Effects of First and Second Flower Stamps on Growth and Production of Hybrid Pepper (*Capsicum annuum* L) Mace Varieties

Endro Puji Astoko^{1,*}

¹ Department of Agribusiness, Faculty of Agriculture, Islamic University of Kadiri;

* Correspondence: pujiastoko@yahoo.com; Tel.: +62-821-4136-4888

Received: 15 August 2019; Accepted: 25 August 2019; Published: 30 September 2019

Abstract: Chili is a shrub from the family of eggplant that has the scientific name *Capsicum sp.* The purpose of this study was to determine whether the first and second flower vines could stimulate vegetative growth of hybrid chili (*Capsicum annuum* L) varieties. Gada Experiment was carried out in Sumberurip Hamlet, Manggis Village, Ngancar District, Kediri Regency on dry land with Latosol soil type (sandy cane) and pH 6.0. The height of the place from sea level is around 450 above sea level, the average annual rainfall is 1,785 millimetres with 85 rainy days. The average temperature is 29°C and the type of climate is C3. The experiment was conducted from December 1, 2009 to February 30, 2010. The results of the study: the first and second flower flowering treatments in the hybrid red pepper variety of Gada significantly affected the fruit diameter and significantly affected the plant height at 70 days, the number of tertiary branches at the age of 70 days, fruit length, and number of fruits per plant and fruit weight. The highest production was achieved in the first and second flower treatment Z (P3), which is 16.6 grams per fruit which is equivalent to 25,853.17 kg/ha.

Keywords: Chili cultivation; Chili flower perempelan; Chili production

1. Introduction

Chili is a herbaceous plant of the family of eggplants that has the scientific name *Capsicum sp.* Chili originates from the American continent precisely in Peru and spreads to the countries of the Americas, Europe and Asia including Indonesia. Chili plants are many kinds and types of growth and shape of the fruit. It is estimated that there are 20 species, most of which live in their home countries. The general public only knows a few types, one of which is hybrid chili/large chili. Hot peppers are planted using plastic mulch after they are previously fertilized using manure, dolomite and chemical fertilizers. Plastic mulch is used to suppress pests, diseases and weeds. The chili planted must be given routine maintenance, replacing and installation of stake so that the plant does not collapse due to the wind. After that the shoots are done and the subsequent fertilization to add nutrients needed by plants. When the first and second flowers appear, they are carried out so that their vegetative growth is perfect.

Chilies are harvested at a minimum of 90% when cooked and are red. Chili is harvested in the morning because it still has optimal weight. Chili is harvested by including the stem, in this way will have a longer shelf life than those picked without a stem. Hybrid chili peppers can be harvested up to 30 times quotation with harvest time intervals every 2 to 3 days or depending on crop area and current market conditions.

Large chili has many nutritional and vitamin contents, they are among calories, protein, fat, carbohydrate, calcium, and vitamin A, B1 and C. Besides being used for household purposes, hybrid chili can also be used for industrial purposes including, the spice industry, the food industry, and the pharmaceutical or herbal medicine industry.

The increasing need for hybrid chili for both households and industry and in line with population growth and the development of processed industries, the opportunities for developing

hybrid chili agribusiness are very wide open in market share. Efforts to increase the production of hybrid chilies which at the same time increase farmers' incomes, can be carried out from cultivation to proper post harvest handling. One of the most important steps in improving cultivation techniques is the selection of hybrid chili varieties cultivated to select varieties that are high in production and resistant to pests and diseases. Besides that cultivation techniques also determine the level of production of hybrid chili. One technique that is able to increase production is pruning techniques on the first, second and third interest. Aside from being a appetite generator, chili with its spicy flavor has long been believed to be beneficial for health.

Based on the background described above, the purpose of this study is to find out whether the first and second flower vines can stimulate vegetative growth of hybrid chili (*Capsicum annum* L) varieties of Gada.

2. Research Methods

The experiment was carried out in Sumberurip Hamlet, Manggis Village, Ngancar Subdistrict, Kediri Regency on dry land with Latosol (sandy cane) soil type and pH 6.0. The height of the place from sea level is around 450 above sea level, the average annual rainfall is 1,785 millimeters with 85 rainy days. The average temperature is 29 ° C and the type of climate according to R. Oldeman is C3. The trial was conducted from 1 December 2009 to 30 February 2010.

The study was conducted with a non factorial experiment, using a randomized block design (RBD) consisting of 4 (four) treatments, each repeated 7 (seven) times, namely,

- P0: Without flower arrangements,
- Q1: The first flower stamps are done,
- P2: The second flower is done,
- Q3: First and second flower arrangements.

Of the four treatments there were 28 plots. The tools used in this research are hoes, ganclongs, knives, sickles, spray tanks, buckets, plastic jugs, planting holes, ruler, ruler, calipers, scales, litmus paper, kenteng rope, stationery, tweezers, peram paper, and tray. While the materials used are hybrid mace chilli seeds, fungicides (Dithane M-45), insecticides (agrimec), Curacron, camphor, seedling plastics, silver white plastic mulch (MPPP), grades, grades, agricultural lime, calcium, calcium inorganic fertilizers (Superphos, NPK Mutiara, KCL, ZA, Urea, Ponskha) and organic fertilizers in the form of bio composite.

3. Results and Discussion

The results of the analysis of variance showed that the treatment of flower stubs on red chilli plants did not significantly affect plant height at 55 days after planting. This is due to the time span between flower planning and the observation time is relatively short so that the effect on plant height has not been seen significantly. The plant height at the age of 70 days after the flower treatment is very significant.

Based on the 5% LSD test (**table 1**) it was seen that the highest plants (76.56 cm) were produced in the first flower treatment and the second flower (P3), and were significantly different from the other treatments. This is due to the treatment of flower stubbing done twice, namely the first flower when the plants are 30 days after planting and the second flower when the plants are aged 38-40 days after planting. The effect of the flowering is that the plant will concentrate more energy (from the results of the process of dismantling carbohydrates, proteins and fats) for vegetative growth at the beginning of its growth. In plants that are not stamped with flowers (P0) at the beginning of the growth energy the growth is split for vegetative growth and generative growth, so that vegetative growth is slower than other treatments. In plants with only the first flower (P1) and both (P2) plants the obstacles to vegetative growth are not as great as those

planted with the first flower and both. Harjadi (1992) said that plant flowers that appear when plants are still young should be discarded. Disposal of these flowers is intended so that vegetative growth of plants is not disturbed, so it is expected that plants will grow faster and will produce more productive branches.

Table 1. Average plant height (cm) at 70 days after planting

Treatment	The average number of tertiary branches is 70 Hst
P0	59.20 ^a
P1	75.00 ^b
P2	71.59 ^c
P3	76.56 ^d
$\alpha = 5\%$	0.93

Source: Primary data processed

Note: the numbers accompanied by the same letter in the same column show no significant difference in the LSD test of 5%

3.1. Number of Tertiary Branches

The results of the analysis of variance showed that the treatment of flower stubs on red chilli plants did not significantly affect the number of tertiary branches that formed when the plants were 55 days after planting. This is due to the time span between the flowering perempel with a relatively short observation time so that its effect on the number of tertiary branches formed has not been seen significantly. The number of tertiary branches when the plant is 70 days after planting flower treatment is very significant.

Table 2. The average number of tertiary branches 70 days after planting

Treatment	The average number of tertiary branches is 70 Hst
P0	16.49 ^a
P1	24.51 ^c
P2	22.56 ^b
P3	25.40 ^c
$\alpha = 5\%$	0.25

Source: Primary data processed

Note: the numbers accompanied by the same letter in the same column show no significant difference in the LSD test of 5%

The LSD test of 5% (table 2) on the average number of tertiary branches in plants shows that the plants that have the most tertiary branches are plants that are treated with the first flower and the second flower (P3) but not significantly different from the plants treated by the first flower patch only (P1), compared to other treatments, it was significantly different. This is due to the treatment of flowering done twice, namely the first flower when the plant is 30 days after planting and the second flower when the plant is 38-40 days after planting. The effect of the flowering is the plant which will concentrate its energy for vegetative growth at the beginning of its growth, thus affecting the number of tertiary branches formed. In plants that are not stamped flower (P0) at the beginning of the growth energy growth is split for vegetative growth and generative growth, so that vegetative growth is slower and the number of tertiary branches formed is less than other treatments. In plants that are only stamped with the first flower (P1), the sealing is done earlier where at that time the plant is actively growing, thus allowing the formation of more tertiary branches. Plants that are both flower-stamped (P2) alone inhibit the vegetative growth of plants not as much as those planted with the first flower and both of them and only the first flower-stamped, so that the number of tertiary branches formed is less.

3.2. Fruit Diameter

The results of the analysis of variance showed that the treatment of flower stamps on the red chili plant significantly affected the diameter of the fruit.

Table 3. Average fruit diameter (cm)

Treatment	Average diameter of fruit (cm)
P0	1.26 ^a
P1	1.33 ^c
P2	1.30 ^b
P3	1.32 ^b
$\alpha = 5\%$	0.02

Source: Primary data processed

Note: the numbers accompanied by the same letter in the same column show no significant difference in the LSD test of 5%

Based on the 5% LSD test (table 3), it was seen that the fruit with the largest diameter was produced in the first flower treatment (P1) treatment, and it was significantly different from the other treatments. This is due to the treatment of the early flowering, so that the vegetative growth of the plant is good. According to Prajnata (2002) good vegetative growth of chili plants will greatly determine the number of flowers and the size of the fruit produced. Flowers will become more numerous and the size of the fruit will be greater than the plants whose vegetative growth is disturbed.

In plants that are not stamped with flowers (P0) at the beginning of the growth energy growth is broken down for vegetative growth and regenerative growth, so that vegetative growth is slower than other treatments. In plants with the first flower (P1) and both (P2), the obstacle to vegetative growth is not as great as the plant with the first flower.

3.3. Fruit Length

The results of the analysis of variance showed that the treatment of flower stamps on the red chili plant significantly affected the fruit length.

Table 4. Average fruit length (cm)

Treatment	Average diameter of fruit (cm)
P0	13.65 ^a
P1	14.30 ^b
P2	14.32 ^b
P3	14.25 ^b

Source: Primary data processed

Note: the numbers accompanied by the same letter in the same column show no significant difference in the LSD test of 5%

Based on the 5% LSD test (table 4) it appears that the longest average fruit is produced in the treatment of the second flower (P2), but not significantly different from the treatments (P1) and (P3). This is due to the treatment when flowering is the right time, so that the energy reserves that are supposed to be for generative growth are concentrated for vegetative growth, so that the vegetative growth of plants is good. According to Prajnata (2002) the good vegetative growth of chillies will greatly determine the number of flowers, the fruit that is made and the size of the fruit produced. Flowers will become more numerous and fruit size will be longer than plants whose vegetative growth is disturbed.

In plants that are not stamped with flowers (P0) at the beginning of the growth energy growth is broken down for vegetative growth and generative growth, so that the vegetative growth is slower than other treatments.

3.4. Number of Fruits Per-plant

The results of the analysis of variance showed that the treatment of flower stamps on the red chili plant had a very significant effect on the number of fruits per plant.

Table 5. Average number of fruits per plant

Treatment	Average number of fruits per plant
P0	66.49 ^a
P1	84.26 ^c
P2	78.94 ^b
P3	86.16 ^c
$\alpha = 5\%$	3.22

Source: Primary data processed

Note: the numbers accompanied by the same letter in the same column show no significant difference in the LSD test of 5%

The LSD test of 5% (table 5) shows that the average number of fruits produced in the first and second flower (P3) flowering treatment, but not significantly different from the treatment (P1). This is due to the treatment when the flowering is the right time, so the energy reserves that are supposed to be for generative growth are concentrated for vegetative growth, so that the vegetative growth of the plant is good, because the photosynthetic net produced becomes larger. Plants with good vegetative growth phases will be ready and able to support generative growth. According to Prajnata (2002) good vegetative growth of chilli plants will greatly determine the number of flowers, fruit that is made and the size of the fruit produced. Flowers will become more numerous, the number of fruits will be more and the size of the fruit will be greater than plants whose vegetative growth is disturbed.

In plants that are not stamped with flowers (P0) at the beginning of growth energy growth is broken down for vegetative growth and generative growth, so that vegetative growth is slower than other treatments. Plants that are only stamped with both flowers (P2), while the first flower is left, the initial growth of the plant is also hampered.

3.5. Weight per fruit

The results of the analysis of variance showed that the treatment of flower stamps on the red chili plant significantly affected the weight per fruit.

Table 6. Average fruit weight (gr)

Treatment	Average weight of fruits per fruit (gr)
P0	14.12 ^a
P1	14.73 ^b
P2	14.09 ^a
P3	16.67 ^c
$\alpha = 5\%$	0.09

Source: Primary data processed

Note: the numbers accompanied by the same letter in the same column show no significant difference in the LSD test of 5%

The LSD test of 5% (table 6) shows that the average of the heaviest fruit was produced in the first and second flower treatment (P3) treatments, namely 16.67 grams per fruit which is equivalent to 25,853.17 kg / ha and significantly different from other treatments. This is due to the fact that the generative phase of the plant is postponed because the first flower and the second flower are stamped, so that the energy reserves that are supposed to be for generative growth are concentrated for vegetative growth, so that the plant's productive growth becomes baik, because the net photosynthesis produced becomes larger. Plants with good vegetative growth phases will

be ready and able to support generative growth. According to Prajnata (2002) the good vegetative growth of red chilli plants will greatly determine the number of flowers, the finished fruit and the size of the fruit produced. Flowers will become more numerous, the number of fruits will be more and the size of the fruit will be greater than plants whose vegetative growth is disturbed.

In plants that are not stamped with flowers (P0) at the beginning of the growth energy growth is broken down for vegetative growth and generative growth, so that vegetative growth is slower than other treatments. Plants that are only stamped with their first flower (P1) and plants only with their second flower (P2), while the first flower is left, the initial growth of the plant also experiences obstacles.

4. Conclusions

The treatment of the first and second flower stamps on the Gada variety hybrid pepper plant significantly affected the fruit diameter and significantly affected the plant height at 70 days, the number of tertiary branches at 70 days, fruit length, number of fruits per plant and the weight of the fruit. The highest production is achieved in the first and second flower Z treatment (P3), which is 16.6 grams per fruit which is equivalent to 25,853.17 kg / ha.

5. Acknowledgement

Author would like to thank to Department of Agriculture, Fisheries, and Marine, Kediri Regency, East Java Province for technical and financial supports. There is no conflict of interest.

References

- Anonymous1*, 1994. **Trik Menanam Cabai Merah di Musim Hujan**. Trubus No.259 Thn. XXV 1994.
- Anonymous2*, 1996. **Cabai Hibrida Unggulan dari Korea**. Trubus No. 315, Thn. XXVII, Februari 1996.
- Anonymous3*, 2007. **Budidaya Cabai Merah pada Musim hujan**. PT. Agromedia Pustaka. Jakarta.
- Anonymous4*, 2007. **Budidaya Cabai Hibrida dengan Mulsa Plastik**.
<https://id.answer.yahoo.com/question/index>
- Bernardinus, T., Wiryanta, W. 2006. **Bertanam Cabai pada Musim Penghujan**. PT Agromedia Pustaka. Jakarta.
- Harjadi, S. 1992. **Pengantar Agronomi**. PT. Gramedia Pustaka Utama, Jakarta.
- Novizan, 2005. **Petunjuk Pemupukan yang Efektif**. Agromedia Pustaka. Depok.
- Nuryuana, 2009. **Berkah dari Cermi**. *Trubus No.471 Thn XI*, Februari 2009.
- Prajnata, Final. 2002. **Agribisnis Cabai Hibrida**. Penebar Swadaya. Jakarta.
- Rukmana, R. 1994. **Bertanam Cabai Hibrida**. Kanisius. Yogyakarta.
- Suryabrata, Sumadi. 1981. **Metode Penelitian**. CV. Rajawali. Jakarta.
- Sutopo, Lita. 2004. **Teknologi Benih**. PT Raja Grafindo Persada Jakarta. Jakarta Utara.
- Salundik, Simamora, S. 2006. **Meningkatkan Kualitas Kompos**. PT. Agromedia pustaka. Jakarta.
- Setiawan. A.I. 2008. **Memfaatkan Kotoran Ternak**. Penebar Swadaya. Jakarta.
- Tjitrosoepomo, Gembong. 1989. **Morfologi Tumbuhan**. Gajah mada University Press. Yogyakarta.
- Tjahyadi, Nur. 1993. **Bertanam Cabai**. Kanisius. Yogyakarta.