



The Effect of Various Compositions of Planting Media On The Growth of Red Calliandra Seedlings (*Calliandra calothyrsus Meissen*)

Ridwan¹, Annadira^{2*}, Rahmawati², Asgar Taiyeb², Muslimin²

¹ Faculty of Agriculture, Sintuvu Maroso University, Poso, Indonesia

² Faculty of Forestry, Tadulako University, Palu, Indonesia

*Correspondence E-mail: annadiraahsan25@gmail.com

Article History: Received: June 28, 2023; Accepted: August 20, 2023

ABSTRACT

The aim of this research was to determine the effect of various types of planting media on the growth of calliandra seedlings. This research was carried out in Wuasa Village, North Lore District, Poso Regency and was carried out for 7 months, namely from April to October 2021. The research method used a Completely Randomized Design (RAL) which consisted of 4 treatments, namely: PO = Land Without Fertilizer (control), P1 = Soil + Sand + Soil Liquid Fertilizer + Leaf Liquid Fertilizer, P2 = Soil + Sand + Solid Organic Fertilizer, P3 = Soil + Sand + Solid Organic Fertilizer + Soil Liquid Fertilizer + Leaf Liquid Fertilizer. Each treatment was repeated as many times as ten times, so that a total of 40 experimental units were needed. The observational data was analyzed using analysis of variance (F) with the Least Significant Difference (BNT) test at a significance level of 5%. The results of the research showed that treatment with various types of planting media had a very significant effect on increasing the number of shoots, increasing height, increasing the number of leaves and stem diameter on the growth of calliandra calothyrsus Meissen seedlings. Soil+sand+solid organic fertilizer+soil liquid organic fertilizer+liquid organic leaf fertilizer (P3) is the best medium for the growth of calliandra mesh (*Calliandra calothyrsus Meissen*) seedlings, in all the variables observed.

Keywords: Types of Media, Calliandra Calothyrsus Meissen, Critical Land.

1. INTRODUCTION

The red calliandra (*Calliandra calothyrsus meissen*) is a popular multi-purpose tree species because it is easy to plant, grows quickly and regenerates after repeated pruning. In various places in Indonesia, this tree is planted for firewood and forage for livestock, conservation and improvement of soil quality, as well as a shade tree for other plant species (Stewart et al., 2001). a source of fat protein of 31.35% which has an important role for ruminants (Novia et al., 2015).

Based on the nature of the red calliandra plant, the development of this plant must be carried out in a sustainable manner to meet the ecological and economic needs of the community. Seed readiness in terms of quality is one of the factors that must be considered in supporting forest development activities. The seeds to be used in planting must meet several requirements, namely healthy, appropriate size (height 30-50cm), the amount needed and available on time (Mansur,





2013). These requirements will be fulfilled if the treatment and care of the seedlings is as good as possible. The factors that influence the process of growth and development of seedlings are the fertility of the media, the use of fertilizers and the method of planting.

Soil conditions at the land location, especially in Wuasa Village, Lore Utara District, Poso Regency, contain N (0.17%-low), P (19.11 mg/100g-low), K (2.38 mg/100g-very low), C-Organic (0.91% very low), CEC (16.52 c mol(+) kg l-low) (Muslimin, 2018). And the results of the analysis show that the quality of the soil does not support the growth and development of seedlings. The use of topsoil for media with poor soil quality will cause growth. plant seeds become not optimal so that it requires the addition of fertilizer to the media. Suita et al, (2017) reported that growth of calliandra seedlings in soil media was relatively lower than seedlings in compost mixture media. Types of planting media such as soil, sand, and compost have different characteristics, so it is necessary to understand that the soil media is suitable for the type of plant. Therefore it is necessary to conduct research on the effect of various types of planting media on the growth of red calliandra (*Calliandra calothyrsus* Meissen) seedlings. Based on the background that has been described, the formulation of the research problem is which planting medium has a better effect on the growth of red calliandra seedlings (*Calliandra calothyrsus* Meissen). The purpose of this study was to determine the effect of various planting media compositions on the growth of red calliandra (*Calliandra calothyrsus* Meissen) seedlings. It is hoped that the results of this research can be used as information material in efforts to provide quality red calliandra (*Calliandra calothyrsus* Meissen) seeds.

2. RESEARCH METHODS

This research used a Completely Randomized Design (CRD) consisting of 4 treatments and 10 replications, so there were a total of 40 experimental units. The research data were analyzed using test variance analysis (F) with the Least Significant Difference Test (BNT) at the 5% level. This research carried out in Wuasa North Lore District, Poso Regency which was carried out for 7 months, namely from April to October 2021.

3. RESULTS AND DISCUSSION

Shoots Addition

To determine the effect of the treatment given on the shoots addition of calliandra seedlings, an analysis of variance was carried out which is presented in Table 1.





Table 1. Analysis of Variety of Shoots of Red Calliandra Seeds in the Treatment of Various Types of Growing Media Tried

SD	DF	S	MS	CF	TF
					5%
Treatment	3	40,6750	13,5583	38,43 *	2,86
Error	36	12,7000	0,3528		
Total	39	53,3750	Description * = Significant		

Information : SD (Source Of Diversity), DF (degrees of freedom), SS (squared sum), MS (Middle square), CF (Count Factor), TF (Table Factor)

Table 1 shows that the application of various planting media compositions to the growth of red calliandra seedlings (*Calliandra Calothyrsus* Meissen) has a significant effect on the shoots addition of calliandra seedlings. Therefore, further tests were carried out using the BNT test which is presented in Table 2

Table 2. Average Increase in the Number of Shoots of Red Calliandra Seeds on the Treatment of Various Types of Growing Media Tried

Treatment	Average	BNT 5%	KK
P0	1,30 ^a	0,58	22,63
P1	2,30 ^b		
P2	2,80 ^c		
P3	4,10 ^d		

Height Addition (cm)

To determine the effect of the treatment given on the height addition of calliandra seedlings, an analysis of variance was carried out which is presented in Table 3.

Table 3. Analysis of Variety of Plant Height addition in the Treatment of Various Types of Growing Media Tried.

SD	DF	SS	MS	CF	TF
					5%
Treatment	3	689,6750	229,8917	60,28 *	2,86
Error	36	137,3000	3,8139		
Total	39	826,9750	Description * = Significant		

Information : SD (Source Of Diversity), DF (degrees of freedom), SS (squared sum), MS (Middle square), CF (Count Factor), TF (Table Factor)

Table 3 shows that the application of various planting media compositions to the growth of red calliandra seedlings (*Calliandra Calothyrsus* Meissen) has a significant effect on the height



addition of calliandra seedlings. Therefore, further tests were carried out using the BNT test which is presented in Table 4.

Table 4. The average Increase in Plant Height in the Treatment of Various Types of Growing Media Tried.

Treatment	Average	BNT 5%	KK
P0	1,90 ^a	3,33	27,80
P1	5,60 ^b		
P2	7,20 ^c		
P3	13,40 ^d		

Number of Leaves Addition

To determine the effect of the treatment given on the leaves addition of calliandra seedlings, an analysis of variance was carried out which is presented in Table 5.

Tabel 5. Analysis of variance of the increase in the number of leaves in the treatment of various types of planting media that were tried.

SD	DF	SS	MS	CF	TF
					5%
Treatment	3	2550,8750	850,2917	63,18 *	2,86
Error	36	484,5000	13,4583		
Total	39	3035,3750	Description * = Significant		

Information : SD (Source Of Diversity), DF (degrees of freedom), SS (squared sum), MS (Middle square), CF (Count Factor), TF (Table Factor)

Table 5 shows that the application of various planting media compositions to the growth of red calliandra seedlings (*Calliandra Calothyrsus* Meissen) has a significant effect on the leaves addition of calliandra seedlings. Therefore, further tests were carried out using the BNT test which is presented in Table 6.

Table 6. The Average increase in the number of leaves in the treatment of various types of growing media that were tried.

Treatment	Average	BNT 5%	KK
P0	9,20 ^a	6,25	19,96
P1	12,90 ^b		
P2	21,60 ^c		
P3	29,80 ^d		

**Diameter Addition (cm)**

To determine the effect of the treatment given on the diameter addition of calliandra seedlings, an analysis of variance was carried out which is presented in Table 7.

Table 7. Analysis of variance of red calliandra stem diameter in the treatment of various types of growing media tried

SD	DF	SS	MS	CF	TF
					5%
Treatment	3	0,7188	0,2396	345,00*	2,86
Error	36	0,0250	0,0007		
Total	39	0,7438	Description * = Significant		

Information : SD (Source Of Diversity), DF (degrees of freedom), SS (squared sum), MS (Middle square), CF (Count Factor), TF (Table Factor)

Table 7 shows that the application of various planting media compositions to the growth of red calliandra seedlings (*Calliandra Calotrhyrsus* Meissen) has a significant effect on the diameter addition of calliandra seedlings. Therefore, further tests were carried out using the BNT test which is presented in Table 7.

Table 8. Stem diameter of red calliandra in the treatment of various types of growing media tried

Treatment	Average	BNT 5%	KK
P0	0,05 ^a	0,045	14,05
P1	0,10 ^b		
P2	0,20 ^c		
P3	0,40 ^d		

Table 1 shows the increase in the number of shoots, in the treatment (P3) soil+sand+solid organic fertilizer+soil liquid fertilizer+liquid leaf fertilizer showed the highest increase in the number of shoots (4.10), followed by (P2) soil+sand+fertilizer solid organic matter (2.80), (P1) soil + sand + liquid soil fertilizer + leaf liquid fertilizer (2.30), while the least was obtained in (PO) soil (1.30). It is suspected that the addition of solid organic fertilizer, liquid soil fertilizer, and leaf liquid fertilizer can meet the nutrient needs of red calliandra seedlings, especially N which plays a role in plant vegetative growth. According to Augustien and Suhardjono (2010) the formation of leaves by plants is strongly influenced by the availability of nitrogen and phosphorus nutrients in the medium and those available to plants. These two elements play a role in the formation of new cells and are the main components of organic compounds in plants such as amino acids, nucleic



acids, chlorophyll, ADP and ATP. In the treatment without applying compost, the plants experienced nutrient deficiencies, because the growing media did not provide enough nutrients.

The average high increase in seedling height was in the treatment (P3) of soil+sand+solid organic fertilizer+soil liquid fertilizer+liquid leaf fertilizer which was equal to (13.40) showing the highest average increase in seedling height, then followed by (P2) soil + sand + solid organic fertilizer of (7.20), (P 1) soil + sand + liquid fertilizer soil + leaf liquid fertilizer of (5.60), while the lowest was obtained on (PO) soil of (1.90). PO media (soil) provides relatively poor seedling growth compared to other media. This is presumably because the soil media without a mixture of sand and organic fertilizers becomes denser and less friable, thereby slowing down the growth of the seedlings. Soils that contain a lot of organic matter with a fine texture have more total pore space and relatively large proportions composed of small pores.

The average increase in the number of leaves that was high was in the Treatment (P3) of soil+sand+solid organic fertilizer+soil liquid fertilizer+liquid leaf fertilizer of (29.80 strands) indicating the highest average increase in the number of leaves, followed by (P2) soil+sand+solid organic fertilizer of (21.60 strands), (PI) soil+sand+soil liquid fertilizer+liquid leaf fertilizer of (12.90 strands), while the least was obtained at (PO) land of (9.20 strands). This is suspected by the addition of solid organic fertilizer, as well as the addition of liquid leaf organic fertilizer applied to red calliandra seedlings (*Calliaridra calothyrsus* Meissen) so that leaf growth is more optimal. Nasaruddin and Rosmawati (2010) stated that the application of liquid organic fertilizer is able to provide essential nutrients for plant growth, especially N elements. Provision of fertilizers with high nitrogen content can accelerate the growth and development of plant organs so that the number of leaves and leaf area increases faster. . The same thing was stated by Ohorella (2011), that liquid organic fertilizer contains the element potassium which plays an important role in every plant metabolic process, namely in the synthesis of amino acids and proteins from ammonium ions and plays a role in maintaining turgor pressure properly so that it allows smooth metabolic processes and ensure the continuity of cell elongation.

The highest average increase in stem diameter was in the treatment (P3) of soil+sand+solid organic fertilizer+soil liquid fertilizer+liquid leaf fertilizer of (0.40) indicating the greatest average increase in diameter, then followed by (P2) soil+sand+solid organic fertilizer of (0.20), (PI) soil+sand+soil liquid fertilizer+liquid leaf fertilizer of (0.10), while the smallest was obtained in (PO) soil of (0.05). This shows that the combination of giving solid organic fertilizers not only acts as a source of nutrients but also plays a role in improving chemical, physical, and increasing





soil microbial activity which is very beneficial for plants. In addition, the addition of liquid foliar fertilizer which is given directly through the leaves can increase photosynthetic results because nutrients are directly absorbed by the leaves and used for the photosynthesis process, so that the food supply that is distributed to all parts of the plant can be fulfilled quickly, so that it quickly overcomes nutrient deficiencies and does not problems in nutrient laundering are also able to provide nutrients quickly (Priangga, et al., 2013). Wulandari (2012) reported jabon seedlings fed with foliar fertilizer organic matter had better growth compared to other treatments. From the results of observations it can be seen that the media in PI and P2 have not been able to provide maximum results for the growth of red calliandra seedlings. This is presumably due to the incomplete combination of fertilizers so that the completeness of the nutrients is not maximized for the growth of red calliandra seedlings. Based on the results of research on all observation parameters, it proves that the media soil + sand + solid organic fertilizer + liquid soil fertilizer + liquid leaf fertilizer is a medium that suits the needs of red calliandra seeds and increases soil fertility at the study site so that the growth of red calliandra

Plant growing media is one of the factors that must be considered, because it affects the growth and development of plants to obtain optimal results. The various planting media used must continue to support plant growth and development so that productivity can be better. A mixture of several materials for planting media must produce an appropriate structure because each type of media has a different effect on plants. Based on the observational data in this study, it was shown that the treatment of the various types of planting media tested had a very significant effect on all observation parameters, namely the increase in the number of shoots, the increase in the number of shoots, the increase in the number of leaves, and the stem diameter of red calliandra seedlings (*Calliandra calothyrsus* Meissen).

4. CONCLUSION

The treatment of various types of planting media has a very significant effect on increasing the number of shoots, increasing height, increasing the number of leaves and stem diameter. on the growth of red calliandra (*Calliandra calothyrsus* Meissen) seedlings and Soil + sand + solid organic fertilizer + liquid soil fertilizer + liquid leaf fertilizer (P3) is the best medium for the growth of red calliandra (*Calliandra calothyrsus* Meissen) seedlings, in all observed variables with an average shoot growth of 4.10 , the average increase in height was 13.40 cm, the average increase in leaves was 29.80 pieces and the average increase in diameter was 0.40 mm.

Suggestion





Based on the results of this study, it can be suggested as follows: 1) It is necessary to have the results of soil analysis on the soil used after the addition of organic fertilizers. 2) It is necessary to conduct trials on various types of plants using the same type of media.

REFERENCES

- Dalimoenthe, S.L. 2013. Effect of organic growing media on growth and rooting in the early phases of tea seeds in nurseries. *Journal of Tea and Quinine Research* 16(1): 1-11
- Forest Watch Indonesia. 2014. Portrait of the State of Indonesia's Forests in 2009-2013. Bogor
- Hardiwinoto, S., Handojo, H., Nurjanto, Agung, W., Nugroho, and/ Widiyatno. Effect of composition and media materials on the growth of pine seedlings (*Pinus Mercury*). *Journal of Plantation Research* 10 (8):9-18.
- Hendrati, R.L., Hidayati, N. 2014. *Kaliandra (Calliandra Calothyrsus) Cultivation for Energy Source Raw Materials*. IPB Press.
- Jacobs, D.F., Landis, T.D., and Luna, T. 2015. Growing Media. In *Nursery Manual For Native Plants: A Guide For Tribal Nurseries*. Washington, D. C: US. Department Of Agriculture, Forest Service.
- Kung'u, J.B., Kihara, J., Mugendi, D.N. & Jaenicke, H. 2008. Effect Of Small Scale Farmers' Tree Nursery Growing Medium On Agroforestry Tree Seedlings' Quality In Mt. Kenya Region. *Scientific Research And Essays* 3(8),359-364
- Mansur, I. 2013. *Silvicultural Techniques for Reclamation of Former Mine Lands*. Book. Seameo Biotrop. Bogor. 125
- PgMathowa, T., Hababa, K., Mpofu, C., Legwaila, G.M., and Mojeremane, W. 2014. Influence Of Different Potting Media On The Growth Of Pod Mahogany (*Azelia Quanzensis*) Seedlings. *Int. J. Adv. Res. Biol.Sci. International Journal Of Advanced Research In Biological Sciences* 1(7): 105-113
- Muslim. 2018. Results of Soil Analysis of Air Terang Village, Tiloan District. Bulol District. Soil Science Unit Laboratory, Faculty of Agriculture. Tadulako University. Personal data.
- Nasaruddin and Rosmawati. 2010. Effect of Liquid Organic Fertilizer (POC) Fermented Gamal Leaves, Banana Stems and Coconut Coir on the Growth of Cocoa Seedlings. Faculty of Agriculture, Hasanuddin University
- Nora Augustien, N.K. and Suhardjono, H. 2010. The Role of Various Compositions of Organic Growing Media Against Mustard Greens (*Brassica Juncea L*) in Polybags. *Agritrop Journal of Agricultural Sciences* 2: 54-58
- Novia, Q., Y, Retnani, and LG. where. 2015. Digestibility of Dry Matter and Organic Matter of Kaliandra Leaves in Etawah Peranakan Goats. *Journal of Agriculture Agrosystem* 17 (O1): 113-120.





- Ohorella Z. 2011. The effect of doses of liquid organic fertilizer (POC) of cow dung on the growth and production of mustard greens (*Brassica sinensis* L). Faculty of Agriculture, Muhammadiyah University - Sorong. Osaigbovo, A.U., Nwaoguala, C.N.C., and Falodun, J.E. 2010. Evaluation Of Potting Media For The Production Of Pepper Fruit (*Dennetia tripetala*) Seedlings. *African Journal of General Agriculture* 6(2): 47-51
- Priangga, R., Suwarno, and Nur H. 2013. Effect of Liquid Organic Fertilizer Level on Production of Dry Material and Leaf Balance of Fourth Defoliation Elephant Grass Stem. *Animal Science Journal*. Apr. 2013. 1(1): 365-373
- Pramono AA, Kurniaty R. 2015. Growth of white jabon seedlings (*Anthocephalus cadamba*) aged 5 months in several media and shade.
- Roshetko, J.M., D.O. Lantagne, M.A Gold, B. Morikawa, and S. Krecik. 1996. Recommendations For Establishing And Managing *Calliandra Calothyrsus* As A Fodder Resource In Jamaica. In DO Evans, Ed. *International Workshop On The Genus Calliandra*. Forest, Farm, And Community Tree Research Reports. (Special Issue). Winrock International. Morrilton, Arkansas, Usa. P. 168-179
- Sudomo, A., Santosa, H.B. 2011. Effect of Organic Media and Mineral Soil on the Growth and Quality Index of Mindi (*Melia Azedarach* L) Seeds. *Journal of Forest Research and Nature Conservation* 8(3): 263-271
- Suita, E., Sudrajat, D.J., and Kurniaty R. 2017. Growth of Kaliandra Seeds in Several Compositions of Print Seedling Media in Nurseries and Fields. *Journal of Tanaman Forest Research* 14 (1): 73-84.
- Stewart, J., Mulawarman, J.M., Roshetko, and M.H. Powell. 2001. Production and Utilization of *Kaliandra* (*Calliandra Calothyrsus*): Field Guidelines. International Center For Research In Agroforestry (Icraf), Bogor, Indonesia And Winrock International, Arkansas, As.
- Tsakalimi, M., and Ganatsas, P. 2016. A Synthesis Of Results On Wastes As Potting Media Substitutes For The Production Of Native Plant Species, 2: 147-163.
- Turner, B.L., H. Nichols, G. Denny, and O. Doron. 2003. Atlas Of The Vascular Plants Of Texas, Vol. 1. Sida, Botanical Miscellany, No. 24. Botanical Research Institute Of Texas Press, Fort Worth.
- Wulandari 2012. Application of Organic Foliar Fertilizer to Increase the Growth of Jabon (*Anthocephalus Cadamba* Roxb. Miq.) Seedlings. *Tropical Silviculture* 03(02): 137 -142

