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THE PRUNING ON MANGO (*Mangifera indica* L.)

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ABSTRACT

The research was conducted at Sumani Experimental Farm, Indonesian Tropical Fruit Research Institute, Solok, West Sumatera in June 2010. The grafting of mango seedlings (cv. Bengkulu) was as a treatment and rootstock (cv. Bengkulu) was as a control. The grafting of mango seedlings were pruned about 10 cm above the grafting area and the rootstock seedlings were cut 30 cm above soil surface. The parameters were observed include: shoots emergence time, shoots number, biomass percentage, leaf length and leaf width. Observations were carried out once a week. Data were analyzed using paired t test. Based on the results and observation, it was found that treatment had not significant effect to all parameters.

Keywords: mango, pruning, shoots.

INTRODUCTION

Mango is an important seasonal tropical fruits, rich in vitamin A (1, 000 IU/100 g) and C (20 mg/100 g). However, the mango crop was still not much studied. The big difference between cultivars and production areas in tropical and subtropical areas causing difficulty in making generalizations crop phenology, fertilization, nutrient needs, crop protection and others (Verheij, *et al*., 1992).

The productivity is low because of low soil fertility, lack of sunlight, unsuitable climate, dominant vegetative growth and excessively ground water (succulent). Lack of sunlight can affect to flower inhibition. Lack of sunlight causes the dense growth of trees and branches and twigs too tight, so the interest does not arise (Notodimedjo, 1997).

Pruning is a series of cut branches/twigs plants in the framework to the canopy formation (cut forms), plants rejuvenation (pruning rejuvenation), or plant maintenance (pruning maintenance). By cutting, the plant canopy will form a pattern of 1-3-9-27, which is 1 main stem, 3 primary branches, 9 firstly tertiary branches and 27 secondary tertiary branches. According to Purnomo *et al.* (1996) formation of mango crop canopy is significantly determine the production, including to the fruit quality. But in general, farmers do not apply the canopy pruning to mango so that the canopy formation is less regular and low productivity. According to Ginting *et al.* (2008) early pruning to canopy formation is intended to spur the growth of vegetative shoots are dormant so that shoots grow a lot and easy to set up a canopy. Davenport (2006) said that three pruning strategies have been developed to prevent the trees from getting large through annual pruning as part of a flowering management program, reshape intermediate sized trees to be smaller, more manageable sizes and completely rejuvenate large trees that are no longer productive due to their size and height.

In addition to fertilizing, pruning can also stimulate the flower formation. Pruning can increase the leaf buds formation by 78% and the flower buds number of 31% (Hidayat, 2005).

The purpose of this study was to compare the growth speed of mango shoots after pruning on grafting seedling and rootstock.

MATERIALS AND METHODS

This research was conducted at Sumani Experimental Farm, Indonesian Tropical Fruit Research Institute, Solok, West Sumatera in June 2010. The grafting of mango seedling (cv. Bengkulu) was as a treatment and rootstock (cv. Bengkulu) was as a control. The seedlings were 2.5 years old.

For the treatment, mango seedlings were pruned about 10 cm above the grafting area and for control seedlings were cut 30 cm above the soil surface. The parameters were observed included: shoots emergence time, shoots number, biomass percentage, leaf length and leaf width. Observations were carried out once a week. Data were analyzed by using paired t test.

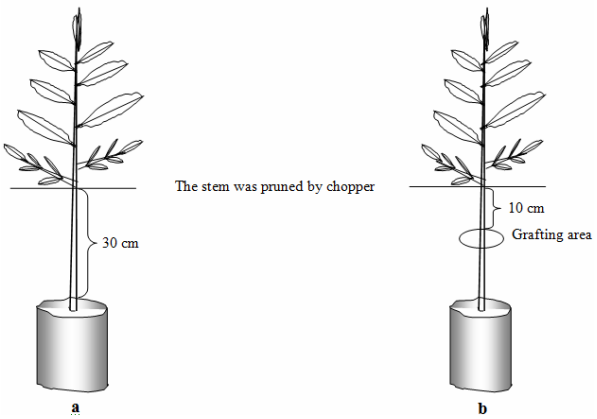

Figure-1. Illustration of pruning method (a) Pruning on rootstock (b) Pruning on grafting seedling.

RESULTS AND DISCUSSIONS

Means value of shoots emergence time, shoots number and biomass percentage are presented in Table-1.

Table-1. Pruning response on emergence time shoots number and biomass percentage.

Pruning treatments	Observation Variabel		
	Shoots emergence time (day)	**Shoots number** (shoots)	**Biomass percentage** (%)
Rootstock (control)	7.47 ns	15.36 ns	27.8 ns
Grafting seedling	7.26 ns	12.74 ns	26.17 ns

ns = not significant

The t test analyze that there is not significant different effects on shoots emergence time, shoots number, and biomass percentage. The rootstock or grafting seedlings have ability to shoots emergence. It is not matter whether the plants result of grafting or rootstock. Pruning can prove that it has useful to growth of plant. This can increase the supply of available nitrogen and other essential elements to the growing points which remains and it can stimulate the vegetative phase and retards the reproductive phase (Edmond *et al*., 1987).

The branch cutting of the mango will bring up several shoots in the period of the next flush. Pruning aims to form a canopy through a reduction in bud. According to Daventport (2006), the purpose of shape pruning is to reduce the dimensions of the canopy in trees that are becoming overcrowded or to make it more convenient for tip pruning as part of the flowering management program. This type of prune requires cutting branches ranging in size from 2 - 10 cm in diameter depending upon the original size of the trees. The depth of prune into the canopy must be at least one meter inside the final desired dimensions in order to allow for re-growth of the canopy.

Shoots emergence until flowering takes a relatively long time. Even some of the mango plant shoots in the following year did not have flush (new shoots) so that low productivity (Notodimedjo, 1997). Trimming is done by pruning mango branches to stimulate the formation of vegetative shoots branching-generative so that the field is more spacious and allow for increased production (Hidayat, 2005). According to Purbiati and Yuniastuti (1992) pruning type effect on mango showed that pruning a flush just at internude gives the shoots number and the highest number of fruits per branch. Nuraini (2008) told that the aim pruning to control plant growth in order to form a plants canopy into an oval, which in turn the harvest facilitate and spur greater development of lateral branches. Estrada *et al.* (2005) In addition, pruning has an important effect on the trees physiology and on their growing patterns and yield; therefore equilibrium between sanitary requirements and minimal growth disturbance has to be found.

Pruning is significantly increased number of new developed flushes (Sahaban, 2009), pruning of Alphonso mango trees in February resulted in immediate production of vegetative growth (Kulkarni, 1983), removing the mango apical buds by pruning stimulated shoots initiation from auxiliary buds (Nunez-Elisea *et al.*, 1996).

Extension growth flushes of mango trees are evident in branches from the terminal stems down through scaffold limbs to the graft union. Each flush of vegetative growth is characterized by long internodes that gradually become close together forming a cluster of buds at the each flush termination. The growth record of these flushes in branches has been described as intercalary units and the leaves cluster and buds at the terminus of each intercalary unit as intercalation numbered from the stem terminus (Davenport and Nunez-Elisea, 1997).

Mango plants pruning at one shoots (flush) right at its internude can be stimulating the new shoots growth at spy shoots around of internude (Hidayat, 2005). This is consistent with the statement of Kusumo (1989), on the internude found many knots that are ready to form shoots so that the pruning produces the number of shoots that emerged more. The pruning principle is to stimulate the vegetative and generative buds formation so that a wider field of branching thereby increasing the mango plants productivity.

Mango trees generally begin commercial production in three to four years after planting and continue to produce increasing yields as canopies enlarge until shading by adjacent trees forces the growth upwards and out of reach of harvesters. Lower branches supporting previous year's productive stems die back due to shading by higher branches. Flowering and fruits production in mango occurs on stem terminals; therefore, as canopy size increases, production moves to the top as competition for available light continues (Davenport, 2006).

Tabel-2. Pruning response on leave length and leave width.

Pruning treatments	Treatment Variabel	
	Leaf length (cm)	**Leaf width** (cm)
Rootstock (control)	13.21 ns	4.25 ns
Grafting seedling	12.34 ns	4.39 ns

ns = not significant

Table-2 showed that the treatment was not significantly different on the leaf length and leaf width. On this basis, it can be concluded that the length and width of leaf after pruning was not influenced by the seed crop type. According to Ermayasari (2010), pruning aims to

obtain an optimum leaf area index, which support the optimum achievement so that the maximum production.

CONCLUSIONS

The t test analysis showed that shoots emergence time, shoots number, biomass percentage, leaf length and leaf width was not significantly different between the rootstock with grafting seedlings of mango.

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