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Influence of planting mediums on growth of *Ficus carica*

Nik Nadira Nazua Nik Rusmadi, Rozilawati Shahari*, Che Nurul Aini Che Amri, Nur Shuhada Tajudin

Department of Plant Science, Kulliyyah of Science, International Islamic University, Malaysia

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Abstract

Ficus carica or locally known as fig is a species belonging to the Moraceae family. It is native to the Middle East and Western Asia but has been reported to have been cultivated in Malaysia. Information on the agronomic requirements of this species is still lacking at present. Thus, this field trial was conducted to study the growth and yield of *F. carica* as affected by different planting mediums. *Ficus carica* cv. BTM6 two months old seedling and *Ficus carica* cv. TGF was grown in the Glass House and Nursery Complex at the International Islamic University Malaysia. Four different combinations of coco peat, peat moss, topsoil and sand were used as a growing medium. The potted plant was arranged in a split-plot design with five replications. Growth and yield parameters such as plant height, number of leaves, number of branches, number of fruits and fruit weight have been recorded. The data was statistically analysed using the SAS version 9.2 package and the means were separated by the Duncan New Multiple Range Test (DNMRT) at ρ = 0.05. Based on this study, the combination of 25% sand: 25% topsoil: 25% peat moss: 25% coco peat (M1) gives both *F. carica* cv. BTM6 and *F. carica* cv. TGF better growth and yield. This study also concluded that the use of peat moss as one of the growing medium mixtures increases the growth and yield of *F. carica* varieties.

* **Corresponding Author:** Rozilawati Shahari ✉ firdawila@iium.edu.my

Introduction

Ficus carica, or locally known as "Fig" or "Tin," is one of the species belonging to the Moraceae family. According to the Weeds of Australia (2017), *F. carica* is a native of Northern Africa, Southern Europe, Western Asia and Northern Pakistan. There is proof that *F. carica* has been widely cultivated for agriculture since 11,000 years ago (Khatib & Vaya, 2010). Statistics show that fig is one of the fruits that attracts attention in 2015 with more than 300,600 million tons of total world production (Polat, 2017). Turkey is the largest producer of *Ficus* (Aydin & Kaptan, 2015), followed by Egypt (16%), Algeria (13%), Iran (7%), Morocco (6%), the Syrian Arab Republic (4%), the United States (3%) and Brazil (3%) (FAOSTAT, 2017).

The demand for fruit is increasing due to the consumer interest in fruit due to the content of micronutrients such as anthocyanin, pigment, flavonoid and other phenolic compounds (Mawa *et al.*, 2013). Among the more than a hundred varieties introduced in Malaysia, *F. carica* cv. BTM6, *F. carica* cv. TGF and *F. carica* cv. Alma are famous varieties due to its high survival and easy production of yields. Currently, the market price of fig fruit in Malaysia is RM 80 to RM 200 per kilogram and depends on the type of variety (Kamarubahrin *et al.*, 2019). Due to the high demand for seedlings and the price of their fruit, Fig is likely to become one of the most important crops in Malaysia.

Morphologically, the plant can range from 9m to 30m in height depending on its species and varieties. It has an acute to obtuse shape, dark green in the colour of the leaf. It is 3 made up of a shallow and taproot system. *F. carica* is made up of male and two types of female flowers. The female flower is long-shaped, adapted to the production of seeds and short-shaped flowers, which act as an oviposition site for the pollination of the wasp.

Fruit from *F. carica* has been widely consumed as jammed and the leaves have been processed as a tea that can help with weight loss (Mars *et al.*, 2008). On the other hand, fig has a high nutritional value that can cure disease (Kumar *et al.*, 2015; Paknahad & Sharafi, 2015). Root, fruit and leaves part of the fig are widely used as traditional medicines to treat diarrhea, indigestion, cough, sore throat, and cardiovascular disorders (Duke *et al.*, 2002). *F. carica* also reported high levels of antioxidant compounds due to high levels of oxidant compounds such as anthocyanins, flavanoids, phenols, alleloids and triterpenes (Shukranul *et al.*, 2013).

F. carica was cultivated in a dry and sunny area with good aerated soil (Lansky & Paavilainen, 2010). In addition, it is suitable for cultivation in a region with full sunlight and various well-drained soils (Bealmer – Jones, 2014). The plant can survive the drought season and is widely planted in the Middle Eastern climate. According to Mathowa *et al.* (2014), the use of different combinations of planting mediums is one of the factors that influence the quality and quantity of nutritional value of *Ficus* fruit.

In order to obtain crops of the desired quality, it is necessary to manipulate agronomic factors such as the planting medium used. Appropriate planting mediums can enhance root formation and increase growth and yield. Besides that, one alternative to obtaining high-quality cuttings can be the composition of growing medium for plant propagation (Sudarjat, 2018). Thus, this study was conducted to investigate the effect of planting medium on growth of *Ficus carica* cv. BTM6 and *Ficus carica* cv. TGF.

Materials and methods

Experimental site, treatment and layout

An experiment was conducted at Glass House and Nursery Complex, International Islamic university Malaysia from January 2017 until October 2017.

The 2 months old seedling of *F. carica* cv. BTM6 (V1) and *F.carica* cv. TGF (V2) were used as planting material. Planting media used were combination of 25% peat moss: 25% coco peat: 25% sand: 25% topsoil (M1), 25% sand: 50% peat moss: 25% topsoil (M2), 25% sand: 50% coco peat: 25% topsoil (M3),

100% topsoil (M4). Plant were grown in polybag with size 20 x 20-inches.

The experiment was outlined in a split plot design with 5 replications where type of growing medium and *F.carica* varieties were assigned as main plot and sub plot, respectively. Plants were watered twice a day and organic fertiliser (15 grams/polybag) was applied every two weeks.

Data collection

Data such as plant height (PHT), number of leaves (NOL), number of branches (NOB), number of fruit (NOF), and weight of fruit (WOF) were recorded at harvesting time.

Data Analysis

Data was analysed using SAS version 9.4 and the mean was compared with Duncan's Multiple Range Test (DNMRT) at ρ = 0.05.

Result and discussion

The results showed that the planting medium had a significant effect on all parameters measured (Table 1).

Plant Height

Based on the study, *F. carica* cv. BTM6 and *F.carica* cv.TGF recorded highest plant height (101.10cm and 96.36cm) when grown in soil combination of 25% coco peat: 25% peat moss: 25% topsoil: 25% (Table 1). In line with the findings of this study, the presence of peat moss promotes the height of the plants of both varieties. It is because most of the peat in the growing medium will act as a source of nutrient to increase plant growth and yield (Olle *et al.*, 2012). In addition, the presence of topsoil and sand helps to prevent water from clogging in the medium used (Grubinger, 2012).

Table 1. Growth performance of *Ficus carica* as affected by the different. planting medium

Treatments (Medium: Variety)	Plant height (cm)	Leaves Number	Branches Number	Fruit Number	Fruit weight (g)
M1V1	101.10a	98.0^{a}	6.0^{a}	3.0^{a}	36.97^{a}
M1V2	96.36a	89.0^{a}	3.4^{b}	2.0^{a}	21.38^{a}
M2V1	75.14b	62.0^{b}	4.0^{b}	3.0^{a}	39.98^{a}
M2V2	74.84b	55.0^{b}	4.0^{b}	3.0^{a}	28.94^{a}
M3V1	49.30c	40.0^{c}	4.0^{b}	0.0^{b}	0.0^{b}
M3V2	48.58c	40.0^{c}	4.0^{b}	0.0^{b}	0.0^{b}
M4V1	71.06b	39.0^{c}	3.0^{b}	2.0^{a}	30.73^{a}
M4V2	74.92b	42.0^{c}	3.0^{b}	3.0^{a}	28.56^{a}

Note. Means followed by the same letter within a row are not significantly different at p = 0.05 by Duncan's New Multiple Range Test (DNMRT) test; M1 = 25% coco peat: 25% peat moss: 25% topsoil: 25% sand, M2 = 25% topsoil: 50% peat moss: 25% Sand, M3 = 25% topsoil: 50% coco peat: 25% sand, M4 = 100% Topsoil, V1 = Brown Turkey Masui (BTM6), V2 = Taiwan Golden Fig (TGF).

According to Chou *et al.* (2005), the growth of Chrysanthemum in the potting medium, consisting of peat moss and sandy soil, resulted in the highest percentage of plant growth compared to that planted in the fly ash. The growth of *Molineria rubriclavata* increased when it was grown in a medium consisting of 60% of peat moss (Shahari *et al.*, 2016). It was supported by a study conducted by Mehmood *et al.* (2013) that the use of peat moss as a planting medium had a positive effect on the plant and height of Floral shower (*Antirrhum majus* L.) compared to the use of leaf mould and farmyard manure.

Leaves

Besides, plant grown in media consisting of the combination of 25% topsoil: 25% peat moss: 25% coco peat: 25% sand (M1) gives the highest performance of leaves number for both *F. carica* cv. BTM6 (V1) and *F. carica* cv. TGF (V2) with 98.0 and 89.0 respectively (Table 4.10). There were significant differences in treatment with and without the presence of peat moss. The study showed that the combination of 25% topsoil: 50% coco peat: 25% sand (M3) and 100% topsoil (M4) yields the lowest number of leaves in the range of 39 to 42 per plant. According to King *et al.* (1997), the increase in plant height also increases the efficiency of the number of leaves in both the above-ground production. The result of this

study shows that the increase in plant height also increases the number of leaves (NOL) and the number of branches (NOB). According to Zotz *et al.* (2002), an increase in the number of leaves can increase physiological parameters such as photosynthesis and leave water potential.

This is important because the leaves were part of the process of photosynthesis and transpiration for the whole plant (Holding & Streich, 2013).

Branches

It was found that, the combination of 25% coco peat: 25% peat moss: 25% sand: 25% topsoil grown in *F. carica* cv. BTM6 (M1V1) shows the highest number of branches compared to other treatments with 6 branches per plant. The study by Okunlola & Akinpetide (2016) showed that the maximum number of branches recorded on *Ficus benjamina* was due to the high organic content of the medium which releases essential nutrients for plant development. In addition, the number of runners per plant was highest when grown in peat medium (Sezai *et al.*, 2015). The yield of different vegetables tends to be higher for plants grown in different growing media than those grown in the soil, indicating that the growing media could meet plant requirements better than the soil (Olle *et al.*, 2012).

Fruit

The number of fruits of both varieties ranges from 2-3 fruits per plant when grown in M1, M2 and M3. However, no fruit is produced in the M4 media (100% of topsoil). In term of fruit weight, *F. carica* cv. BTM6 and *F. carica* cv. TGF recorded the highest yield (39.98g and 28.94g) when grown in M2 (25% topsoil: 50% peat moss: 25% sand). A study by Tehranifar *et al.* (2007) reported that the production of strawberry fruit was slow when the media consisted of 40% coco peat and 60% perlite. Based on the findings of the previous study, peat growing media may be advised to improve the quality and yield of pepper cultivars (Fatma, 2013). It is also comparable to another study in which the 461 Chilli variety was able to produce the highest number of fruit and all physical fruit qualities when grown conventionally in peat soil (Hanifah *et al.*, 2016).

According to (Schmilewski, 2009), a combination of different growing mediums was used in the production of vegetables.

In order to achieve optimum growth, the right balance of air and water holding capacity is essential for the plants to be grown as well as the long-term stability of the medium (Bilderback *et al.*, and Nair *et al.*, as cited in Olle *et al.*, 2012).

Conclusion

In the present study, peat moss was recognised as one of the important planting medium mixtures for *Ficus carica* cv. BTM6 and *Ficus carica* cv. TGF. Thus, the combination of peat moss with topsoil, cocopeat and sand increases the growth and yield of both varieties.

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