

Growth Responses of Arben (*Rubus fraxinifolius* Poir.) Seedling to Various Planting Media

Respon Pertumbuhan Bibit Arben (*Rubus fraxinifolius* Poir.) pada Berberapa Jenis Media Tanam

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ABSTRACT. Study of the effects of various media on growth of Arben (*Rubus fraxinifolius* Poir.) seedlings through seed multiplication was carried out. This study was aimed to determine the effect of planting media on the growth of arben seedlings. The experiment used various media i.e. compost, sand + husk (1:1), compost + husk (1:1), compost + sand + husk (1:1:1). The study was arranged by completely randomized design with three replicates. The results showed that statistically almost of parameters were significant by Tukey test at 1% level. The best media of all of parameters was compost and the low result was showed by sand and husk media.

Keywords: Arben (*Rubus fraxinifolius* Poir.), planting media

ABSTRAK. Studi terkait pengaruh beberapa media tanam terhadap pertumbuhan bibit Arben (*Rubus fraxinifolius* Poir.) melalui perbanyakan biji telah dilakukan. Penelitian ini dilakukan untuk mengetahui pengaruh media tanam terhadap pertumbuhan bibit arben. Media tanam yang digunakan dalam percobaan ini terdiri atas kompos, pasir + sekam (1:1), kompos + sekam (1:1), dan kompos + pasir + sekam (1:1:1). Percobaan ini menggunakan rancangan acak lengkap dengan tiga ulangan. Hasil penelitian menunjukkan bahwa secara statistik terdapat perbedaan pada hampir semua parameter yang diamati dengan uji Tukey pada taraf 1%. Media terbaik untuk pertumbuhan bibit adalah kompos, dan media dengan komposisi pasir + sekam menunjukkan hasil pertumbuhan bibit yang rendah.

Kata kunci: Arben (*Rubus fraxinifolius* Poir.), media tanam

INTRODUCTION

Arben (*Rubus fraxinifolius* Poir.) is a fruit crop that belongs to Raspberry group (Fig 1). *R. fraxinifolius* belonging to the Subgenus *Malachobatus* is one of Raspberry which is spread in mountain forests of Indonesia. Kalkman (1993) reported that this type has a vast range of distribution in Indonesia such as Borneo, Java, Celebes, Moluccas, Bali and Lesser Sunda Islands, at an altitude of 0–2500 feet above sea level. *Rubus fraxinifolius* have characteristics of shrubs, erect, thorny stems bald, red fruit, leaves compound, generally 5-9 multiplied, length leaves 4 to 16 cm and width of 2 to 7 cm (van Steenis, 1972; Surya, 2009). Inflorescences usually terminal, cymose panicles, to 14 cm; rachis, pedicels, and bracts often glabrous; bracts lanceolate to oblong, divided at apex. Pedicel 1–3 cm. Sepals triangular-ovate, 6–10 mm, abaxially glabrous except margin tomentose, apex narrowly acute. Petals white,

orbicular, 7–12 mm, glabrous. Stamens and pistils many, glabrous. Aggregate fruit red at maturity (Kalkman, 1993).

Currently, cultivation of arben in Indonesia is very low. It is caused by the lack of information related to the plant propagation and cultivation. Besides, there are very rarely studies and also publication on this crop. Although most of researcher has been done some parts in this area, but there is not sufficient knowledge about this crop in Indonesia. Cibodas is one of the central of production arben, but so far the fruit was obtained from plants which growing wild in the surround of Cibodas area. To support the development of Arben, we needs to do various research activities relate to plant propagation and cultivation.

Seedling is a young plant, that grown from a seed. This is one of the early activities of cultivation and

some of the publications reported that planting media were influence to seedling growth (Ozenc and Ozenc, 2007; Gulcu *et al.*, 2010; Hassanein, 2010). The development of seedling was started with germination of the seed. The quality of seedling obtained from nursery influences re-establishment in the field and the eventual productivity (Baiyeri and Mbah, 2006). Therefore, it is necessary to do research about planting media on the seedlings of arben.

In this study, four planting media with different composition were evaluated. The aim of this study was to find the best media and also to determine the effect of planting media on the growth of arben seedlings.

MATERIALS AND METHODS

The experiment was conducted in the greenhouse of Cibodas Botanical Garden. The planting materials came from seeds of arben, which grow in Cibodas Botanical Garden.

Seed, which is obtained from the fruit of arben was cleaned from the pulp. And then, it was dried and germinated in petridish that was given wet tissue. After germinated, the germination was transplanted to the pots that was consisted the media husk and compost (2:1), and then shield by transparent plastic. Seedlings that had been growth normal and has three or four leaves, was used for this experiment.

The experiment was conducted using a completely randomized design with three replicates. The treatment had four planting media, i.e.: compost, sand + husk (1:1), compost + husk (1:1), and compost + sand + husk (1:1:1). The observed growth parameters including plant height, leaf numbers, stem diameter, leaf length, leaf width, root length, number of shoots, wet weight of plants and dry weight of plants. All the parameters were observed until 18 weeks after planted. The data were analyzed using ANOVA ($\alpha = 5\%$), and the differences among the treatment was tested using tukey test ($\alpha = 1\%$ and 5%) (Gomez and Gomez, 1995).

RESULTS AND DISCUSSION

Statistically, study of the effects of various media plant on the growth of arben show that, almost of parameter observed was significantly on 5% and 1% level. Although, there were a few parameter that observed was not significant, such as leaf numbers, leaf length, leaf width, and root length (Table 1).

Plant Height. Plant height of arben seedling was affected significantly by planting media. At 12 week after planted, the best response was given by compost media (3,56 b). However, at 18 week after planted, the combination of sand + husk + compost media (39,55 b) was giving a better response than the others media, but statistically it was not different with a compost media (33,63 b).

Leaf Parameters. Leaf is one of morphological character which is influenced by plant media and also easy to be observed. This experiment used three parameters of leaf i.e. leaf number, leaf length, and leaf width. The results showed that media plant has no effect on leaf number and leaf length at 5 weeks after planted, but it was affecting to the leaf width. Generally, at 18 weeks after planted the result shows that compost was the best media on all of leaf parameters.

Stem Diameter. Steam diameter showed that at 12 weeks after planted, the combination of sand + husk + compost media gave better response than the others media. At 18 weeks after planted, the high value of diameter was showed by the combination of compost + husk media (3,70 b), but it was not significant compared to compost media (3,69 b).

Bud Number. The results showed that compost media gave the best response to the bud numbers of arben at 12 and 18 weeks after planted. It was seen at 18 week after planted that seedling planted in compost media has 4 numbers of bud per plant. In the other hands, seedling that was planted in the combination media (sand + husk + compost) did not produce the bud.

Root Length. The combination of compost + husk media (43,75) has longer root than the others, such as combination of sand + husk + compost (38,23), combination of sand + husk (37,46) and compost media (33,28). This result was interesting, because generally plant that grown in the compost media has longer root. Surya and Rahman (2011) reported that root length of *Rubus pyrifolius*, planted in compost media, was longer than the others. Although, the combination of compost + husk media was higher than the others, but statistically the differences were not significant from those planting media. Moreover, root was sensitive to variations of inorganic nutrient in the soil (Forde and Lorenzo, 2001). The ability of plants to respond appropriately to nutrient availability is important for their adaptation to the environment. Nutrients are giving signals trigger molecular mechanisms that modify cell division and cell differentiation processes within the root and have a profound impact on the development of root architecture system, such as root-hair formation,

primary root growth and lateral root formation (López-Bucio *et al.*, 2003).

Weight of Plant. Weight of plant was divided into two parameters, i.e. wet and dry weight of plant. This experiment showed that average of wet weight was between 6,25–22,58 g and dry weight were between 0,83–2,71 g (Table 1). These characters also showed that plant growth in compost media has more weight than the others. The highest wet weight showed on compost media (22,58 g), and followed with dry weight of plant (2,71 g) in the same media.

Planting media was one of factors that influence the growth of plant. Al Menaie, *et al.* (2008) reported that the optimum soil medium should have a right combination of moisture, drainage and organic matter content for vegetative and reproductive plant growth. In the other hand, Hartman *et al.* (2002) said that the media used for plant propagation has several requirement such as firm and dense, capacity to hold water, quite porous, free of disease, high CEC (cation exchange capacity), and low salinity. Seedling of arben gave different response to the various media plant. Compost was the best media to growing the seedling of arben and followed by combination media compost + husk (Fig. 2). The result was similar with Surya and Rahman (2011) that also reported compost as the best media to growth the seedling of *Rubus pyrifolius*.

CONCLUSIONS

Planting media had a significant effect on the seedling growth of arben. As far as the various media are concerned, compost provided the best media to growing arben seedling, even though no different results in the root growth.

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Figure 1. Arben (*Rubus fraxinifolius* Poir.) (A: flowers; B: fruits)



Figure 2. Growth of *Rubus fraxinifolius* Poir. seedling in various media (A: sand+husk; B: compost+husk; C: compost and D: sand+husk+compost)

Table 1. Effect of planting media on vegetative growth of Arben (*Rubus fraxinifolius*) seedling

No.	Parameters	Planting Media				sig.
		sand + husk	compost + husk	compost	sand + husk + compost	
1.	Plant height (cm)					
	a. age 12 wap	0,96 a	2,08 a	3,56 b	1,60 a	**
	b. age 18 wap	3,59 a	13,46 a	33,63 b	39,55 b	**
2.	Leaf number					
	a. age 5 wap	3,27	4,88	4,36	4,83	ns
	b. age 12 wap	4,89 a	8,38 ab	11,45 b	7,33 a	**
	c. age 18 wap	5,14 a	10,63 b	17,18 c	7,50 ab	**
3.	Leaf length (cm)					
	a. age 5 wap	5,19	6,88	9,02	8,13	ns
	b. age 12 wap	10,14 a	14,20	16,63 b	16,45 ab	*
	c. age 18 wap	12,34 a	23,38 b	25,07 b	16,57 a	**
4.	Leaf width (cm)					
	a. age 5 wap	2,45 a	3,66 ab	4,41 b	4,03 ab	**
	b. age 12 wap	4,84	7,05	6,85	6,98	ns
	c. age 18 wap	5,63 a	9,88 bc	11,91 c	7,68 ab	**
5.	Stem diameter (mm)					
	a. age 12 wap	2,15 a	2,98 ab	2,94 ab	3,16 b	*
	b. age 18 wap	2,60 a	3,70 b	3,69 b	3,30 ab	**
6.	Bud number					
	a. age 12 wap	0 a	0,75 ab	1,55 b	0 a	**
	b. age 18 wap	0,18 a	1,25 a	4,00 b	0 a	**
7.	Root length (cm)	37,46	43,75	33,28	38,23	ns
8.	Wet weight of plant (g)	6,25 a	19,17 b	22,58 b	8,79 a	**
9.	Dry weight of plant (g)	0,83 a	2,14 bc	2,71 c	1,15 ab	**

Remarks: ns = not significant; sig. = significant; * = significant on $p < 0,05$; ** significant on $p < 0,01$; wap = weeks after planting; numbers followed by same letters in the same row indicated no significant difference according to 5 % Tukey test.