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PERFORMANCE OF THREE DAHLIA CULTIVARS WITH RESPECT TO FOLIAR FERTILIZER APPLICATIONS TO SUPPORT AGROTOURISM AROUND MOUNT MERAPI

Heti Herastuti
Agrotechnology Department, Faculty of Agriculture,
Universitas Pembangunan Nasional "Veteran" Yogyakarta
Jl. SWK 104 Condong Catur Yogyakarta, Indonesia

Email: heti_astuti@yahoo.co.id

ABSTRACT

Dahlias are ornamental plants that are an ideal for landscapes and gardens because their diversity in shape and size adds visual interest and texture. These plants grow well in a number of weather conditions including those around Mount Merapi in Central Java. This study aimed to determine the concentration of a foliar fertilizer to promote growth and flowering of three dahlia cultivars. The study was conducted at Kinahrejo, Cangkringan, Sleman Regency using a randomized complete block design with two factors: foliar fertilizer application at 1, 2, and 3 g/L; and three cultivars namely, Dahlia Bishop of Llandaff, Dahlia Sakkuru Apricot andDahlia Fleur. The fertilizer used was Grow More and was applied 2, 4, 6 after weeks after planting. The result showed that there was no interaction between fertilizer concentration and dahlia cultivar. Fertilizer at 2 or 3 g/L produced taller plants than applications at 1 g/L. Application at 2 g/L produced plants with greater leaf areas per plant and leaf fresh and dry weights than the other treatments. Fertilizer concentration did not affect flower diameter nor were there any differences among the diameters of the flowers produced by the three different cultivars. Therefore, Growmore at 2 g/L is recommended for use and can be used to aid the development of agrotourism around Mount Merapi.

KEYWORDS : Dahlia, foliar fertilizer, agrotourism, Mount Merapi

INTRODUCTION

After the eruption of Mount Merapi at the end of 2010, Kinahrejo was one of the locations that was worst affected with many people killed and buildings damaged by the hot ash clouds. Currently, agricultural lands are damaged and covered with sand, but they are recovering and are often visited by tourists for sightseeing. However, more activities are needed to support the recovery of these areas. One of these activities is the development of agrotourism involving the production of dahlias.

Dahlias are herbaceous, perennial plants with tuberous roots, with flowers of different shapes and shades. They are one of the most popular bulbous flowers grown in many parts of the world as they have beautiful ornamental blooms of varying shades and colours that can be used for the beautification of gardens or as cut flowers. The blooms are curvaceous, spiky with single or double forms and colours that range from white to red, orange to yellow, pink

to dark purple. Dahlias can be planted in sand (Kiran et al. 2007), so dahlias can be planted in Kinahrejo.

To improve the growth and flowering of dahlias, several studies have recommended the application of foliar fertilizers containing macro- and microelements. . Iris sprayed with Gala (Naglaa and Kandeel 2001), Strelitzia reginae spayed with Stimoful (Youssef 2004) and Acanthus mollis sprayed with Kristalon all had improved vegetative growth and flowering. However, applications should be made at appropriate concentrations as high concentrations will damage the plant cells and low concentrations will have little effect on growth. Therefore, the objective of this study was to determine the concentration of a foliar fertilizer suitable for the growth of dahlias.

MATERIALS AND METHODS

The experiment was conducted at Kinahrejo, Cangkringan, Sleman Regency from January to April, 2011. Three cultivars(Dahlia Bishop of Llandaff, Dahlia Sakkuru Apricot and Dahlia Fleur)of dahlias were grown that had red, yellow and white flowers. These plants were given three foliar applications of Grow More (Produce by PT Yudistira Adi Perkasa Surabaya) 2, 4, 6 after weeks after planting at concentrations of 1, 2, and 3 g/L water. Grow More fertilizer contains: 20% N; 20% P2O5; 20% K2O; 0.05% Ca; 0.10% Mg; chelated Mg 0.10%; 0.20% S; 0.02% B; 0.05% Cu; 0.05% chelated Cu; Fe 0.10%, 0.05% Mn; 0.0005% Mo; and 0.05% Zn. The experiment was laid out in randomized complete block design with two factors. The first factor was foliar fertilizer concentration, comprising 3 levels (1, 2, and 3 g/L) and the second factor was cultivar (three cultivars). Each combination of treatments was repeated 3 times. The data (plant height, leaf area/plant, leaf fresh weight, leaf dry weight and diameter of flower) collected were subjected to ANOVA and means were separated using Duncan's Multiple Range Tests (DMRT) at P=0.05.

RESULTS AND DISCUSSION

Plant height. The data showed that different concentration of foliar fertilizer had a significant effect on plant height (Table 1). The plants given 2 or 3 g/L were taller than those given 1 g/L at all three assessment times. There were no differences in plant height amongst the cultivars. An increase in plant height is the most obvious manisfestation of growth, which is directly affected by the plant's genetic makeup and cultural practices especially fertilization (Meyre et al., 1973). Among the minerals added, nitrogen is the most important as far as growth is concerned, because it is a constituent of proteins and nucleic acids (Haque, 2001). Phosphorus, is also important, as it is the structural part of many compounds, notably nucleic acids and phospholipids. In addition to this, phosphorus plays an important role in energy metabolism (Memon, 2001).

Table 1. Effect of different concentrations of foliar fertilizer and dahlia cultivar on plant height

Treatment	Plant height (cm)		
	4 weeks after planting	6 weeks after planting	8 weeks after planting
Concentracion of foliar fertilizer			
1 g/L water	21.78 q	44.44 q	72.44 q
2 g/L water	27.44 p	66.33 p	105.67 p
3 g/L water	27.78 p	65.22 p	98.78 p
Dahlia cultivar			
Bishop of Llandaff (Red)	27.33 a	54.56 a	90.00 a
Sakkuru Apricot (Yellow)	25.44 a	58.44 a	90.33 a
Fleur (White)	24.22 a	63.00 a	95.56 a

Notes: Means followed by different letters are significantly different according to DMRTs at P=0.05

Leaf area/plant. Data related to leaf area are given in Table 2 and showed that foliar fertilizer of concentration has significant effect on leaf area/plant. The maximum leaf area (262.40 cm2) occurred at an application of fertilizer at 2 g/L; this treatment was significantly.

different from the other two. The minimum leaf area (180.53 cm2) was at 1 g/L. Nitrogen has a tendency to increase in cell numbers and size and this may have caused the increase in leaf area seen in this experiment (Meyer et al., 1973). Phosphorus and potassium may have resulted in more chlorophyll formation thus increasing photosynthesis and also contributing to the increased leaf area (Belorker et al., 1992).

Leaf fresh weight. The data in Table 2 shows that all tested concentration of foliar fertilizer increased leaf fresh weight; however, 2 g/L gave plants with the largest leaf area. The treatment at 1 g/L gave the same area as 3 g/L. All three cultivars produced leaves with the same leaf areas. The results of Youssef and Goma (2007) on Iris tingitana and Abou-El-Ella (2007) on Acanthus mollis showed that spraying plants with foliar fertilizer at 2-4 g/L increased plant height and fresh and dry leaf weights.

Leaf dry weight. The data in Table 2 show that foliar fertilizer at 2 g/L produced the greatest leaf dry weight compared to the other treatments. As with fresh weight, leaf dry weight at 1 g/L was the same as at 3 g/L. Again, there were no differences among the cultivars. Leaf dry weight indicates the presence of dry matter accumulation. This accumulation is due to effect of nutrient elements promoting vegetative growth. Naggar (2009) states that the simulating effects of macro- and micronutrients is due to activating apical meristems as well as stimulating protoplasm formation, the division and elongation of meristem cells, and enhancing the biosynthesis of proteins and carbohydrates.

Table 2. Effect of different concentrations of foliar fertilizer and dahlia cultivar on the leaf area / plant, leaf fresh weight, leaf dry weight and flower diameter.

Treatment	Leaf area/plant (cm^2)	Leaffresh weight (g)	Leaf dry weight (g)	Flower diameter (cm)
Concentracion of foliar fertilizer				
1 g/L water	180.53 r	424.14 q	82.22 q	7.78 a
2 g/L water	262.40 p	620.44 p	109.93 p	8.22 a
3 g/L water	233.90 q	472.99 q	86.46 q	7.67 a
Dahlia cultivar				
Bishop of Llandaff (Red)	227.29 a	511.70 a	93.76 a	8.33 a
Sakkuru Apricot (Yellow)	228.35 a	492.56 a	90.12 a	7.56 a
Fleur (White)	221.19 a	546.66 a	94.72 a	7.78 a

Notes: Means followed by different letters are significantly different according to DMRTs at P=0.05

FlowerDiameter. Data regarding flower diameter (Table 2) showed that there are no significant differences between fertilizer concentrations and cultivars. According the research by Youssef and Goma (2007) foliar fertilizer at 6 g/L increased diameter of flower. However, this concentration depends of the type of fertilizer used and this concentration of the fertilizer used in this study would be toxic.

CONCLUSIONS

Based on the analysis of results, there is no interaction between foliar fertilizer concentration and cultivar of dahlia. The optimal concentration of fertilizer appears to be 2 g/L for all three cultivars grown. Future work could look at fertilizers with different concentrations of the different micro- and macronutrient components of the fertilizer used.

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