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Three Type Layout Pattern Setup Intercrops and Their Influence on Early Growth of Castor Plant (Jatropha curcas) in the Tumpangsari System

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ABSTRACT

The research showed that the observations made on jatropha from 60 to 180 HST in general had a significant effect on all observed parameters but differed at the age of observation. Parameters of plant length were significantly different from 150 dap of observation, plant height, shoot stem length, number of leaves and canopy width from 120 dap, shoot length from 90 dap, leaf area and leaf area index from 60 dap and the number of shoots was only different significant at the age of observation 60 dap while at 90 to 150 dap was not significantly different. The results of this study also show that planting eggplant on Jatropha land in two cropping patterns will significantly affect Jatropha growth. while for tomato and chili intercrops planted on jatropha plantations using two planting models, it shows that jatropha growth is still relatively good. Based on the estimated calculation of the economic value of the intercrops, it can be seen that the highest economic value is obtained from the planting of the intercrops of the eggplant, both the treatment of the planting pattern with the same spacing in all directions and square spacing with R/C Ratio values of 2.74 and 2.2, then intercrops of chili with R/C Ratio values were 2.12 and 2.11 and the lowest values were shown by the results of tomato intercrops with R/CRatio values of 2.04 and 1.99.

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1. INTRODUCTION

Jatropha curcas (Jatropha curcas) is a plant that has a high potential value. Almost all parts of the jatropha plant can be utilized for the benefit of humans and the environment. The leaves of the jatropha plant can be used as food for silkworms and for medicines. The stems of this plant produce tannins, the fuel and sap are believed to have anti-cancer medicinal properties. The part of the Jatropha plant which has the highest economic value lies in the fruit. From this Jatropha fruit, various products can be produced, including: soap, fuel, biodiesel, glycerin, fertilizer, insecticide, biogas, tannin and animal feed.

Jatropha curcas plant previously received less special attention in Indonesia. However, in the midst of the fuel oil (BBM) crisis that hit Indonesia in 2005, jatropha was recalled because of its lamp oil. Vegetable oil from jatropha can be processed into fuel to replace petroleum. Jatropha curcas can be an alternative energy source (BBM) and a biofuel. Because it can regenerate or become a source of renewable energy (renewable energy) or renewable green energy (biofuel) to increase the economic yield per unit area and per unit time in the initial cultivation of Jatropha

curcas, it is necessary to optimize the land by intercropping, namely planting intercrops between main plant Jatropha. Plants planted in a community, where one plant is close enough to another, will not be separated from competition or competition events, this competition can be classified into (1) competition between plants of the same species or intra-species competition, (2), competition between plants of different species or inter-species competition. The intercropping cropping pattern causes competition between staple crops and intercrops in fighting over components for plant growth such as light, water, nutrients and space to grow. The types of plants planted in intercropping will utilize better growth factors if the two plants have different canopies, leaf structures, and root systems. competition between plants of different species or competition between species. The intercropping cropping pattern causes competition between staple crops and intercrops in fighting over components for plant growth such as light, water, nutrients and space to grow. The types of plants planted in intercropping will utilize better growth factors if the two plants have different canopies, leaf structures, and root systems. competition between plants of different species or competition between species. The intercropping cropping pattern causes competition between staple crops and intercrops in fighting over components for plant growth such as light, water, nutrients and space to grow. The types of plants planted in intercropping will utilize better growth factors if the two plants have different canopies, leaf structures, and root systems.

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The intercrops used in this study included: tomatoes, eggplants, and chilies. The intercrops will be planted between the main Jatropha curcas plants. And the layout pattern for each planting of intercrops will use two layout patterns, namely (1) a square pattern (on the square), (2) a pattern of equal distance in all directions, the arrangement of the location of plants on a plot of land affects the efficiency of using light.

In general, equidistant plant spacing is more efficient than other plant spacings, because the start of the competition point is delayed. This is supported by the opinion of Jumin (1988) which states that equidistant plant spacing in all directions is a more efficient spacing than plant spacing. another.

2. METHOD

2.1 Types of research

type of quantitative research by processing secondary and primary data. Primary data which will be obtained from previously available data and processed using tools.

2.2 Research variable

The variables used were independent variables with the observed variables as jatropha hedges and several types of intercrops.

2.3 Research design

This research was carried out in the field using a randomized block design (RBD), which consisted of 2 treatment factors and was repeated 3 times. The first factor is the plant layout pattern (P), namely (P1) the layout pattern of the square spacing (on the square), (P2) the layout pattern of the equidistant layout. The second factor is the type of intercropping (T) namely (T1) tomato plants, (T2) eggplant plants, (T3) large chili plants. This study included a control (jatropha curcas without intercrops) which was used as a comparison between treatments. So that there were 21 treatment combinations.

2.4 Sampling Locations.

4 types of plants were taken, namely tomato plants, eggplant plants, large chili plants and jatropha plants.

2.5 Time and Location of Research

The research started from February to July 2006 and was carried out in the housing complex Joyogrand, Merjosari, Malang City with an altitude of 500 m above sea level, average air temperature of 25ºC and rainfall of 1750 mm/year.

2.6 Tools and materials

The tools used in this study were sickles, hoes, trowels, gembor, hammers, rulers and scales. The materials used include Jatropha curcas, tomato seeds, eggplant and curly chilies, manure, urea, SP-36, KCl and ZA, fungicides (Anthracol), insecticides (Buldog, Furadan).

2.7 Research procedure

Soil preparation is done by hoeing the land as deep as 30 cm, removing weeds that grow and cleaning plants and rocks. Beds are then made with a length of 4 m and a width of 3.2 m. The distance between repetitions is 80 cm. Simultaneously with the tillage, spraying of herbicides is carried out. The intercrops are planted one month after planting the Jatropha curcas plant. The previous intercrops must be sown first, only after seven days of age from the nursery, the plants are ready to be transplanted into jatropha land which is one month old After all the intercrops and jatropha are planted, then if there are plants that die or grow abnormally, stitching is immediately carried out, both intercrops and jatropha, which are part of the maintenance, after that, harvesting each type of plant periodically and followed by observation.

2.8 Data Analysis.

The data obtained was tested using analysis of variance (count F test). To find out the difference in treatment, a test was carried out with the Least Significant Difference Test (LSD) at a significant level of 5%.

3. RESULTS AND DISCUSSION

3.1 Research result

The jatropha plant in this study is very adaptable to its growing environment. Jatropha curcas plant is an annual plant that can live more than 20 years if properly cared for. The growth of this plant is relatively short, starting to flower after 3-4 months. Formation of fruit begins at the age of 4-5 months. Harvesting is done when the fruit is ripe, with the characteristics of the fruit skin is yellow and then begins to dry. Usually ripe fruit after the age of 5-6 months. Jatropha curcas generally can be harvested after the age of 6-8 months. Apart from the seeds and fruit which can be used as fuel to replace diesel oil (diesel) and kerosene, other parts of this plant are also useful. The leaves are food for silkworms, antiseptic and anti-inflammatory. The sap is used to heal wounds and other treatments. The pulp can be used for green manure and gas production and the seeds are used for animal feed.

In this arrangement of plants in rows, the distance in rows and between rows determines the density, plant density will affect the appearance and production of plants mainly because of the efficient use of light. In cropping patterns, setting spacing is one way to make the growth factors needed by plants available evenly for each individual plant to optimize the use of available environmental factors. Irregular spacing patterns cause plant growth to vary greatly, dense plants will grow small, while tenuous plants will grow large.

Parameters of Growth of Jatropha Plants Average Length of Jatropha Main Plant on Various Kinds of Intercrops with Different Planting Layout Patterns at Various Ages There was no significant effect on the observation of the main plant length of Jatropha curcas at the age of 60 DAP, 90 D.A. DAP, and 120 DAP, but observations showed a significant effect at the age of 150 HST and 180 DAP.

Table 1. Average Length of the Main Plants of Jatropha on Various Kinds of Intercrops with Different Planting Layout Patterns at Various Ages of Observation

Treatment	Plant length				
	60 hst	90 hst	120 hst	150 hst	180 hst
T0P0	42.67 a	65.53 a	82.53 a	145.80 d	151.80c
T1P1	43.00 a	67,27 a	77,87 a	140,20 d	133.00b
T1P2	41.13 a	66.93 a	80.13 a	122.73b	132.33 b
T2P1	39.07a	62.53 a	63,20 a	63,20 a	67.00 a
T3P2	38.20 a	61,67 a	65.33 a	66,87 a	78.53 a
T3P1	40.53 a	65.73 a	76.40 a	133.67c	146.33c
T3P2	40,60 a	67,60 a	92.27a	138.00 cds	154.40c
BNT 5%				**10.47**	10,18

Information :
- hst : days after planting; Numbers accompanied by the same letter in the same column are not significantly different based on 5% BNT test
- T0P0 = Control (Jatropha plant, without intercropping)
- T1P1 = Tomato intercrops, the pattern is the same distance in all directions
- T1P2 = Tomato intercrops, square spacing pattern

- T2P1 = Eggplant intercrops, the pattern is the same distance in all directions
- T2P2 = Eggplant intercrops, square spacing pattern
- T3P1 = Interplanting of chilies, the pattern is the same distance in all directions
- T3P2 = Chili intercrops

The plant height showed no significant effect on the observed parameters of the main plant height growth of Jatropha curcas at the age of 60 HST and 90 HST, however the observations showed a significant effect at the age of 120 HST, 150 HST and 180 HST and on shoot length, stem length. shoots, the number of shoots, the number of leaves, the width of the leaves and the width of the canopy on the plant.

The crop production yields of various intercroppings at different treatments showed differences even though some were almost the same and with different harvest amounts for each different intercrop.

Table 2. Intercrop Yields (kg/ha)

treatment	Harvest amount	Production (g/plot)*)	Production (kg/ha)
T0P0	4 times harvest	16,562	12,939 2
T1P1	4 times harvest	16.171	12,634 3
T1P2	9 times harvest	39,392	30,775
T2P1	9 times harvest	31,639	24,718
T3P1	7 times harvest	3,441	2,688
T3P2	7 times harvest	3,413	2,666

Plot Size 12.8 m2

Information:
- T1P1 = Tomato intercrops, the pattern is the same distance in all directions
- T1P2 = Tomato intercrops, square spacing pattern
- T2P1 = Eggplant intercrops, the pattern is the same distance in all directions
- T2P2 = Eggplant intercrops, square spacing pattern
- T3P1 = Interplanting of chilies, the pattern is the same distance in all directions
- T3P2 = Interplanting of chilies, square spacing pattern.

Then the calculation of the results of the economic analysis of intercropping of the main jatropha crop with three different types of intercrops obtained using various forms of planting patterns is obtained

3.2 Discussion.

Growth is a process of plant life which results in an increase in plant size and determines yield. Based on the results of statistical analysis, it shows that in general the growth of the main Jatropha curcas plant includes plant height, plant length, number of shoots, shoot length, shoot length, shoot length, number of shoots. Canopy width, number of leaves, leaf area and leaf area index were significantly affected by different types of intercrops and layout patterns of intercrops, for all observation parameters, although there were different days after planting (DAP). From the results it can be seen, almost all parameters for growth factors, observations show significantly different results at the age of 90 HST. This is because at the beginning of growth,

From the data from the statistical analysis presented, it can also be seen that the intercropping treatment of planting intercrops with the main Jatropha plant using the equidistant pattern (T2P1) and the square spacing pattern (T2P2) produces an unfavorable effect on the plants. distance principal.

The jatropha plant can be seen in the data from the statistical analysis in each table, for all growth parameters the growth is not optimal or the growth is significantly the lowest compared to other treatments. Except for the observation parameter of the number of buds. The lowest real growth occurred above 90 hst. This happens because at the age above 90 dap visually and from the results of statistical analysis it can be seen that the crop canopies are overlapping one another, and this is an estimate that there has been competition between the main jatropha tree and the intercrops. The benefits derived from planting intercrops among the main crops which are annual in nature, apart from taking advantage of the empty space in the area of land that has the potential for crop cultivation, intercrops also experience a faster harvest period than the main crops, so that financial economic calculations can be carried out. after the first harvest of intercrops.

4. CONCLUSION

Research results on the planting treatment of three different types of intercrops namely tomatoes, eggplant and chili, in the jatropha planting area gave a significant effect on the growth of

jatropha from 90 dap. Based on the estimated calculation of the economic value of the intercrops, it can be seen that the highest economic value is obtained from the planting of the intercrops of the eggplant, both the treatment of the planting pattern with the same spacing in all directions and square spacing with an R/C ratio of 2.74 and 2.2, then intercrops of chili with R/C Ratio values were 2.12 and 2.11 and the lowest values were shown by the results of tomato intercrops with R/C Ratio values of 2.04 and 1.99.

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There is a need for research on the effect of intercropping around the main crop which is good enough to require further and detailed research.

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