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Effect of Chrysanthemum Plants to Artificial Defoliation and Disbudding on Growth and Yield

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A B S T R A C T

The market outlook for chrysanthemum flowers is extremely optimistic, as domestic and international consumer demand has increased over the past five years. The development of chrysanthemum plants is anticipated to positively affect the region's employment opportunities, economic growth, and service sector growth. Along with the increasing intensity of chrysanthemum cultivation in various regions, more in-depth research on chrysanthemum flowers is required to improve quality and added value and utilize the potential of locally available resources that are simple for farmers to apply and have a significant impact on improvement. The majority of chrysanthemum cultivation business actors are small farmers. Chrysanthemum plant technology is distinct from other horticultural crops, requiring special maintenance such as Disbudding, adding artificial light, artificial Defoliation, and the erection of plant enforcement nets. The research method employs the Factorial Group Random Design. The first factor is artificial Defoliation including no defoliation, Defoliation at 30 dap (day after planting) , and Defoliation at 60 dap. The second factor is disbudding including no disbudding, disbudding at 60 dap, and disbudding at 90 dap. The results demonstrated that the interaction between artificial Defoliation and disbudding significantly affected flower stalk weight but did not affect other variables. The treatment of leaf defoliation had significant to very significant effects on all observed variables, except for the weight of flower stalks, which was unaffected. At the same time, the disbudding treatment significantly affects all observed variables. The interaction between leaf defoliation at 30 dap and disbudding at 60 dap resulted in the heaviest average flower stalk weight of 93.58 grams. Artificial Defoliation at 30 dap increased the yield of economically viable fresh flower weight by 8.09 percent compared to when Defoliation was not performed. The 60 dap Disbudding treatment increased the yield of fresh flower weight by 9.25% when compared to the control.

1. INTRODUCTION

1.1. Research Background

The production of chrysanthemums in Java and Bali has not been able to meet market needs because productivity is still low. Increased production needs to be continuously increased both through extensification and intensification. Chrysanthemum planting in Bali until now has only been concentrated in the Buleleng and Tabanan areas, so it needs to be developed in other potential areas [1]. Not all potential areas have been planted with ornamental plants due to various considerations such as their location far from the marketing center, lack of adequate infrastructure, and limited knowledge of cultivation, harvesting, and postharvest handling. Increasing production through intensification often encounters problems, including the provision of planting material (cuttings), planting spacing, regulating soil moisture by mulch, determining the optimum dose of organic and inorganic fertilizers, pre-and postharvest (sorting, grading, and packaging), and managing production systems. These cultivation factors cause low production and quality of chrysanthemums, which affect the selling price of chrysanthemums as cut flowers [2].

Chrysanthemum is a commodity that has a high enough economic value that it has the potential to be developed commercially as a basic component in agribusiness, both as cut flowers, ornamental plants in pots, and medicinal plants [3]. Data on the development of cut flowers in the last five years shows that cut flower production from year to year has increased by an average of around 31.6%. Of the total 9 types of cut flowers in 2012, the largest production is chrysanthemum flowers reaching about 64.79% of the total production of 9 types of cut flowers. Chrysanthemum production experienced an average growth of 43.2% per year, greater and largest than the average growth of cut flowers [4]. The rapid development of tourism also has an impact on the variety of horticultural products needed to meet the demands of a quality market and the continuity of guaranteed products, related to Bali is a tourism area so that the potential of the chrysanthemum market is very promising for individual consumers such as: florist, wedding events and holidays. As well as institutional consumers (hotels, banks and government offices and sawasta) [5]. Thus, the development of ornamental plants is directed to refer to market needs, comparative benefits, and economic value. In addition, its development follows the potential of resources, agro-climatic conditions, agroecosystems of an area, supporting facilities and infrastructure, and market prospects [6][7].

The main obstacle in cultivating chrysanthemums in new centers is the limited knowledge of cultivation technology (since special maintenance exists). Therefore, special maintenance efforts must be made so that farmers are interested in adopting and developing the technology into the chrysanthemum cultivation production system.

Leaf defoliation to the bottom or removal of the lower leaves of the stem serves to improve air circulation so that the humidity around the plant can be reduced. Defoliation can also reduce pests and plant diseases, especially in conditions of high air humidity. Defoliation can also be used to overcome leaf miner pests so as not to spread on other leaves. Piracy is usually done when plants are two months or older and looks at plant conditions and temperature. The removed leaves are 5 cm from the soil surface [8]. Disbudding is a flowering activity. This activity occurs when plants begin to have prospective flowers after 2.5 months on standard-type chrysanthemums. The pontes flowers are axillary bud flowers, so only the main flowers remain. On the contrary, in spray-type chrysanthemums, the pontes flowers are the main flowers. This activity is carried out so plants can produce good flowers [9] [10].

Based on the above, the following problems can be formulated: 1). How do leaf defoliation and Disbudding affect chrysanthemum plants' growth response and yield? 2). Is there any interaction between artificial Defoliation and Disbudding?.

1.2. Research Objective

The study aimed to obtain the ideal leaf piracy and disbudding age for site-specific chrysanthemum cultivation to increase productivity and produce quality products. The urgency of this research is that in introducing new businesses, especially chrysanthemums in Bali, more persistence and patience are needed to realize increased production, productivity, and quality of chrysanthemum products. It is necessary to carry out strategies so that obstacles and problems in the cultivation of chrysanthemum plants that often occur in the development of new commodities for farmers can be minimized so that improving the welfare of farmers through the development of chrysanthemum farming can be realized. The application of cultivation technology findings is expected to have a real impact on increasing the income or welfare of local farmers so that farmers will be interested in adopting the technology and developing it into the production system on their farmland.

2. MATERIALS AND METHODS

The research method uses Factorial Group Random Design conducted in the field in a greenhouse. This study uses two factors, namely Factor I is l Artificial Defoliation, and Factor II is Disbudding, each consisting of Factor I, Artificial Defoliation (P) consists of 3 levels: Without Defoliation, Defoliation at 30 dap, and Defoliation at 60 dap. Factor II, Dusbuding (D), consists of 3 levels: Without Disbudding, Disbudding 60 days after planting, and Disbudding 90 days after planting. Research materials and tools include White giant chrysanthemum cuttings, calipers, electric scales, labels, inorganic and organic fertilizers, pesticides, and fungicides. The implementation of experiments includes preparation of planting media, fertilization, planting, treatment, plant maintenance (watering, diving, weeding, pest, and disease control), observation of plant growth and development, and harvest

Figure 1. Artificial Defoliation and Disbudding Treatment

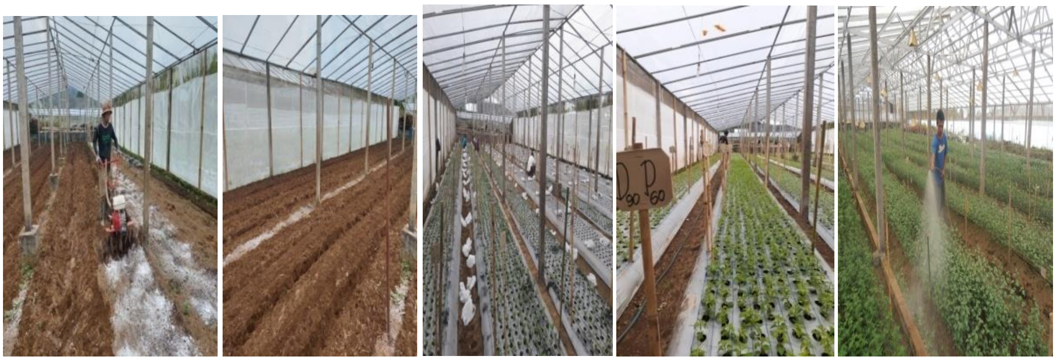

Figure 2. Tillage, bed making, planting, treatment, and control of pests and diseases

The variable observed is the length of the flower stalk (cm). Measurement before harvest, by measuring the length of the flower stalk from ground level to the tip of the highest flower. Dikur from the base of the stem to the tip of the highest flower. Flower stalk weight (g), Measured by weighing all plant samples with electric scales at the time of harvest. Trunk diameter (cm). By measuring the diameter of the stem with a caliper before harvest, by measuring the stem of the plant among the maximum height. Flower diameter (cm). Measured using calipers of flowers that have been in full bloom on each floret. Economical fresh weight of flowers (g). Measured by weighing the fresh weight of economical flowers along 80 cm after harvest with electric scales.

Observational data were analyzed using variance analysis if a single treatment had a real or very real effect followed by the smallest real difference test at the level of 5%, and if there was a real or very real effect on the interaction continued with a multiple distance test from Duncan's level of 5% [11] [12].

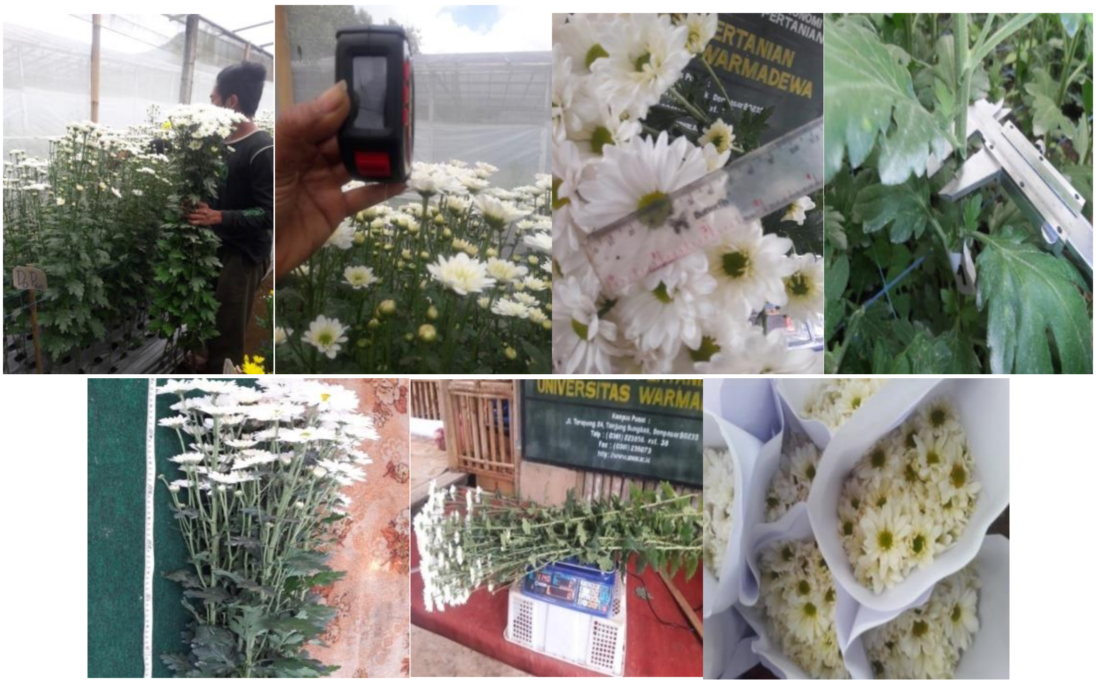

Figure 3. Harvesting research results, measuring flower stalk length, flower diameter, stem diameter, flower stalk weight, economic flower fresh weight, and postharvest handling.

3. RESULTS AND DISCUSSION

The results showed that the interaction between leaf piracy and Disbudding showed a real effect on the weight of flower stalks and no real effect on other variables. The treatment of leaf defoliation significantly affected all variables observed except for the variable weight of flower stalks with no real effect. At the same time, the disbudding treatment exerts a noticeable influence on all observed variables (Table 1). The average results of the interaction and treatment of leaf defoliation and disbudding on all variables observed are presented in Tables 2 and 3.

Table 1. The significance of the results of variance analysis of Artificial Defoliation and Disbudding and their interaction on all variables observed in chrysanthemum plants

No	Variable	Treatment		
		Artificial Defoliation	Disbudding	Artificial Defoliation x Disbudding
1	Flower stalk length (cm)	*	*	Mr
2	Flower stalk weight (g)	Mr	*	*
3	Rod diameter (cm)	*	*	Mr
4	Flower diameter (cm)	**	*	Mr
5	Economical fresh weight of interest (g)	*	*	Mr

Description: * = significant effect, ** = very significant effect, ns = non-significant.

Table 2 shows that the highest average weight of flower stalks is found in the interaction between leaf defoliation of 30 dap with Disbudding of 60 dap of 93.58 g. The lowest is found in interactions without leaf defoliation and Disbudding of 73.24 g. The interaction of 30 dap leaf defoliation with 60 dap disbudding significantly affects all other interaction treatments.

Table. 2. The effect of interaction between artificial defoliation and disbudding on the average weight of flower stalks (g)

Treatment	Artificial Defoliation		
	0 DAP	30 DAP	60 DAP
Disbudding			
0 DAP	73.24 C	74.41 C	82.41 b
60 dap	80.06 b	93.58 A	83.53 b
90 DAP	84.30 b	84.33 b	81.76 b

Remarks :
The average value followed by the same letter indicates an unsignificant object in Duncan's 5% test

Table 3. The average effect of artificial defoliation and disbudding on all observed variables

Treatment	Flower stalk length (cm)	Rod diameter (cm)	Flower diameter (cm)	Economic, Fresh weight of interest (g)
Artificial Defoliation				
No defoliation	119.97 b	1.76 b	5.17 b	59.49 b
Piracy age 30 dap	130.16 A	2.09 a	6.00 A	64.73 A
Piracy age 60 dap	122.32 b	1.81 b	5.68 A	61.94 AB
LSD 5%	*6.98*	*0.22*	*0.38*	*3.98*
Disbudding				
No disbudding	119.99 b	1.74 b	5.40 b	59.26 b
Disbudding age 60 dap	128.91 a	2.08 A	5.89 a	65.30 a
Disbudding age 90 dap	123.55 AB	1.82 b	5.56 AB	61.60 AB
LSD 5%	*6.98*	*0.22*	*0.38*	*3.98*

Remarks : The numbers in the same column for each factor followed by the same letter did not differ significantly in the 5% LSD test. Dap : the day after planting

Artificial defoliation treatment of 30 dap resulted in the highest average values on flower stalk length (130.16 g), stem diameter (2.09 cm), flower diameter (6.00 cm), and economical flower fresh weight (64.73 g) (Table 3). The 30 dap artificial defoliation treatment was able to increase the yield of economic fresh flower weight by 8.09% when compared to without leaf piracy. This is because early leaf turnover and removing old and unproductive leaves and diseased leaves will improve air circulation around plants or the growing environment so that humidity levels are maintained to prevent the development of pests and diseases. Piracy is performed to remove small lateral shoots growing on the knuckles of the lower stem [13] [14] [15]. On the other hand, microclimate conditions around plants are conducive to allowing plants to grow and develop optimally.

Disbudding treatment of 60 dap, produces the highest economic fresh weight of 65.30 g and differs significantly with treatment without Disbudding. The 60 dap Disbudding treatment increased the yield of fresh weight of economic interest by 9.25% when compared to without Disbudding. Disbudding treatment of 60 dap significantly affected flower stalk length, stem diameter, flower diameter and fresh weight of economical flowers compared to without disbudding (Table 3). The increase in fresh weight yield of economical flowers is due to generally the first flowers that appear faster blooming compared to the flowers that grow below so that the level of flower bloom becomes not uniform. Growth is slower; with earlier Disbudding carried out, flower growth becomes more optimal.

4. CONCLUSION

The study results can be concluded as follows: The interaction between 30 dap leaf defoliation and 60 dap disbudding significantly affects the weight of flower stalks and has no significant effect on other variables. The treatment of leaf defoliation affected significantly against all observed variables except for the variable weight of flower stalks with no significant effect. The 30 dap artificial defoliation treatment increased the yield of economic fresh flower weight by 8.09% compared to without leaf piracy. The disbudding treatment had a noticeable effect on all observed variables. The 60 dap Disbudding treatment increased the yield of fresh weight of economic interest by 9.25% when compared to without Disbudding.

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REFERENCE

[1] Arjana, I Gusti Made, 2015. Cultivation of chrysanthemums, cut flowers of the national flagship. Ministry of Research, Technology and Higher Education.
[2] Darti, 1992." Plants and Cultivation of Ornamental Plants", PD. Mahkota, Jakarta
[3] Nuryanto, H., 2011. Cultivation of chrysanthemum plants, Ganeca. Bekasi Horticultural Development Agricultural Research and Development Agency. Persada Jakarta.
[4] Agricultural Data Center and Information System, 2014. Chrysanthemum Commodity Outlook. Secretariat General of the Ministry of Agriculture.
[5] Directorate of Floriculture Cultivation and Postharvest, 2013. Profile of Chrysanthemum. Director General of Horticulture, Ministry of Agriculture.
[6] Agricultural Research and Development Agency, 2012. Chrysanthemum Innovation Business Opportunity Agricultural Research and Development Agency. Agro Innovation. Issue March 7-14 2012.No. 3447 Year XLII.
[7] Cahyono, F. B, 1999. Chrysanthemum cultivation. Technology Agribusiness Guidance and Training. Ciputri.
[8] Silvia Yusuf, E and Suhardi, 2013. The effect of varieties, defoliation, and fungicide application against rust (puccinia horiana p. henn.) intencity on chrysanthemum (Dendranthema grandiflora Tzvelev). AGRIC Vol.25, No. 1, December 2013: 19-25
[9] Puspitasari, Ita, 2009. Cultivation of cut chrysanthemum flowers (chrysanthemum sp.) in the farmer group udi makmur wonokerso, hargobinangun, pakem, sleman. Agribusiness, Horticulture and Landscaping Architecture Study Program, Universitas Sebelas Maret Surakarta. https://eprints.uns.ac.id/8584/1/79622107200903501.pdf
[10] Laksmita, Puspa Pearl Devi, 2021. Effect of Paklobutrazol Concentration and Disbudding Time on Growth and Flowering of Potted Chrysanthemum (Chrysanthemum sp.). Undergraduate thesis, UPN "Veteran" East Java.
[11] Hanafiah, K.A. 2001.Experiment Design, Theory & Application. PT. King Grafindo
[12] Harsojuwono, B. A, I Wayan Arnata and G.A.K. Diah Puspawati, 2018. Experiment Design, Theory, SPSS and Excel Applications. Cross words.
[13] Balithi, 2018. Technical Guide to the cultivation of cut flower chrysanthemums. http://balithi.litbang.pertanian.go.id/berita-394-panduan-teknis-budidaya-krisan-bunga-potong.html
[14] Ornamental Plant Research Institute, 2006. Chrysanthemum Production Technology. Horticultural Research and Development Center of the Agricultural Research and Development Agency.
[15] Rukmana, HR. 1997. Chrysanthemum. Canisius Publishers. Yogyakarta.
[16] BPP, 2015. Chrysanthemum cultivation technique. Agricultural Training Center, Lembang. http://www.bbpp-lembang.info/index.php/teknis-budidaya-iut/897-teknis-budidaya-krisan
[17] Widyastuti, Titiek, 2018. Agribusiness Ornamental Plant Technology. CV. Mine, Yogyakarta. http://repository.upnjatim.ac.id/1861/6/5.PDF