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*Full Length Research Paper*

# Community Economic and Education Empowerment through Cultivation of Sesame Program in the Bugel Beach Area, DIY Indonesia

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**ABSTRACT:** This research explored the idea of empowerment coastal communities through an education approach and development of cultivation for environmental sustainability of coastal areas in Bugel, Kulon Progo DIY. Indonesia territory, two-third of the territory consists of the ocean with exotic islands which has tourism potential. Coastal tourism is one-stop coastal tourism. One-stop coastal tourism could be a strategy of local tourism policy to improve well-being, quality of life, and community independence to optimizing poverty alleviation of coastal and coastal communities in Indonesia territory. Therefore, coastal management has to prioritize community empowerment and revive the surrounding economy, to establish continuity conservation of the living environment. The selection of adaptive plants on coastal sand land is also crucial. One of the adaptive plants against all types of soil, both fertile and non-fertile land is Sesame. Sand texture to Sandy loam is quite suitable for this cultivation. Sesame requires good drains due to it could not survive in stagnant conditions. Sesame (*Sesamum indicum* L.) as an industrial commodity product has functional properties and beneficially contributes to the healthy and demanded by various industries, food materials in particular. Sesame productivity in coastal areas requires applied technology to fill the standard of growing media physically, chemically, biologically to helps growth and development of sesame in coastal areas, by involving cow manure fertilizer that functionally to the improvement of growing media. The success of Sesame cultivation development in coastal areas supported by environmental education programs positively affects community empowerment in providing a solution for improving the well-being of the society in coastal areas. The research used cow manure fertilizer with dosage levels of 30 tons/ha through a randomized complete block design. The research is located at Congot Kulon Progo. Treatment factor of various sesame varieties. Varieties of Sesame namely M1 = Varietas Winas 1, M2 = Varietas Winas 2, M3 = Varietas SBR 1, M3 = Varietas SBR 4. The observation parameter research including grow media condition, sesame agronomy and growth, Sesame production, the data were analyzed using Analysis of Variance (ANOVA) and Duncan Multiple Range Test at a significant level of 5%. It was obtained that some varieties were not significantly different from some parameters except Winas 1 that significantly different from the total fat content.

**Keywords:** Cow manure fertilizer, coastal land, sesame variety, community empowerment

## INTRODUCTION

One of the marginal lands that potential to be developed in Indonesia is coastal land. It was found several problems with sandy lands. In physics, coastal land consist of sandy land texture, clay fraction, and clay fraction, causes macro pore domination resulting in low moisture storage. Chemically, it contained low colloid, Munir (1996) adds owned organic material less than 1% nutrient binding power, and cation exchange capacity is

low. The land consists of Phosphor that is not ready for the plant to absorb and contained low nitrogen also (N) potassium. Biologically, carrying capacity on organism quantity and activity is low. Therefore, the addition of cow manure fertilizer is highly needed. Giving manure could increase the availability of nutrients and also improve soil physical properties. Some of the soil physical properties that can be influenced by cow manure fertilizer are aggregate stability, volume weight, total pore space, plasticity, and water holding power (Sarief, 1989). The selection of adaptive plants to coastal areas is also crucial. in the general provisions of Law, 27 year 2007 about Coastal area and small islands management states that Coastal area and small islands management is a process of planning, utilizing, supervising and controlling of Coastal Resources and small islands between sectors, between Central and Local government, between terrestrial and marine ecosystems, and between science and management to improve community well-being. Sesame has comparative benefit due to it is dry resistant, sesame seeds are stable in every condition, planted on thin soil, and cultivated extensively and have relatively high economic value (Soenardi, 1996). Sesame is worthy to be cultivated in coastal areas if manure and bio- char soil repairer is provided since it resulting in high total fat (Dewi and Siswadi, 2019). The utilization of marginal land/ sandy land for agricultural cultivation either empowerment of law resources or economic empowerment. Mostly, the community of coastal areas is the poverty community that socio-economic life depends either on coastal resources or marine, generally, land utilization is only for the cultivation of certain plants such as corn, coconut, and papaya. Meanwhile, livestock manure waste around coastal areas from cattle maintained by the surrounding farmers. Society empowerment is a conceptual idea of improvement that provides society competences. Empowerment aims to create a society live that independent, either in educational, economic, or industrial side Gunawan (1999). The implementation of cow manure fertilizer (Dewi, 2014) repair and improvement of growing media of coastal land to be a good growing media as one of the solutions to improve marginal land. The research on society empowerment through the cultivation of Sesame (*Sesamum indicum.L*) is highly needed to be conducted. The use of superior/tolerant varieties of Sesame to marginal lands is an efficient technology compared with other technologies. It is efficient since the use of high yielding seame varieties, tolerant to particular plant pests, tolerant to environmental stress, suitable for a particular Eco regional could ensure high production (Weiss, 2000). The importance of Sesame value lies in its high productivity including oil content, protein, calcium, iron, and methionine (Shehu et al., 2009). The oil is obtained by extracting sesame seeds that are mechanically pressed. Oil production is quite influenced by growth conditions and sesame varieties. Sesame is suitable for a tropical area, up to an elevation of 1 - 1,200 meters above sea level (m dsl), sensitive to low temperatures, high rainfall, cloudy weather especially at disposal. The required optimal temperature during the growth phase is 25º - 30ºC with full light. Sesame could grow optimally on various kinds of lands, either fertile or non-fertile land, fertile sandy loam soils with a pH of 5.5 - 8.0 are known as the best land ever. Shallow ground. Another thing, Sesame requires good drains since it could not tolerant inundated, therefore the drainage channel is highly important on heavy soil and excess water can be removed immediately (Hariyono, 2005).

## METHODOLOGY

The research was conducted at the Coastal land area of Congot Kulon Progo. June – September 2020.A Randomized complete block design was used as research design, a single factor with 3 times repetitions. Parameter factor including M : Sesame Varieties. Sesame varieties namely as follows:
M1 = Winas 1
M2 = Winas 2
M3 = SBR 1
M4 = SBR 4
Cow Manure Fertilizer giving with dosage levels 30 ton/ha

### Research varaibles

Agronomic variables and plant growth analysis including plant height, number of branches, weight of seeds per plant, number of pods per plant, weight of dry pods per plant, age of harvest, society response on Sesame as alternative plant. The data will be analyzed by using Analysis of Variance, Duncant Test with significant level 5% will be tested if the data is significantly found.

## RESULTS AND DISCUSSION

### Plant height

Table 1 shows that the four Sesame varieties resulting different mean of Plan Height, Winas 1 is the highest and significantly different with Winas 2, SBR 1 is not significantly different with SBR 4. Likewise, Winas 2 is significantly the highest among SBR 1 and SBR 4. Meanwhile, SBR 1 is not significantly resulting different height with SBR 4. Nitrogen compounds contained in manure could stimulate vegetative growth of plants (plan height) stimulate shoots that produce leaves and also plant organs, on the other hand varieties is also contributes to fertilization response (Buckman and Braddy, 1982).

**Table 1.** Effect of varieties on sesame plant height.

| Varieties (M) | Mean of Plan Height (cm) | Result of Tukey Test 5% |
|---|---|---|
| M1 = Winas 1 | 123,1 | c |
| M2 = Winas 2 | 117,9 | b |
| M3 = SBR1 | 106,1 | a |
| M4 = SBR4 | 111,0 | a |

Note :Mean with same letter is not significantly different from each other

**Table 2.** Effect of varieties on number of sesame branches.

| Varieties (M) | Mean of Branches | Result of Tukey Test 5% |
|---|---|---|
| M1 = Winas 1 | 89,4 | b |
| M2 = Winas 2 | 85,5 | ab |
| M3 = SBR1 | 81,0 | a |
| M4 = SBR4 | 83,5 | a |

Note :Mean with same letter is not significantly different from each other

**Table 3**. Effect of varieties on number of pods.

| Varieties (M) | Mean of Pods (piece) | Result of Tukey Test 5% |
|---|---|---|
| M1 = Varietas Winas 1 | 101,3 | c |
| M2 = Varietas Winas 2 | 93,2 | b |
| M3 = Varietas SBR1 | 86,2 | a |
| M4 = Varietas SBR4 | 88,7 | a |

Note :Mean with same letter is not significantly different from each other

**Number of branches**

Table 2 shows that the four varieties resulting different number of branches, Winas 1 resulting the most widely number of branches and significantly different with SBR 4 and SBR 1, but it is not significantly different compared with Winas 2. Meanwhile, Winas 2 resulting number of branches more than SBR 4 and SBR 1. On the other side, SBR 4 is not significantly resulting different number of branches with SBR 1.

**Number of pods**

Table 3 shows that the four varieties resulting different number of pods, Winas 1 resulting the most widely number of pods and significantly different compared with Winas 2, SBR 1 and SBR 4. Likewise, Winas 2 resulting significantly number of pods compared with SBR 4 and SBR 1. Meanwhile, SBR 4 is not significantly resulting different number of pods compared with SBR 1. Sesame seeds formation on seed weight per plant showed significant interaction between addition of various kinds of fertilizers and the use of sesame cultivar. The fertilizer addition is significantly resulting seed weight per plant. Since fertilizer provides the nutrients needed to do vegetative and generative growth (Dewi, *et al* .2013 ). The nutrient uptake is also could be optimum. The nutrient ions which are absorbed by the roots are trans locatedto the leave to do a photosynthesis process. The more optimum of the leavegrowth resulting the more maximum of photosynthetic formed. Photosynthetic is beneficially to be used to growth and to cultivate such as branches, pods, and seed formation (Nurmasari and Taryono, 2013)

**Oil seed**

Table 4 shows that the four varieties resulting different number of oil seed, Winas 1 resulting the most widely fat level and significantly different compared with, SBR 1, Winas 2 and SBR 4. Mean while, SBR 1 resulting significantly fat level compared with Winas 2 and SBR 4. Improvement of Nutrient N in the soil will reduce the oil content in sesame seeds. Reduction of soil might be caused by the use of assimilates into amino acids, protein and productivity or seed formation. Besides, varieties response on environment is potentially cause it (Bhattacharya *et al*., 2010).

**Weight of 1000 seeds**

Table 5 shows that the four varieties resulting different mean of 1000 seeds weight, Winas 1 resulting the most widely 1000 seeds weight and significantly different compared with, Winas 2 and SBR 4 but it is not significantly different with SBR 1,. Meanwhile, SBR 1 resulting significantly weight of 1000 seeds but it is not significantly different compared with SBR 4 and Winas 2. On the other hand, SBR 4 is not significantly resulting

**Table 4.** Effect of varieties on sesame oil.

| Varieties (M) | Mean of Oil seed (%) | Result of Tukey tes 5% |
|---|---|---|
| M1 = Winas 1 | 44,47 | b |
| M2 = Winas 2 | 43,08 | a |
| M3 = SBR1 | 43,22 | a |
| M4 = SBR4 | 42,79 | a |

Note:Mean with same letter is not significantly different from each other

**Table 5.** Effect of varieties on weight of 1000 sesame seeds (g).

| Varieties (M) | Mean of 1000 seeds (g) | Result of Tukey Test 5% |
|---|---|---|
| M1 = Winas 1 | 3,41 | b |
| M2 = Winas 2 | 2,62 | a |
| M3 = SBR1 | 3,03 | ab |
| M4 = SBR4 | 2,63 | a |

Note:Mean with same letter is not significantly different from each other

**Table 6**. Effect of Varieties on Dry Weight (g).

| Varieties (M) | Mean of Dry Weight (g) | Result of Tukey Test 5% |
|---|---|---|
| M1 = Winas 1 | 30,53 | b |
| M2 = Winas 2 | 27,87 | a |
| M3 = SBR1 | 29,91 | ab |
| M4 = SBR4 | 28,21 | ab |

Note: Mean with same letter is not significantly different from each other

weight of 1000 seeds compared with SBR 1. The higher photosynthetic used for plan growth and cultivation, the higher assumption of photosynthetic to be trans-located and dry weight is improved (Okonmah, 2012 ).

## Dry weight

Table 6 shows that the four varieties resulting different mean of dry weight, Winas 1 resulting the most widely dry weight and significantly different compared to Winas 2, but it is not significantly different with SBR 1 and SBR 4. Meanwhile, SBR 1 resulting significantly dry weight more than SBR 4 and Winas 2 but it is not significantly different. On the other hand, SBR 4 is not significantly resulting dry weight compared with Winas 2. Result of interview with local society in Bugel found that Education of Sesame Cultivation Program beneficially contribute to local society economic and could be alternative additional plant in coastal land at coastal area. Sesame (*Sesamum indicum* L.) is a potential smallholder plantations commodity. Based on Economic analysis results, this commodity has high economic value and multifunction, supporting commodities of various industries. Sesame seeds oil used for food industry, cosmetics, and pharmacy. Identification of land resources is needed to improve sesame production in Indonesia. Proportionally, one of strategic areas for Sesame cultivation is in coastal area that does not explored yet, especially for agricultural. The optimization of coastal land area of Pantai Selatan in Yogyakarta is needed to get explored, since the exploration of coastal land area is not explored optimally. The use of Sesame product has been expanded to several areas in Africa and Middle East. Either the high export target, the need of sesame consuming in Indonesia is higher that its production. Sesame commodity is more stable compared with others commodity so it gives an opportunity to be cultivated monoculture by using agribusiness and agro-industry (Soekartawi, 2006), farm structure analysis that needs to be explored is revenue, expense and revenue structure. Farm revenue is a combination of product obtained and selling price. Expense is *is* the cost of operations that a company incurs to generate revenue. Revenue is gap between total revenue and total cost. Farming feasibility analysis is a process to know feasibility level or appropriateness of a business type by observing parameter or certain criteria. It could be stated that a successful business is when the profit could cover the total cost, direct costs as well as indirect costs. Financially, business feasibility could be analyzed based on several approach indicators or other analysis tool by using Break Event Point/BEP),Revenue-Cost ratio (R/C ratio),Benefit-Cost ratio (B/C ratio),Payback period etc (Prajnanta, 2006). It is in line with research conducted by Duhoon (2007) the study about optimization of sesame production through amelioration by using organic fertilizers were already done. In 2002—2004, an experiment was conducted involving four regions in India where the treatments tested were combination of organic

fertilizers wood ash 75 ka/ha, manure 3.75 t/ha, compost of Nimba 900 kg/ha, fishbone 75 kg/ha, Sulphur 20 kg/ha, phosphorus enriched with bacteria 5 kg/ha, *azotobacter* 5 kg/ha, and *Trichoderma viridae* (0.4%) yielded high BC ratio and net money return (NMR) .

## Conclusion

Society Economic Empowerment through Education to Coastal Society give responsive results and Sesame cultivation could be used as alternative of cultivation on coastal land, by using Winas 1 variety.

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