IMPROVEMENT OF RED CHILIPEPPER PRODUCTION IN DRY LAND AREA THROUGH INTRODUCTION OF HIGH YIELDING VARIETY

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Abstract - Red chili pepper is one of the horticultural crops that have high economic value. Red chili pepper plants have a high tolerance to environmental changes, so this plant can be planted in the lowlands to the highlands and can grow and produce in the rainy season and dry season. Development of Red chili pepper on dry land, especially dry land is one of the efforts to increase production considering the potential land for pepper cultivation is reduced. The planting of red chili pepper in dry land must be balanced with the application of technology to minimize the risk of failure, given the different cultivated land conditions with potential land. The one component of technology that influenced in increasing the production of red chili pepper is the use of improved varieties. The purpose of this study is to study the use of red chilipepper varieties in dry land and to inform that the use of improved varieties is able to increase the growth and production of red pepper at the farm level. The study was conducted from March to June 2016 in Sengir Hamlet, Sumberharjo Village, Prambanan Sub-district on 5,000 m farmer's land, using study method of two varieties of red chili pepper, Kencana variety and local variety and two cultivation technology, that is recommended technology and farmer's way. The results showed that Kencana varieties production reached 4.14 tons/ha higher than local varieties which only reached 1.42 tons/ha. The results of the analysis show that adaptive Kencana varieties in dry land and can increase become one of the solutions to increase the production of red pepper in dry land.

Keywords - Red Pepper, Varieties, Introduction, Dry Land

I. INTRODUCTION

Red chilipepper plant is one of the important horticultural crops, both for domestic consumption and as an export commodity. The need for chili consumption every year is increasing and until now the chilli pepper plant is one of the plants considered potential to be developed. Red chili production in Indonesia ranges from 1.6 to 11.2 t / ha, still below the potential yield of about 12-20 tons / ha [Sumarni and Muharam, 2005]. Red chili pepper plants have a high tolerance to environmental changes, so this plant can be planted in the lowlands to the highlands and can grow and produce in the rainy season and dry season. In the Special Province of Yogyakarta, red chili is one of the region's leading commodities. The diverse agro-ecosystems in D.I.Yogyakarta, in the form of agro-ecosystem zone of paddy fields, lowland dry lands, highland dry lands and coastal sandy lands have great potential for the development of red chili.Increasing the number of residents resulted in the need for red pepper also increased, this may encourage farmers to improve crop yields. Production of red chili pepper D.I. Yogyakarta in 2013 reached 17.13 thousand tons. An increase compared to the previous year of 677 tons (4.11%) [BPS-D.I.Yogyakarta, 2014]. The increase of red pepper production is due to the increase of planting area / harvest respectively by 135 hectares. However, in terms of productivity, red pepper has slightly decreased due to seasonal / weather factors with high rainfall at the time of cultivation is done so many plants are damaged. The main obstacle of low chili production is generally limited to farming technology owned by farmers due to lack of information technology [Arief and Mahdalena, 2014].

The low productivity of red chili pepper at D.I. Yogyakarta, in addition to the effect of the optimal land conversion function to be settlement is also caused by the lack of knowledge of farmers on proper red chili cultivation technology. Most of the farmers have applied the recommended technology for cultivation, but still not fully. If red chili farming is implemented by applying the recommended technology appropriately, the potential productivity level of red chili can reach 12 -15 tons / ha [Duriat dan Muharam, 2003].

Chili farming on dry land faces a very complex, diverse and high-risk problem. Therefore, an integrated land management strategy is needed [Sudaryono, 2002]. Cultivation technology used by farmers is still simple, so the results achieved are still low. The results of the survey and data collected in farmer groups in Sengir village, Sumberharjo, Prambanan, average productivity of red chili only ranged from 0.7-1.2 tons/ha. Farmers have not fully implemented the recommended technology in implementing red chili farming, so that productivity is still low. If the red chili cultivation business is carried out using the recommended technology, the productivity can be increased [Duriat and Muharam, 2003]. The use of seeds from local varieties is also one of the triggers of low productivity of chili, and often farmers use again seeds from previous harvest seeds without selection. According to Wahyuni et al. [2008], the quality and quantity of a product produced is strongly influenced by the use of quality seeds, ie seeds that are obviously originated and

produced by seed breeders that have been registered in the relevant agencies. The use of improved varieties is one technique to increase the production and productivity of red chili. Kencana variety is one of the varieties released by Agricultural Research Agency which has advantages with potential yields ranging from 15.0 - 18.0 tons/ha. According to Setiawati et al. [2016], Kencana varieties have a very wide adaptability can be planted at various altitude places, both lowlands (0-200 m asl), medium (200 - 700 m asl) up to the plateau (> 700 m asl) and at various types of land (paddyland-dry land), soil type (Andisol-Peat), in various growing seasons (wet, wet-dry, dry and extremely dry). Therefore the introduction of improved varieties to farmers is expected to increase the yield of red chilipeppers, so that farmers' income also increases. The purpose of the assessment to determine the extent to which the use of improved varieties in red chili farming in dry land can increase the production of red chili pepper.

II. MATERIALS AND METHODS

The assessment was conducted in Dusun Sengir, Sumberharjo Village, Prambanan Sub-district, Sleman District. In March - June 2016. The assessment involves cooperator farmers and non-cooperator farmers on dry land with an area of 5,000 m^2 by comparing recommendation technology and farmer's way. The varieties are Kencana varieties and local varieties (excisting). Kencana variety is a new varieties of Agricultural Research Agency, while local varieties grown by farmers come from seeds made by farmers using the previous harvest season. In this study, cooperative farmers apply recommended technology packages to the use of superior varieties (Kencana), while non-cooperative farmers apply the technology of local farmers using their own seeds.

Recommendation Technology vs Farmer's way for red chili pepper cultivation
The details of recommendation technology and farmer's way in the cultivation of red chilli peppers, as follows:

Component of technology	Recommended Technology	Farmer's way
Variety	New variety Kencana	Seeds from previous harvest
Seed treatment	PGPR dose 10ml/littre water	Without seed treatment
Soil tillage	Landprocessed, makingbeds, plastic mulch	Landprocessed and without beds, without plastic mulch
Plant spacing	Plant spacing50 cm x 60 cm	Plant spacing 40 cm x 40 cm
Basic fertilizer	Cow manure mixed with Trichoderma using dose 20 ton/hectare	Cow manure without fermentation using dose 40 ton/hectare
Continous fertilizer	Recommendation: 100-150 kg/ hectare Urea 300-400 kg/ hectare ZA 100-150 kg/ hectare SP-36 150 – 200 kg/ hectare KCl (3,6,9 WAP) **Atau** 300-500 kg/ hectare NPK 16-16-16	Urea : 500 kg/hectare ZA : 300 kg/ hectare SP-36 : 200 kg/ hectare NPK : 150 kg/ hectare Without the use of KCl fertilizer and all fertilizers are only given as follow-up fertilizer
Side shoots cutting	Unproductive shoots attributes and parts of diseased plants	Not doing the unproductive shoots cutting
Weeding weeds	Weeding done 4 times (2,3,8,12 weeks after planting	More than 4 times

Table 1. Components of red chili pepper cultivation technology in Sengir Hamlet, Sumberharjo Village, Prambanan Sub-district, Sleman District

Observation and Data Analysis
Observations made on the growth and production varieties of red chili include:Plant height (cm), number of dichotomous branches per plant, canopy width(cm), number of fruit / plant (fruit), average weight per fruit (gr), total weight of harvest (production) per plant (kg), and total population of vector disease in border of maize and yellow trap. In this study, agronomic performance data were analyzed by statistical test of similarity of middle value (t-test) for two independent samples using excel.

III. RESULTS AND DISCUSSION

The Growth Performance of Kencana Variety Growth in Dry Land
Using recommended technology has significant effect on several growth parameters such as plant height, canopy width and number of productive branches per plant. Growth of Kencana variety which is New

Superior Varieties (VUB) from Vegetable Crops Research Institute on dry land is good enough. Results of plant height analysis showed that Kencana varieties with BPTP technology gave better result when compared with farmer's way and different very real when seen from the reratanya. The average rate of Kencana varieties with the AIAT technology is 51,53 cm, while for the farmer the mean of plant height is 22,35 cm. Only half of plant height with BPTP technology. The growth of Kencana varieties by farmers is less optimal, the crops are very stunted, in contrast to the recommended technology of BPTP given mulch. Based on the description of varieties, Kencana has a plant height of 112.6 - 125.6 cm. When comparing descriptions of varieties with crop conditions on the land, has not shown the maximum growth.

Parameter	Recommended technology	Farmer's way
Plant height (cm)	51,53**	22,35
Canopy width (cm)	31,43**	23,36
Number of productive branch	33,00**	22,73
**** significant different in α 0,05 (t-test for two sample independent)**		

Table 2. Growth performance of Kencana variety in dry land

Table 2 also presents the results of canopy width analysis and number of productive branches. The width of the canopy is measured every two weeks until both canopy plants in a bed meet. Results of canopy width analysis showed that the four varieties of red pepper Kencana with recommended technology treatment of BPTP have better canopy development when compared with farmer's way. The average development of canopy from Kencana varieties (31,43 cm) was significantly different with the farmer's way of only 23,36 cm. The development of canopy width is very important for plant growth because it is an indicator of vegetative growth of the plant. A well-developed canopy signifies that nutrients added through the fertilization process can be well absorbed by the plant. Based on the results of the analysis it is assumed that the width of the canopy is not only influenced by the cultivation technique alone but more influenced by weather conditions, such as the intensity of sunlight received by the canopy of the plant. The better the radiation intensity received by the plants will spur the development of the canopy for the better. Spacing also determines the development of the canopy. Planting of red chili on dry land using spacing 50 x 60 cm and made two arrays in each bed. Planting distance is made wide considering the predicted rainy weather conditions, so anticipating the canopy of the trees to avoid shading each other, while for the farmers, it is not standard standard for planting distance but only according to the farmer's habit. The habit of farmers using a tight distance of 30 cm x 30 cm. Observation of cropping conditions in the land by way of farmers, less well developed plants due to lack of nutrient intake through fertilization, so that although the distance is tight, the canopy is not shade because the condition of the plants is very small/dwarf.

The number of productive branches is a branch that produces flowers and will become fruit. The result of t test analysis showed that application of technological innovation of BPTP was able to increase the number of productive branches in red chili varieties of Kencana in dry land (Table 2). Implementation of BPTP recommended technology can provide better branch growth compared to the way farmers. The results showed that Kencana varieties with recommended technology have higher productivity and different branches are very real with farmers. The average number of productive branches of Kencana varieties with the application of technology recommendations as many as 33 different branches with the real cultivated by farmers 22.73 branches. Implementation of BPTP recommended technology on the planting of red chili pepper on dry land proved to increase plant growth. This is in line with previous high crop observations which also show good results as well as two other characters of canopy width and number of productive branches. The increase in plant height will be in line with the increase in the number of productive branches. This is in accordance with research Ganefianti [2000] which states that there is a close relationship between growth components on red peppers. The plant height character correlates positively to the number of branches, so the higher the plant, the more branches will be. By looking at some growth characters that have been analyzed, it is known that BPTP technological innovation able to increase the growth of red chilipepper on land with minimal nutrient conditions / suboptimal.

The Production performance of Kencana Variety in Dry Land

The results of the analysis for the production parameters showed in Table 3.

Parameter	Recommended technology	Farmer's way
Number of fruit per harvest	58 buah**	24 buah
Fruith length	8,39 cm **	7,08 cm
Fruit width	0,45 cm **	0,39 cm
Weight per fruit	1,64 gr **	1,06 gr
Fruit weight/plant	1616,14 gr**	553,12 gr
Total production	4,14 ton/ha **	1,42 ton/ha **

**** significant different in α 0,05 (t-test for two sample independent)**

Table 3. Production performance of Kencana variety in dry land

The amount of fruit is one component of the results in red peppers. Observation on the parameter of the number of fruit per harvest was done until the age of 10 weeks after planting. The data presented in Table 3 is the average number of fruits that can be harvested each time the harvest. The result of analysis in Table 3 shows the number of fruit per harvest from Kencana with the application of BPTP recommended technology of 58 fruits, very different from the real cultivation of farmers only 24 fruits per plant. This results showed that the application of technology BPTP able to increase the number of fruits per harvest up to two times the way farmers.

For fruit size parameters observed include length and diameter of fruit. Based on the analysis result of Table 3, it can be seen that Kencana varieties treated with the recommended technology of BPTP showed an increase in fruit length significantly different to Kencana varieties with farmers treatment. Average length of red chili pepper Kencana with recommended technology of 8.39 cm while for the farmers only way of 7.08 cm. This shows that the application of technology BPTP able to increase the length of fruit on red peppers. In fruit diameter characteristic, t test result show there is real difference between fruit diameter with technology of BPTP and farmer way for Kencana varieties 0,45 cm, bigger than farmer only 0,39 cm.

Another parameter that determines the production is weight per fruit. The results of t test analysis showed that BPTP technology was able to increase the weight per fruit. In Table 3, the mean weight per fruit of Kencana varieties treated with recommended technology of BPTP showed significant differences when compared to varieties treated by farmers. The average weight per fruit Kencana varieties with recommended technology is 1.64 grams, significant different to weight per fruit grown by farmers only 1.06 cm.

In this study also observed the parameters of total weight of harvest / plant to estimate red chili production per unit area. The results of the t test show that with increasing the size of the fruit it can have a significant effect on weight increase per fruit and of course also increase the total weight of the harvest. In Table 3, we can see t test results on the total weight of the harvest per plant. The total weight of the harvest was calculated during the harvest of the red chilipepper, each sample plant was weighted each time the harvest was then sterilized for 10 harvests. Based on the analysis it can be seen that, Kencana varieties treated with recommended technology show a better total harvest weight compared to farmer's way. The average total weight of Kencana varieties of 1616,14 gr, while for the farmers only amounted to 553.12 grams. The application of recommended technology can increase the total yield of harvests per plant to three times that of farmers.

The total weight parameter of the harvest can be the standard calculation of red chilipepper production per hectare. Red chilipepper production is calculated based on the tile yield and also the estimation of the total weight of the harvest / plant. The result of t test of two independent samples showed that for Kencana varieties, the application of BPTP technology could increase the production of red chili pepper per hectare. Increasing the size of fruit, weight per fruit and total weight of harvest indicates that the application of technology recommended by BPTP is able to optimize the growth and production, especially in dry land which is included in suboptimal land.

Production of red chili pepper with the application of recommended technology of 4.14 tons/hectare is significantly different with the way farmers are only at 1.42 tons / ha. Based on the data analysis shows that the difference in production between BPTP technology with farmers is large enough. The application of BPTP technology in both cultivation technology was able to increase the production of each varieties to 2-3 times of farmer's production. This is because in planting the red chili pepper, farmers still implement it in a very simple way, doing fertilization that is not based on rules only rely on

erratic doses, other than that farmers to grow chili tumpangsari with spinach but in maintenance and care of the plant is not considered. Fertilizer given can not be absorbed maximally by chili plants because with the same dose of fertilizer must be divided by spilled plants spilled. In addition, farmers cultivation conditions are very unkempt, rarely weeded when in the absence of mulch weed conditions become very uncontrolled.

The yield of red chili pepper from Kencana varieties planted is lower when compared with its potentialyield. For Kencana 12,9-22 ton / ha. However, for suboptimal land conditions with very low nutrient content, chili production with a range of 4-6 tons / ha is good enough, supported by improved nutrition and maintenance management, the hope will continue to increase production.

CONCLUSION

Implementation of recommended technology BPTP able to increase growth parameters of red chili pepper Kencana in dry land, including the increase of plant height, canopy width and number of productive branches.The application of recommended technology can improve the production parameters of Kencana varieties in dry land, including increasing the number of fruit per harvest, fruit length, fruit diameter, weight per fruit, total weight of harvest per plant.Production of red pepper varieties Kencana with the application of recommended technology of 4.14 tons/ha, while by way of farmers of 1.42 tons / ha.

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