AGRONOMIC TRIALS OF TEBU TERUBUK(Saccharum edule L.)TO SUPPORT FOOD DIVERSIFICATION AND FOOD SECURITY IN PAPUA,INDONESIA

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AGRONOMIC TRIALS OF TEBU TERUBUK(Saccharum edule L.)TO SUPPORT FOOD DIVERSIFICATION AND FOOD SECURITY IN PAPUA,INDONESIA

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Abstract

The sustainability of national food security needs to be developed and strengthened to improve the domestic food supply.The primary objective of the diversification of food production is to attain greater self-sufficiency and food security. With the current situation, which the global food price increased at the international and national markets,emphasize on food promotion and usage should be based on traditional food crops.This can be increased by exploring the local food plants and improving an agricultural production. Papua is considered as a place of mega diversity of plant species. It is the primary center of Saccharum diversity. Among the Saccharum species that grows widely in Papua is Saccharum edule that have not been exploited and scientifically studied for their potential use. The inflorescence of S.edule is a delicate part for consumption.With the growing concern of food production shortage, food security problem, limited supply, and growing demand of S. edule in the local market, exploration and identification of this plant was conducted at the selected areas of Papua and Papua Barat provinces, covering the lowland and highland areas,from June to September 2009. It showed the variability in morphological traits of 77 accessions. To attain the maximum growth and yield of S. edule, the following agronomic researches of S.edule with soybean intercropping and cutting types were carried out with the selected S.edule plant distances and cutting types from June to December 2010. S. edule of 200 cm x 200 cm produced the highest biomass,flower number and weight. Tip cuttings produced the best growth and inflorescence characters. Cutting trial was also carried out to observe the best cutting that produce better growth and inflorescence yield. Based-cutting produced greater flower yield and number.

Keywords:Saccharum edule,exploration, identification, diversity, intercropping,cuttings

1.INTRODUCTON

Papua is a home to diversity of plant species that have not been exploited for their potential use. Among the food plant species that have not been scientifically studied is Saccharum edule (Quartermain, 2006). S. edule is among the Saccharum species, which belongs to the same famnily of sugarcane (Saccharum officinarum).The plant grows widely in the land of Papua,and hence this area is considered as the center of Saccharum diversity (Daniels and Roach, 1987).The genus Saccharum consists of six species S. officinarum L., S. sinense Roxb.,S.barbert Jesw.,S.edule Hassk.,S. robustum Brandes and Jesw. ex Grassl and S. spontaneum L., of which the former four species are cultivated and the latter two species are wild (D'Hont et al., 1998).

The local Papuan name for Saccharum edule is sayur lilin or tebu terubuk.S. edule has an aborted inflorescence that enclosed inside the leaf sheaths (Glyn,2004).This inflorescence serve as an edible part for consumption and can be prepared in many ways (Mudaliar, 2007). In the highland areas of Papua,the leaves were used for thatching the roof of traditional house, while stem is used to make the traditional music instrument.

Saccharum edule plays a significant role as a source of vegetable; however the production is generally in the hands of small subsistent farmers with lack of cultivation techniques. With future concern of increasing population and decreasing cultivated land, and also concerning the genetic erosion,evaluation of S. edule is needed. With the global food price increased at the international market, emphasize on food promotion and consumption should be emphasis on traditional food crops. It is believed that S. edule grow widely in Papua and its diversity needs to be preserved in order to support food security and the sustainability of biodiversity.

The agronomic aspects of S. edule need to be studied through intercropping and cutting trials. Intercropping is a traditional farming practiced by Papuan from generation to generation.S.edule is commonly planted with root crops and various vegetables.However,the productivity is unstable and low due to several factors including inappropriate cultural practices. Farmers use inappropriate population density or irregular plant distances. As a consequence the plants usually suffer from poor growth and development and finally low yield. S. edule is multiplied with stem cutting, however there is no study yet related to the use of cutting type of S. edule which produce good yield.

Research was aimed to observe the influence of plant distance of S. edule to growth and yield of S-edule in S. edule -soybean intercropping system. The research was also aimed to observe the influence of stemn cutting types on selected S. edule to growth and yield of S. edule.

P2(150cm x150 cm)	153,5b	3,3a
P3(200 cm x200cm)	151,8a	3,8a
Monoculture	157.9	3,4

Values within a column followed by the same letter are not significantly different ($p<0.05$).

Different S edule plant spacing did not significantly influence seed weight of soybean per plant (Table 2);however there wasa significant reduction in seed weight per plot area with increasing plant density of S. edule.With increased S. edule plant distance, population density of soybean increased,as there was interplant competition for light,water and nutrients resulted to decreased seed weight of soybean in close distance.

3.2 Stem cutting trials on 5 necessions of S.edule

The experiment was carried out to observe the influence of stem cutting types on the growth and yield components of S. edule. It shows that the accessions of Local Fak-fak and Manokwari (Red Saukori and Green Mandopi) produced the fastest shoot growth.The both accessions also produced more shoot number compared to the other accessions (Wamena and Serui)(Table 3.). This suggests that the accession of Local Fak-fak was more responsive to the environmental conditions in Manokwari where the trial was carried out compared to the accession of Wamena and Serui. Wamena is the highland site, while Fak-fak and Manokwari is the lowland site. As due to the ecological and geographical isolation (ecogeographic), a number of different characters and the response between those 2 locations appeared.Eco-geographic isolation is one of the external factors such as climate, water,soil, and topography that act as a catalyst for the emergence of various barriers, thus allowing each population in a particular ecosystem to have typical characteristics of the region(Mawikere, 2005).

Table 3.Mean of shoot initiation age, shoot length,shoot number,plant height and plant number/sucker of 5 accessions of S.edule (L.) as influenced by 3 types of stem cutfings

Treatment	Shoot Initiation Age(HST)	Shoot Length (cm)	Shoot Number	Plant Height (cm)	Plant Number/ Sucker
Cutting					
- Tip	4.74	9.73	5.40a	83.21	18
-Middle	4.12	9.10	4.15b	70.89	18
-Based	5.25	9.80	4.35b	86.36	18
Accession					
Saukori Red	4.66	9.32	5.92a	86.36	20ab
-Mandopi Green	4.9	11.23	4.50b	85.67	14c
-Wamena	5.18	9.75	3.92b	77.63	17bc
-Local Fakfak	4.52	9.17	4.92ab	75.33	21a
-Serui	4.25	8.25	3.92b	75.78	17bc

Tip cutting produced more shoot number than other stem cutting types. This is due to the ability of shoot cuttings to grow faster than the middle and based-cuttings. Leaf buds serves as photosynthetic site and the photosynthetic products are used to promote root growth. According to Harjadi (1993) leaf is the site of auxin synthesis, and it also produces carbohydrates that stimulate the formation of root cuttings. The present of growth substance and photosynthate may accelerate the stimulation of stem sections of S. edule to form new shoots.

When the growth developed however, S. edule grown from the based-cuttings produced the fastest age of shoot initiation,the highest shoot length and plant height,on the other hand,plants grown from center-cuttings had the shortest plant height. This is because at the time of plantingroots of the based-cuttings were still attached,and therefore further growth process accelerated the formation of leaf and stem sections.

The growth of plants from tip-cuttings was more directed to the formnation of new roots and shoots. The tip-cuttings contain more carbohydrates than the middle and based stem cuttings. According Rismunandar(1990) the availability of carbohydrates and protein in the plant will affect the

process of plant growth. In the process of root formation,cuttings require energy that stored in their plant tissue in the form of carbohydrate and protein. Cuttings with high carbohydrate content will casily rooted than cuttings with low carbohydrate content,while cuttings with higher protein content will be more easily stimulated leaves growth. At the based-eutting, as due to relatively older stem tissue,the carbohydrates decreased but the protein content (especially nitrogen) remain high.Protein contains nitrogen in order to stimulate the growth of leaves,especially in the formation of green new leaves that are useful in the process of photosynthesis(Linggn,1986).

Table 4.Mean of the flower number,length,fresh and dried-weight of 5 accessions of Sedule (L.)as influenced by 3 types of stem cuttings

Treatment	Flower	Flower	Flowers fresh	
	Number	Length(cm)	weight(g)	weight(g)
Cutting				
-Tip	6.48	37.12	62.76	5.12
-Middle	6.72	35.60	59.36	5.06
-Based	8.04	38.70	64.28	5.14
Accession				
-Saukori Red	7.47	38.53	61.40	5.03
-MandopiGreen	6.57	36.07	60.17	5.23
-Wamena	7.27	33.70	60.40	5.10
- Local Fakfak	7.90	41.10	64.60	5.63
-Serui	6.20	36.30	64.10	4.97

4.CONCLUSIONS

S. edule with the density of 200 em x 200 em produced highest plant weight,fresh biomass weight,number of sucker, flower number and weight under intercropping system with soybean. Soybean seed weight per plant and per plot area increased with decreasing population number or reducing plant density.

Based-cuttings showed the best vegetative and generative growth compared to the tip and middle-cuttings.The accessions of Local Fakfak and Red Saukori (Manokwari) produced the best vegetative growth and accession Fakfak also yielded the highest generative components. Tip-cuttings of accession Local Fakfak and Red Saukori produced the best vegetative growth,while based-cutting of the accession Local Fakfak produced the best generative characters.

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