

The Effort To Increase Production of Super Red Dragon Fruit (*Hylocereus costaricensis*) By Artificial Pollination

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Abstract — This study aims to increase production of super red dragon fruit (*Hylocereus costaricensis*) by artificial pollination. The study was conducted from January to April 2016 at dragon fruit plantation located in Sleman, Yogyakarta, Indonesia. The research was done on two groups of artificial pollination. Those were P0, P1, and P2. P1 was a group of the pollen derived from white dragon fruit (*Hylocereus undatus*), P2 was a group of the pollen derived from red dragon fruit (*Hylocereus polyrhizus*), and P0 was a group of super red dragon fruit natural pollination as control. Artificial pollination of fruit set was done by tapping pollen on the stigma of super red dragon fruit flowers receptive. The results showed that artificial pollination with white dragon fruit pollen or red dragon fruit pollen can increase the weight of super red dragon fruit production 11% larger than the weight of super red dragon fruit production on natural pollination.

Keywords — Super red dragon fruit, red dragon fruit, white dragon fruit, artificial pollination.

INTRODUCTION

Dragon fruit or Pitaya (*Hylocereus spp*) originated from South America, but is now grown in Southeast Asia as Malaysia, Thailand, Taiwan, Philippines, particularly in Viet Nam. Dragon Fruit is a perennial, epiphytic, climbing cactus with triangular, fleshy, jointed green stems [1]. There are many clones which can differ in stem type, colour, fruit shape, skin thickness and scale expression. There are however two different species, *Hylocereus undatus* which has red-skinned fruit with white flesh and *Hylocereus polyrhizus* which has red-skinned fruit with red flesh. The blooming of Pitaya flowers is affected by temperature and light intensity. Flowering of *Hylocereus spp* was seasonal and occurred from April to November with 4-7 cycles per year [2]. Fruits can be harvested 30 days after fruit set. Red-flesh dragon fruit contains betacyanin which can be developed into beauty and health products and food natural colourants as its flesh and hence reduce the food wastage [3]. It also contains vitamin C. The higher vitamin C content was found from super red dragon fruit from Pasuruan [4]. The flowers are hermaphroditic, however, some Pitaya species and cultivars are self incompatible. The extremely showy, edible, white (pink in other species) flowers are very large, very fragrant, nocturnal, bell shaped and may be 14 inches (36 cm) long and 9 inches wide (23 cm). The stamens and lobed stigmas are cream colored [5]. The hermaphroditic blooms remain open for one night only, bees are not efficient pollinator of *Hylocereus sp.* Flower. All species inter-pollinate with each other. Hand pollination is required with self incompatible varieties to ensure proper fruit set and weight. The anthers and stigma red dragon fruit and white dragon fruit are at the same height in these flowers and touch as the flower closes. Super red dragon fruit found the anthers and stigma were separated. This may be the reason why super red dragon fruit was not autogamous. Hand pollination is required for super red dragon fruit to increase production. This study aims to increase production of super red dragon fruit (*Hylocereus costaricensis*) by artificial pollination.

MATERIALS AND METHODS

The research was done on two groups of artificial pollination. Those were P0, P1, and P2. P1 was a group of the pollen derived from white dragon fruit (*Hylocereus undatus*), P2 was a group of the pollen derived from red dragon fruit (*Hylocereus polyrhizus*), and P0 was a group of super red dragon fruit natural pollination as control. Artificial pollination of fruit set was done by removing anthers from one flower and touching them to the stigma of another or collecting the pollen and using a brush to pollinate multiple flowers on the stigma of super red dragon fruit flowers receptive (Fig 1), and natural pollination was done without interfering action from experimenters. The observed variables are fruit wide, fruit length and fruit weight.

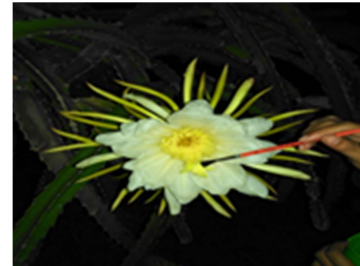


Fig 1. Artificial pollination

RESULTS AND DISCUSSION

The result showed weight super red dragon fruit with artificial pollination was higher than natural pollination (Fig 2).



Fig 2. The fruit result from artificial pollination (left) and natural pollination (right)

The average weight super red dragon fruit pollinated with pollen from the red dragon fruit (782,14 gram) is higher than pollen of white dragon fruit (705,71 gram). Artificial pollination in self-incompatible varieties increase fruit set and fruit weight [6]. Fruit weight is positively correlated with the number of viable seeds [7].

The average fruit weight were recorded in Table 1

Source of Pollen	The Average of fruit weight
Po=natural pollination	212,50 c
P1=Pollen derived from White Dragon Fruit	705,71 b
P2=Pollen derived from Red Dragon Fruit	782,14 a

Mean followed by the same letter within each column are not statistically different by DMRT at significant level 5%

The data analysis of fruit wide can be seen in Table 2.

Source of Pollen	The Average of fruit wide
Po=natural pollination	6,07 b
P1=Pollen derived from White Dragon Fruit	8,85 a
P2=Pollen derived from Red Dragon Fruit	9,07 a

Mean followed by the same letter within each column are not statistically different by DMRT at significant level 5%

The Table 2 showed wide super red dragon fruit with artificial pollination was higher than natural pollination. Artificial pollination with pollen from the white dragon fruit result fruit wide not significantly different from pollen sources of the red dragon fruit.

The Data analysis of fruit length can be seen in Table 3

Table 3. Response pollination on fruit length

Source of Pollen	The Average of fruit weight
Po=natural pollination	6,16 b
P1=Pollen derived from White Dragon Fruit	10,87 a
P2=Pollen derived from Red Dragon Fruit	10,91 a

Mean followed by the same letter within each column are not statistically different by DMRT at significant level 5%

Table 3 showed length of super red dragon fruit with artificial pollination was higher than natural pollination. Artificial pollination with pollen from the white dragon fruit result fruit length not significantly different from pollen sources of the red dragon fruit.

CONCLUSIONS

This research showed artificial pollination can be increase Fruit weight, fruit wide and fruit length super red dragon fruit. Artificial pollination with pollen source from red dragon fruit higher than pollen source from white dragon fruit. The average weight super red dragon fruit pollinated with pollen from the red dragon fruit (782,14 gram) and pollen from white dragon fruit (705,71 gram).

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