorophyll is found in the chloroplast. Many epiphytic orchids also have green photosynthetic roots and stems (20).

The study showed that the use of Leri water in the vegetative phase promoted the root growth, number of roots as well as root number (Table 1). In epiphytes, the root system is very important because it plays an important role in absorbing water and nutrients (21). However, when it comes to attributes that are considered important, the root is often overlooked. In the breeding and production of *Phalaenopsis*, root-related traits may be related to induction and flowering. Generally speaking, larger plants with more leaves are expected to produce more flowers.

When rinsing rice, the water after the first rinse is usually milky white. This color shows that the rice's outer covering has been destroyed. Although many nutrients have been lost, critical nutrients such as phosphorus (P) are still present in the epidermis. Phosphorus (P) is one of the most crucial components required by plants. Compound plant fertilizers always contain this element. This element promotes faster plant growth. Iron is another nutrient that influences chlorophyll. It is critical. The epidermis is also rich in vitamins, minerals, and phytochemicals.

(22) believes that the advantage of organic fertilizers is to prevent pesticides and other pesticide residues from polluting the environment. Organic fertilizers can improve soil structure, increase fertility, maintain and increase nutrient utilization and increase nutrient availability. The number of microorganisms. According to (22), when plants are unable to

give the necessary nutrients, their metabolism becomes problematic, affecting plant growth and development. As a result, even when organic materials are employed, additional nutrients are still required (through fertilization).

Conclusions

This study concluded that the application of Leri water to the *Phalaenopsis Fuller's Pink Stripe* during acclimatization phase increased the length of leaf, length of root and the number of root. The treatment of 10 ml Leri water every 4 days resulted in the longest leaf length, 6.9 cm, significantly different from control plants which was 4.6±0.5 cm. The treatment of 6 ml every 5 days produced the longest root length, 17.3 cm, while the highest number of roots was found in the treatment of 15 ml applied every 2 days as many as 9 roots.

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