

Original paper

THE EFFECTIVITY OF CUTTING TECHNIQUE FOR VIABILITY PROPAGULE OF *Rhizophora stylosa*

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Received: September, 5, 2004 ; Accepted: April, 20, 2005

ABSTRACT

The aim of this research was to investigate the viability of *Rhizophora stylosa* propagule due to cutting treatments (1/3 and 2/3). The result of this research showed that *R. stylosa* without and 1/3 cutting of propagule gave the best result. The viability, i.e. germination ability, rapid growth value, and germination value was the higher compared to the other treatments.

Key words: Propagule, cutting method, viability

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INTRODUCTION

The mangroves forest condition in coastal region has been degraded from time to time and almost happened in all provinces in Indonesia. It mostly caused by unsustainable forest exploitation. Forest conversion for the other use was the most destructive activity and is the one affect of its damage. The existence of mangroves forest along the coastal region actually needed as a green belt between sea and land, and acted a buffer zone which would prevent the land destruction due to the wave energy at the sea.

Lampung is a province in Indonesia which has quite extensive mangroves forest, but most at the forest have been degraded. In 1997, total area of the forest was 17,000 hectares, but currently no more than 3,000 hectares (82%) were degraded.

Rehabilitation is needed in order to recover the forest damage. It's important to do, because of the environmental function of mangroves forest as a coastal protection. Rehabilitation goal is to return and maintain the ecological functions of the forest.

Rehabilitation of mangroves forest should be well planned, actuated and monitored. One problem on planting of *Rhizophora stylosa* is the availability at good quality of seedling in a big amount at any time needed because propagule of *R. stylosa* is highly recalcitrant so that could not store for a long period (Kustanti, 2001).

R. stylosa is often used for rehabilitation activity. Since the propagule of this species is easy to find, tough against pest and disease, and higher on its viability. However the propagule is sensitive to loss of water in hot and dry moisture condition. Storing propagule in a

coconut fiber media could maintain the viability for a week period (Kustanti, 2003).

Another problem on planting *R. stylosa* is the length of the propagule, which sometime more than 30 cm (Kustanti, 2001). There for a bigger media container is needed. Many efforts have been tried to increase the efficiency such as light of plant media, propagule cutting this study, and net shading.

MATERIALS AND METHODS

1. Collection of propagule of *R. stylosa*. The propagule of *R. stylosa* was collected from the mangroves forest in Margasari Village, Labuhan Maringgai District, East Lampung Regency. Propagule were collected from the mother trees. The weight

was 26,79 gram and the ring cotyledon with brown color. The collecting climbing the mother trees.

2. Cutting method of propagule. The cutting methods were without cutting as a control, 1/3 cut of the end propagule and 2/3 cut of the end propagule.
3. Preparation of media for seedling. The media of seedling of propagules were land, land + dirt of chicken (1: 1), land + dirt of chicken + sand (1: 1: 1). The planting of propagules in each polybag done by sticking in the media 5 centimetres of cotyledon of propagules (Taniguchi, *et.al.*, 1999).

The parameters of viability are germination ability (DB), germination value (GV), and rapid of growth (KT). Germination ability is the appearance of two pieces of young leaves at the plumule as long 90 days (day of test).

The formula of germination ability (DB) is (Manan, 1975) :

$$DB = \frac{\text{Amount of normally germination}}{\text{Amount of total propagules}} \times 100 \%$$

Gemination abilty (DB) was the emerge of normaly two leaves of propagule. The periods was accounted for 90 days.

The formula of germination value (Czabator, 1962) : $GV = PV \times FGD$ information :

GV = Germination Value

PV = Peak Value

$$= \frac{\% \text{ peak value}}{\sum \text{ day of test}}$$

FGD = Final Germination

$$= \frac{\% \text{ germination at the last day of test}}{\sum \text{ day of test}}$$

Germination value (GV) was an indeks of the and the complete of propagule. The day of test as long as 90 days

The formula of Growth rate (KT) is (Maguire in Surbakti, 1997).

$$KT = \frac{X1}{E1} + \frac{X2}{E2} + \dots + \frac{Xn}{En}$$

Information:

KT = growth rate

X1 = germination percentage at the first day

E1 = Examinationst

Growth rate (KT) was percentage of growth from first day till 90 days. Data analysis used Factorial Random Design with 2 factor and 3 level. The amount of each repeats are 15 replications samples of propagules. The first degree was cutting methods (without cutting, 1/3 cutting, and 2/3 cutting of propagules). The second degree was plantation media (land, land + dirt chicken, and land + dirt chicken + sand).

RESULTS AND DISCUSSION

Results

Data were analyzed using Analysis of Varians (Table 1, 2, and 3) and the results were Table 4. done its significants different, its test by Duncan Test.

Table 1. Analysis of Varians of Germination Ability (DB) *Rhizophora stylosa*.

Source of Varians	Free degree	Sum of Square	Mean of Square	p- value
Plant Media	2	1251,85	625,93**	0,000
Cutting Technique	2	762,96	381,48**	0,000
Interaction of plant media and Cutting Technique	4	1525,93	381,48**	0,000
Error	18	533,33	55,10	
Total	26			

Table 2. Analysis of Varians of Rapid of Growth (KT) *Rhizophora stylosa*.

Source of Varians	Free degree	Sum of Square	Mean of Square	p- value
Plant Media	2	3,73	1,866**	0,000
Cutting Technique	2	0,793	0,397**	0,000
Interaction of plant media and Cutting Technique	4	0,767	0,192**	0,000
Error	18	0,382	0,021	
Total	26			

Table 3. Analysis of Varians of Germination Value (NP) *Rhizophora stylosa*.

Source of Varians	Free degree	Sum of Square	Mean of Square	p- value
Plant Media	2	1,966	0,983**	0,000
Cutting Technique	2	0,517	0,259**	0,000
Interaction of plant media and Cutting Technique	4	0,959	0,240**	0,000
Error	18	1,056	0,059	
Total	26			

Table 4. The Recapitulation of Analysis of Varians of DB, KT, and NP *Rhizophora stylosa*

Treatments	DB	NP	KP
Plant Media	*	*	*
Cutting Technique	*	*	*
Interaction of plant media and Cutting Technique	*	*	*

Tαβλε 5. = significant different at F-0,05

The all parameters was undergone by 90 day test. The successful of germination are includes germination ability (DB), rapid of growth (KT), and germination value (NP). The next test of cutting technique were that without and 1/3 cutting gave the significant different value of DB was 100%, in the

other that's 2/3 cutting of prapagule had the little DB was 85.55%.

The different of plant/seed media were mix between land + sand (1 : 1) had the DB 100%. The little DB was media sand + dirt of chicken are 87.78%. The next test by Duncan Test (Table 5).

Table 5. Duncan Test of DB, KT, and NP of *Rhizophora stylosa* Propagule.

Treatment	DB	KT	NP
Cutting Technique of Propagule			
Without Cutting	100a	2,79a	2,03a
Cutting 1/3	100a	2,89a	2,11a
Cutting 2/3	85,55b	2,06b	1,50b
Plant Media			
Land	100a	2,78a	2,07a
Land + Sand	97,78a	2,58a	1,74b
Land + Sand + Dirt of Chicken	87,78b	2,37b	1,83b

Info: The number with the same letter was not significant different according Duncan Test at 5%-Test Degree.

The rapid of growth (KT) of *Rhizophora stylosa* propagule influenced by cutting technique and plant media. The value were 2.79, 2.89, and 2.06. The media different were land and land + sand with value 2.78 and 2.58. While the media of land + sand + dirt of chicken was the lowest 2.37.

Germination value (NP) of *Rhizophora stylosa* propagule influenced by cutting technique and plant media. The values were 2.03, 2.11, and 1.50. The significant different of plant media were land, land + sand (1 : 1) and land + sand + dirt of chicken (1: 1 : 1) with the value 2.07, 1.74, and 1.83.

DISCUSSION

The propagule of *Rhizophora stylosa* is vivipary seed, i.e. the seed which germinated still at the mother trees. The length is 31.28 centimeter and the diameter is 11.63 milimeter (Kustanti, 2002). That species was most in the mangroves formation and have the high value of the wood (Tomlinson, 1986).

There are five especially occurrence in course of germination *R. stylosa*, that are: (1) water imbibition pass natural hole in hipokotil propagule and disseminated through tissue culture of propagule, (2) activated enzymes of tissue culture of propagule by water absorption (3) the growth of top plumule of propagul, (4) blooming of two normal leaf of hipokotil plumule at 30 day after planting.

The viability of *R. stylosa* propagule shown among others by ability germinate (DB), rapid of growth (KT), and germination value (NP). Treatment by cutting of propagul was to overcome the matter in transportation of seedling in activity of rehabilitation mangrove forest. This matter conducted because propagul *R. stylosa* have long seed/propagule so that complicate in transportation.

Cutting technique of propagule gave the result that propagule *R. stylosa* could still grow at all of media plant which were tried. Cutting technique of propagule *R. stylosa* (without cutting, cut 1 / 3, and cut 2 / 3 part of propagule) showing response which different each other in each media plant. Propagul which without cutting and cutting propagule 1 / 3 gave the same influence to germination ability (DB) equal to 100% during 90 day test germination. Meanwhile, cutting of propagule 2 / 3 gave the smallest influence to germination ability that is equal to 85.55%. Germination ability of propagule *R. stylosa* marked with appearance two normal leaf look out on from part of

plumule. Propagule of *R. stylosa* in fact have germinated above tree. Planting of that propagule by sticking in 5 cm hyphocotyle.

While usage of media growth were land and land;ground + sand (1:1) resulted in parameter of viability (germination ability, rapid of growth, and germination value). While media plant land;ground + sand + chicken dirt give different result both above mentioned media. The last media give less compared to good growth both previous media. This matter indicate that planting of propagul *R. stylosa* more suitable if using media plant conventional (natural media). The advantage of natural media gave its result more coming near conducted germination in seedling area, moreover its easy to created the balance among humidity and aeration and also lessen possibility of growth of fungi at the surface of seed (Manan, 1976).

In general, usage of mixing of media plant with chicken dirt give poor result, this because of possibility of propagule *R. stylosa* prefer media plant conventionally. Land, and land + sand represent media plant appropriate as planting of propagule *R. stylosa*. Media plant the have provided nutrition insure to its growth. Physiological processes related to germination of propagule *R. stylosa* were 1) water absorbtion, its mostly done by imbibition, 2) start of growth and development on the top of plumule of hipocotyl, 3) the increasing of amount of enzyme and its activity and also digestion of food reserve at endosperm, 4) transportation of food-stuff to growth areas, 5) improving assimilation and respiration, growth of new cell and protoplasm, 6) increasing of differentiation and bisection of cell, 7) differentiation of cells become various tissue culture and parts of tree.

CONCLUSION

The viability of *Rhizophora stylosa* propagule with cutting technique 1/3 and without cutting with media plant land and land;ground + sand (1:1) gave germination ability (DB) remain to 100% till the last research. While rapid of growth (KT) and germination value (NP) also give best result at both cutting technique and media plant which were utilized.

ACKNOWLEDGEMENTS

In this opportunity, researcher say thanks to University of Lampung for funding support in implementation of this research through program of DIK.S.

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