POTENTIAL OF CITRONELLA GRASS INTERCROPPING AMONG THE YOUNG OIL PALM FOR SUPPORTING BIOINDUSTRY ON BANGKA-BELITUNG ISLAND (INDONESIA)

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Abstract: The potential space between the growing oil palm stands are fairly large and until now his presence yet underutilized. In the meantime the demand for essential oil in the world market. Citronella grass as one plant producing essential oils, can be used as an alternative to plant palm oil plantations on the sidelines. Agronomic performance of citronella grass monoculture and intercropping systems 6 months after planting and at harvest time (8 months after planting) showed no noticeable difference. The result showed the growth of Citronella grass grown among oil palm are able to match the growth of the Citronella grass that grown in monoculture. The presence of Palm plant in intercropping system does not provide any negative influence to the growth of the Citronella grass.

Keywords: Citronella Grass, Palm Oil, Intercropping

I. INTRODUCTION

Bangka Belitung Islands has the potential of developing the diversity of plants that can be used as one source of essential oils. The needs of the ever increasing world essential oil industry needs such as oils, soaps, cosmetics and medicines. Most of the essential oils produced by the farmers exported. The market share of some aromatic commodities like patchouli (64%), boxwood (67%), Vetiver (26%), Citronella grass scented (12%), nutmeg (72%), clove (63%), Ginger (0.4%) and pepper (0.9%) of world exports (Ditjenbun 2004). Essential export volume in 2007 was US $101,140,080, but on the other hand Indonesia also imports of essential oil in 2007 reached a value of US$ 381,940,000 (www.comtrade.un.org).

Plants containing essential oils and potentially to be developed was the Citronella grass (*Cymbopogon nardus* L.). Citronella grass is divided into two types, Mahapengeri and Lenabatu (Giuliani and Satuhu, 2012). This type of citronella grass already made its classification by BALITRO Bogor, and was given the name kind of G1, G2 and G3. There are also types of citronella that it does not meet the SNI (Standard Nasional Indonesia), because the levels of citronella and geraniolnya under the standards, but the production of very large leaves and resistant to disease. Citronella grass plants are generally resistant to the disease. Yield to the Citronella grass ranges between 0.5%-0.7% of wet leaves (www.minyakatsiriindonesia.wordpress.com).

Citronella grass already has long cultivated in Indonesia. Citronella grass has wider leaves form than the form of the Citronella grass usual. The leaves form clumps with the number of rods a lot more. The color of the leaf is older (dark green), whereas regular light green leafy Citronella grass a bit grey. Citronella grass plant traits is a plant with root fibers in large quantities, the leaf resembles the elongated flat reeds with long leaves up to 1 m (Rizal, 2011).

Aspects of the environmental benefits of Citronella grass cannot be underestimated. Citronella grass can live in extreme conditions such as soil on poor nutrient, steep slopes, bases, and degraded forests. The roots are able to hold the ground that many plant recommended as preventive erosion. This plant is included in the list of classification of plant protective ground or crop land conservation. Nevertheless, Citronella grass have not been much be cultivated widely in the context of commercial crops (Sumiartha, 2012).

Citronella grass grown at altitudes of 200 – 1.000 mdpl with rainfall is 1800-2500 mm/year. The required temperature for the growth of Citronella grass ranged between 18-25^{o}C with 60-90% of humidity. These conditions are in accordance with the stands of the mixture and monoculture palm oil so that it can serve as one of the plants that can be recommended.

II. PALM OIL PLANTATIONS

The area of oil palm plantations in the province of Bangka Belitung is increasingly every year. According to Central Bureau of Statistics (2014) 2014, oil palm planting area is 201, 090 ha (BPS, 2014. The extent of the area to make the position of palm oil plantations is increasingly strategic for utilized as one of the region's development plant bioindustri, especially in the early stages of planting (aged 1-5 years after planting).

The potential for space is growing among oil palm stands are fairly large and until now his presence yet underutilized. Intercropping is a form of cropping patterns by planting more than one type of crop on the same land in the same time or almost simultaneously. The purpose of the application of the cropping pattern of such land is to increase

productivity by utilizing the diversity of the nature of plant growth, such as rooting system and headers, as well as the difference in the response of plants to climate factors, especially against the light and temperature of air (Baldy and Stigrer, 1997 in Zulkarnaen, 2005).

At this time, the young oil palm plantations, aged less than 5 years old, have low productivity. Up to the age of 3 years, oil palm plants in general have yet to produce bunches of fruit (TBM phase 1, 2 and 3). Meanwhile, 4 – 5 years over its fruit bunches of productivity is still very low (TM 1 and 2). Whereas, the plantation area has potential resources of land, water, mineral nutrient and sunlight enough to support a high land productivity.

III. RESULTS AND DISCUSSION

Research conducted at the Experimental Vineyard land Petaling BPTP Bangka Belitung Islands from May 2014 to February 2015, Citronella grass agronomic characters at the time of 6 months after planting) planted in intercropping on young palm oil plantations did not differ markedly with the Citronella grass that grown in monoculture (table 1).

Table 1 Agronomist performance of citronella grass (6 months)

Observation	Monoculture	Intercropping
Plant height (cm)	108,60a	108,80a
The number of tillers	14,00a	14,60a
Canopi north-south width (cm)	87,40a	95,40a
Canopy ast-west width (cm)	94,60a	103,40a

Note: average on one line followed by the same letter does not differ markedly according to test LSD ($p \leq 0.05$)

Citronella grass plant height measured from the ground to the tip of the leaf is highest, showed no noticeable difference between the two systems. This shows there is no influence of shade of palm oil against one of Citronella grass scented growth parameters. So did the number of saplings, intercropping system is not obstructed by the presence of oil palm plants around the Citronella grass. Citronella grass scented canopy width measured stretching from the North-South and East-West is no different. This shows not the case competition in making energy source sunlight on intercropping systems.

Harvest age to determine outcomes and levels of oil. the average oil yield harvest age 6 months (31.02 ml) compared to the results of the oil from the age of 9 months (27.88 ml). Average levels of oil from 20 accessions harvested 9 month decline results compared to the levels of harvest oil from the age of 6 months. Average levels of oil resulting from the harvest of 6 months of 6.10% while the average yields of oil levels aged 9 months of 1.69% (gratitude, 2011).

Citronella grass scented plants yield components at the age of 8 months after planting (table 2) that includes a high number of plants, saplings, and wide canopy does not indicate the existence of differences in the two systems. Same is the case with the result that can be harvested, wet weight measurement results from stems and leaves of Citronella grass in intercropping can match the results of heavy wet (stem + leaf) Citronella grass grown in monoculture. This is caused in young oil palm area, canopy plant palm oil has not been mutually close, so that's not the case competition in the taking of resources, good source of nutrients, water or light. Micro-climatic conditions in the area which was created between the young oil palm stands are still the same with the condition of monoculture.

Table 2 The components of the result of harvest (8 months after planting)

Observation	Monoculture	Intercropping
Plant height (cm)	138,78a	137,20a
The number of tillers	32,00a	23,00a
Canopi north-south width (cm)	114,50a	107,00a
Canopy ast-west width (cm)	111,30a	114,20a
Wet weight (kg)	7,20a	7,10a

Note: average on one line followed by the same letter does not differ markedly according to test LSD ($p \leq 0.05$)

Factors that determine the production and quality of Citronella grass oil fragrant plant material, among others, the condition of the land, climate, soil and plant pests and diseases (Rosman, 2012). The results of the research conducted and the Syriac Nurmansyah (2013) shows a noticeable difference in height of the plant, the width of the heading, the number of chicks, number of leaves, leaf width and length of the longest leaves between plants grown in medium with high plains terrain.

Production of terna on the plains are higher than the plateau. Clones the most high production shows G132, especially in the Plains. In experiments conducted at the KP Petaling High Plains there is no difference between monoculture and intercropping plants so that the expected quality of essential oil that is produced is no different. Research Tjokrowardojo (2012), Citronella grass scented plants intercropping and ylang-ylang may be used as conservation land at once can increase the income of farmers. Standard quality scented Citronella grass grown in intercropping with ylang-ylang crops in accordance with quality standard according to SNI.

CONCLUSIONS

Agronomic performance of citronella grass monoculture and intercropping systems 6 months after planting and at harvest time (8 months after planting) showed no noticeable difference. This shows the growth of fragrant Citronella grass grown among oil palm can match the growth of the Citronella grass that grown openly. The presence of Palm plant in intercropping system does not provide any negative influence to the growth of the Citronella grass..

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