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THE EFFECT OF FERTILIZER ON GROWTH OF STAGHORN FERN AT SEEDLING STAGE

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ABSTRACT: The effects of two fertilizer types with 3 concentrations on growth of staghorn fern (Platycerium coronarium) were studied. This experiment was conducted at the nursery of Division of Crop Production, Faculty of Agricultural Technology, Rajamangala University of Technology Thanyaburi, during October and December 2013. It was laid out in a RCBD with 4 replications and consisted of seven treatments. The treatments were application of: water, a 21-21-21 fertilizer with the concentration of 0.5 g/l, 1.5 g/l, 3g/l, Bio-fertilizer with the concentration of 1 ml/l, 2 ml/l and 3 ml/l of water. Leaf length, leaf width and canopy width of the ferns were measured. The data were subjected to ANOVA, followed by Duncan's Multiple Range Test at 5% level of significance. No significant difference among treatments was found. However, the water showed the best result. It gave 108.79 mm average canopy width, 3.13 mm average leaf length and 89.67 mm average leaf width.

Keywords: Fertilizer on Growth of Staghorn fern, Staghorn fern, Platycerium coronarium

1. INTRODUCTION

Ferns are categorized in vascular plants in terms of epiphyte diversity [7], which are important in many aspects, especially in ornamental and gardening purposes. Currently, a trend of popularity for both local and international is moving toward more fern species. Staghorn fern (*P. coronarium*) is one of them. Probably, its rareness and typical form play a role on this matter. Streaky leaf hanging down is very unique to this fern. Moreover, some leaves appear in antler-like form. In the forest, this fern is a good indicator for forest richness. In a garden, by having impressively large leaves, it gives an impression of having a naturally rich forest at home. Moreover, its rareness gives an exotic phenomena and of course, a high price. Due to its price, smuggling this fern from the wild for sale is a major problem [3]. On the other hand, weather may be another factor that causes the decreasing in number of staghorn fern. It may not be suitable for the spore germination and the fern growth for some reasons. Now, the staghorn fern is endangered. To increase the number of staghorn ferns to meet market demand [5] and also reduce the smuggling amount from the forest, any attempt to reproduce this fern would be favorable. To achieve this goal, at least, nursery conditions should mimic the natural condition as much as possible. The key issue is to reduce the mortality of fern seedlings. Currently, many staghorn-fern growers attempt to grow them form the spores, but the survival rate of the seedlings requires some improvement. Also, an appropriate fertilizer for them needs to be determined.

Therefore, it is important to find out suitable types and rate of fertilizers for staghorn fern in seedling stage.

2. MATERIALS AND METHODS

2.1 Materials

Some 200 staghorn fern (*P. coronarium*) seedlings with a true leaf (sporophyte stage, 1 centimeter) are transplanted onto a peat moss basket for one month. Some of these seedlings were chosen for the experiment when they reached stage 2 or about four months old. Typically, seedlings at this stage pose rounded leaves with the size of 2.5 cm. The selected seedlings were transferred onto individual pots with planting media. The planting media were prepared from roots of *Asplenium nidus* fern and coconut husk chips. Firstly, the fern roots were chopped into small pieces and soaked in water. The two materials were then mixed and after further soaking the mix was filled into pots. Each experimental pot was placed into a clear plastic bag. The bags were tightly tied up and hung on bars (Fig. 8). This procedure was for controlling humidity.

2.2 Experimental Design

Experimental design was randomized complete block design (RCBD) with 7 treatments in 4 blocks (replications). The 21-21-21 pellet fertilizer and liquid bio-fertilizer were used as the experimental treatments: 1) water, 2) diluted pellet fertilizer at 0.5 g/a liter of water, 3) diluted pellet

fertilizer 1.5 g/a liter of water, 4) diluted pellet fertilizer 3 g/a liter of water, 5) diluted bio fertilizer at 1 ml/a liter of water, 6) diluted bio fertilizer at 2 ml/a liter of water and 7) diluted bio fertilizer at 3 ml/a liter of water. The fertilizer solution was sprayed onto the plants at a rate of 2 ml/plant once a week.

2.3 Data analysis

Statistical analysis was performed using analysis of variance procedure (ANOVA). Duncan's new multiple range test (DMRT) at the significant level of 0.05 was used to compare differences among means.

3. RESULTS

The staghorn ferns grown with water (Trt1) demonstrated the highest growth among treatments. In average, their canopy width was 108.79 mm, leaf width was 89.67 mm, leaf length was 73.13 mm and leaf numbers were 3.33 leaves (Table 1).

Table 1 The growth of staghorn fern (*P. coronarium*) seedling stage at week 9

Treatment	Average growth of *P. coronarium*			
	canopy width (mm)	leave width (mm)	leave length (mm)	leave number
1	108.79	89.67	73.13	3.33
2	91.94	71.42	61.16	3.42
3	79.23	61.14	51.55	2.83
4	96.29	76.57	64.00	3.08
5	98.76	72.18	62.57	2.67
6	102.61	73.57	61.40	3.08
7	98.21	80.23	67.04	2.58
CV (%)	12.23	14.77	14.55	21.30
F-test	ns	ns	ns	ns

3.2 Figures

Figure 1-7 show the growth of *P. coronarium* at the 9th week, from treatments (Trt) 1-7.

Fig.1 Trt1

Fig.2 Trt2

Fig.3 Trt3

Fig.4 Trt4

Fig.5 Trt

Fig.6 Trt6

Fig.7 Trt7

Fig.8 Hanging of the experimental pots

4. CONCLUSION

All levels of both fertilizers were inferior to water probably due to some toxic effects. One of known toxicity causes by nitrogen so called Biuret. This effect was expected to be the case in this study as it was consistent with a germinating experiment in corn. The corn germination was restrained by NH3 gas[1]. In another experiment, urea could generate high biuret even only placed nearby. It was suggested that urea gave rise to NH3 during its degeneration process, and that affected the germination.

In case of seedling plants, the biuret effect may be more serious [2]. Therefore, taking a good consideration on biuret is important for staghorn fern in seedling stage, especially in a closed system. Furthermore, any fertilizer is not recommended.

Timing for removing the staghorn-fern seedlings from the plastic bags is also important. Basically, it may be done when the crown leave reach a diameter of 9.0-10.0 cm. However, in a greenhouse equipped with humidity and sunlight control, the seedlings can removed when the crown leaf has a diameter of 3 cm, approximately [4]. The sporophyte transplanting in the greenhouse has a survival rate of 100% of spores.

4. ACKNOWLEDGEMENTS

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