International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 02 February 2023
DOI: 10.47191/ijcsrr/V6-i2-65, Impact Factor: 5.995
IJCSRR @ 2023
www.ijcsrr.org

Study of Agronomic Characteristics of Citronella Plants *(Cymbopogon nardus L.)* Cultivated Agroforestry in Gayo Lues Regency, Aceh Province

Astro Arnol Sihotang[1]*, Abubakar Karim[2,3], Muhammad Rusdi[2], Syamratul Achwan[4]
[1] Student of Master of Agrotechnology of Syiah Kuala University
[2] Lecturer of Master of Agrotechnology of Syiah Kuala University
[3] Aceh for Coffee and Cocoa Research Centre, University of Syiah Kuala
[4] Lecturers of Agribusiness of Almuslim University

ABSTRACT: Citronella plants can grow on marginal lands. Cultivation of citronella by farmers in Gayo Lues Regency is carried out under pine stands and in open fields. This study aims to examine the agronomic characteristics of citronella cultivated agroforestry that was carried out in citronella gardens owned by farmers in all sub-districts in Gayo Lues Regency. This study used a field survey method and quantitative descriptive analysis. The citronella gardens observed were citronella orchards under pine stands and in open land on different soil types, altitudes and slopes, which were designated as homogeneous land units (SLH) of the observation site. Variables observed were variety, number of tillers, quantity, length and width of leaves, weight of wet herb, dry weight of herb and oil yield. The results showed that the agroforestry cultivation pattern of citronella plants under pine stands showed very good growth, which was indicated by the agronomic characteristics of citronella, namely the number of leaves; the leaves were longer and wider than when planted in open land. The agroforestry system of citronella cultivated in open land has agronomic characteristics of citronella, namely the number of tillers, the weight of the wet herb and the dry herb weight is higher than when cultivated under pine stands in Gayo Lues Regency. Citronella plants should be cultivated in open land (without shade) with Red-Yellow Podzolic soil type at an altitude of 1,000 – 2,000 m above sea level so that the best oil yield is obtained, namely SLH AAS44, without pine stands.

KEYWORDS: Agronomic, Agroforestry, Characteristic, Citronella plants.

RESEARCH BACKGROUND

Citronella plant (*Cymbopogon nardus* L) is an original plant from Asia which grows wild in tropical and subtropical regions such as Indonesia and China. The citronella plant is a type of herbal plant with fast growth and has a canopy structure that can reach approximately 1 m and is very potential in producing essential oils. According to Sulaswatty et al. (2019) essential oil produced from citronella is the result of distillation of the leaves and stems of plants in the form of aromatic compounds.

Citronella plants can grow on marginal lands. Cultivation of citronella by farmers in Gayo Lues Regency is carried out under pine stands and in open land exposed to direct sunlight (Mulyana et al., 2019; Syalahuddin, 2019; Afgan, 2020). Cultivating citronella under pine stands has an effect on leaf area, length and width, chlorophyll content, plant height, stem diameter, dry weight, and the ratio of roots to leaves and shoots (Sadewo, 2018).

This cropping pattern system of citronella has an impact on the yield of the essential oil produced. The research by Juliarti et al. (2020) showed that the citronella planting pattern in monoculture for the Sitrona 2 Agribun variety was able to significantly increase the yield compared to other cropping patterns. The monoculture cropping pattern of the Sitrona 2 Agribun variety produced a yield of 1.95%, the agroforestry-variety Sitrona 2 Agribun 1.50%, the monoculture-variety G2 1.01% and the agroforestry-variety G2 0.99%.

Land management with an agroforestry pattern needs to concern about two basic things, namely the intensity of sunlight and nutrient competition between forest plants and cultivated plants. The choice of forest plants in an agroforestry system must be able to support plant growth, such as being resistant to shade and having high productivity (Devi and Triyatno, 2020). One of the forest plant species that has developed a lot, especially in Gayo Lues Regency, is the pine plant. Citronella plants are also one of the plant commodities that can grow optimally in open and protected places (Firdaus et al., 2021).

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 02 February 2023
DOI: 10.47191/ijcsrr/V6-i2-65, Impact Factor: 5.995
IJCSRR @ 2023
www.ijcsrr.org

The combination pattern between pine and citronella plants can produce a combination that supports each other in an ecosystem and has high potential for development, because it has short and long term benefits. These benefits can be seen from three aspects, namely, ecological benefits for soil and water conservation, economic benefits from the added value produced by citronella in the form of essential oils, compost from biomass, while pine plants produce high sap so that they can increase economic value and use benefits land in terms of productivity, diversity, independence and stability (Yuliantoro et al., 2016).

The agroforestry system applied by Gayo Lues Regency farmers for citronella plants consists of two patterns, namely, an agroforestry pattern planted with pine stands and planted in open land. Based on the description above, it is necessary to do research on the study of the agronomic characteristics of citronella cultivated by agroforestry in Gayo Lues Regency.

RESEARCH METHOD

This research was carried out in citronella gardens owned by farmers in all sub-districts in Gayo Lues Regency. Soil analysis data comes from previous research that has been conducted (Mulyana, 2019). The research was conducted from January to March 2022.

This research employed field survey method with quantitative descriptive analysis. Descriptive research according to Sukmadinata (2011) is a type of research that describes existing phenomena, both phenomena that originate naturally and artificially. The observation site as a sampling site is determined based on the formed Homogeneous Land Units (SLH). The SLH was formed based on the overlapping maps of the distribution of citronella plants and the map of the distribution of pine trees in Gayo Lues Regency so that locations of citronella planted under pine stands and open land were obtained. Then the SLH formed was overlaid with a map of altitude, soil type and slope class in Gayo Lues Regency. Observation sites were determined based on SLH at various altitudes, soil types and slope classes in the Regency. The observation sites (sites) were observed at 2-3 random observation points and at each observation site the agronomic characteristics of citronella and pine trees were observed.

1. Determination of Homogeneous Land Units

Homogeneous Land Units (SLH) are areas of agroforestry systems, namely citronella and pine trees. SLH formed by pine stands and in open land is designated as an observation area. Furthermore, the SLH formed is superimposed with a map of soil type, elevation and slope so that an observation site is formed.

2. Measurement and Data Collection

Measurement and collection of data from research objects consisting of citronella plants, pine and biophysical areas of each observation site. In detail it can be explained that the observed variables of citronella include:

a. Varieties, distinguished by color, width and length of leaves.
b. The number of tillers, is calculated based on the number of tillers that have emerged and left the clump, per clump every 2 (two) months until harvest time.
c. The number of leaves, calculated based on the total number of leaves that grow in each clump, was observed together with the observation of the number of tillers.
d. The length of the leaf, calculated from the base of the stem to the tip of the longest leaf after straightening, was observed while observing the number of tillers.
e. Leaf width was calculated by randomly measuring 3 leaves per clump of citronella plants and observations were made simultaneously with observing the number of tillers. The leaves measured were the leaves on the third oldest midrib for each individual leaf and were measured in the middle of the leaf.
f. Wet and dry herb weights were weighed after harvest and then air-dried in the field for 2-3 days and then weighed again.
g. Oil yield, the yield yield is based on the weight of citronella oil obtained per unit weight of the herb after being refined. Distillation is carried out by farmers using the steam technique. The results of the refining yield were analyzed descriptively. The yield of citronella grass was calculated using the equation of A'yun et al. (2020):

$$\text{Yield (\%)} = \frac{the\ amount\ of\ oil\ produced}{the\ amount\ of\ material\ used} \text{ x } 100\%$$

h. Pine tree variables observed at each observation site include:

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 02 February 2023
DOI: 10.47191/ijcsrr/V6-i2-65, Impact Factor: 5.995
IJCSRR @ 2023
www.ijcsrr.org

- Pine Tree Height
- Pine Tree Density
- Pine tree trunk diameter

3. Data Analysis

Data analysis was carried out descriptively by comparing citronella grass under pine stands and in open land. Furthermore, also compared between varieties. The discussion is supported by regional biophysical data such as soil type, slope and altitude.

RESULT AND DISCUSSION

1. The growth of Citronella Plant

a. Number of tillers per clump

The results showed that the number of citronella plants per clump planted in open land was higher than when cultivated under pine stands. The number of tillers per clump is presented in Table 1.

Table 1. Number of Saplings of Citronella Per Clump Under Pine Stands And In Open Land

No	SLH	Under the pine stands	Observation month-		
			Number of tillers per clump (stems)		
			1	2	3
1	AAS1.	Yes	12	15	18
2	AAS2.	Yes	13	16	19
3	AAS3.	Yes	187	243	280
4	AAS4.	Yes	193	251	290
5	AAS5.	Yes	239	311	359
6	AAS6.	Yes	239	311	359
7	AAS7.	Yes	123	160	184
8	AAS8.	Yes	110	143	165
9	AAS9.	Yes	41	53	62
10	AAS10.	Yes	43	56	65
11	AAS11.	Yes	193	250	289
12	AAS12.	Yes	209	271	313
13	AAS13.	Yes	146	190	219
14	AAS14.	Yes	165	215	248
15	AAS15.	Yes	199	258	298
16	AAS16.	Yes	203	263	304
17	AAS17.	Yes	411	534	617
18	AAS18.	Yes	337	438	505
19	AAS19.	Yes	98	127	146
20	AAS20.	Yes	95	123	142
21	AAS21.	Yes	29	37	43
22	AAS22.	Yes	30	39	45
	Average		**151**	**196**	**226**
23	AAS23.	No	9	12	14
24	AAS24.	No	9	12	14
25	AAS25	No	151	197	227
26	AAS26	No	141	183	211
27	AAS27	No	164	213	246
28	AAS28	No	179	233	269
29	AAS29	No	96	125	144

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 02 February 2023
DOI: 10.47191/ijcsrr/V6-i2-65, Impact Factor: 5.995
IJCSRR @ 2023
www.ijcsrr.org

30	AAS30	No	103	134	155
31	AAS31	No	35	46	53
32	AAS32	No	35	45	52
33	AAS33	No	163	212	245
34	AAS34	No	163	211	244
35	AAS35	No	125	163	188
36	AAS36	No	124	161	186
37	AAS37	No	184	239	276
38	AAS38	No	161	210	242
39	AAS39	No	299	389	449
40	AAS40	No	442	575	663
41	AAS41	No	73	95	109
42	AAS42	No	74	96	111
43	AAS43	No	26	34	39
44	AAS44	No	21	27	32
	Average		**126**	**164**	**190**

Table 1 shows that the highest number of citronella plants per clump at 3 months old was found in the open land observation site; 663 stems per clump found in SLH AAS40, namely the Red-yellow Podzolic soil type and an altitude of 2,000 – 2,500 m asl compared to when planted in under a pine stand; 505 stems per clump found in SLH AAS18, which is a Red-yellow Podzolic soil type and an altitude of 1,000 - 2,000 m asl.

The number of tillers will be maximum if the plant has good genetic properties coupled with favorable treatment or in accordance with plant growth and development. In addition, the maximum number of tillers is also determined by the spacing, solar radiation, nutrients, and the cultivation of the plant itself. The number of tillers is an important parameter in essential oil production, because it can affect the oil content contained in it (Firdaus, 2021).

The results of A'yun's research (2020) show that different varieties also produce different numbers of tillers, where the Lenabatu variety produces 55 tillers per clump while the Mahapenggiri variety produces 71 tillers per clump. The Sitrona 1 Agribun variety has 73 tillers per clump and the Sitrona 2 Agribun variety has 67 tillers per clump (Balitro, 2016). In addition to the genetic characteristics of the citronella plant, it is optimal for soil that is fertile and rich in humus (N and K) and is not flooded, especially if the citronella plant is located in a mountainous area that receives regular rainfall. The availability of organic matter that contains lots of N and K nutrients and the use of optimum spacing are expected to produce high amounts of leaves, tillers and oil (Balitro, 2016). Citronella plants using dense spacing (1 m x 0.6 m) are not good for the development of citronella leaves and planting citronella under cocoa causes the growth of the number of tillers to be less because they are shaded so that the intensity of sunlight entering is less. The development of citronella plants generally uses a spacing of 1 m x 1 m, so that more light hits the leaves of the plant, and production of citronella depends on the weight of the harvested leaves (Daswir, 2010).

b. Number, length and width of leaves

The results of observing the number, length and width of citronella leaves planted in pine stands and in open land are presented in Table 2.

Table 2. Number, Length and Width of Citronella Leaves Planted Under Pine Stands and In Open Land in Gayo Lues Regency

No	SLH	Under the pine stands	Observation month-								
			Number of Leaves Per Clump (strands)			Leaf Length (cm)			Leaf Width (cm)		
			1	2	3	1	2	3	1	2	3
1	**AAS1.**	Yes	47	76	123	188	190	195	1,1	1,5	1,7
2	AAS2.	Yes	51	99	114	186	192	194	1,4	1,6	2,0
3	**AAS3.**	Yes	747	1.214	1.960	188	190	195	1,0	1,4	1,7

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 02 February 2023
DOI: 10.47191/ijcsrr/V6-i2-65, Impact Factor: 5.995
IJCSRR @ 2023
www.ijcsrr.org

4	AAS4.	Yes	774	1.508	1.740	186	192	194	1,2	1,5	2,0
5	AAS5.	Yes	957	1.555	2.512	181	185	190	1,1	1,4	1,7
6	AAS6.	Yes	957	1.866	2.153	182	183	187	1,3	1,5	2,0
7	AAS7.	Yes	491	799	1.290	183	187	190	1,0	1,5	1,9
8	AAS8.	Yes	439	856	987	175	183	189	1,0	1,3	1,5
9	AAS9.	Yes	164	267	431	179	182	186	1,2	1,2	1,6
10	AAS10.	Yes	174	338	391	180	185	189	1,0	1,4	1,7
11	AAS11.	Yes	770	1.252	2.022	173	180	183	1,0	1,4	1,9
12	AAS12.	Yes	835	1.628	1.879	176	180	182	1,1	1,4	2,0
13	AAS13.	Yes	585	951	1.536	174	178	182	1,4	1,7	1,9
14	AAS14.	Yes	660	1.287	1.485	179	184	189	1,0	1,4	1,7
15	AAS15.	Yes	795	1.292	2.087	169	172	176	1,0	1,5	2,0
16	AAS16.	Yes	810	1.580	1.823	168	174	178	1,0	1,7	1,9
17	AAS17.	Yes	1.644	2.672	4.316	170	172	174	1,1	1,5	2,0
18	AAS18.	Yes	1.769	3.449	3.980	167	170	172	1,3	1,4	1,5
19	AAS19.	Yes	390	634	1.024	172	174	179	1,0	1,5	1,9
20	AAS20.	Yes	378	737	851	173	175	181	1,0	1,4	1,7
21	AAS21.	Yes	114	185	299	167	172	174	1,0	1,5	1,9
22	AAS22.	Yes	120	233	269	169	173	176	1,4	1,5	2,0
Average			**621**	**1.113**	**1.512**	**176,59**	**180,59**	**184,32**	**1,12**	**1,46**	**1,83**
23	AAS23.	No	45	83	109	85	88	90	1,1	1,3	1,5
24	AAS24.	No	56	72	98	83	87	91	1,3	1,5	1,5
25	AAS25	No	1.060	1.378	1.817	81	86	92	1,0	1,3	1,6
26	AAS26	No	844	1.280	1.688	88	90	93	1,2	1,5	2,0
27	AAS27	No	984	1.706	1.969	82	85	89	1,0	1,2	1,5
28	AAS28	No	1.074	1.629	2.149	79	81	84	1,0	1,5	2,0
29	AAS29	No	481	875	1.154	76	79	85	1,0	1,6	1,9
30	AAS30	No	516	805	1.239	77	81	83	1,4	1,6	1,7
31	AAS31	No	211	319	421	74	77	79	1,1	1,4	1,7
32	AAS32	No	175	318	419	76	77	81	1,0	1,5	2,0
33	AAS33	No	817	1.487	1.960	71	74	76	1,2	1,5	1,8
34	AAS34	No	813	1.480	1.951	72	75	77	1,0	1,5	2,0
35	AAS35	No	753	1.142	1.506	72	75	77	1,3	1,7	1,9
36	AAS36	No	743	1.126	1.485	73	74	76	1,0	1,0	2,0
37	AAS37	No	919	1.672	2.205	74	77	78	1,0	5,0	2,0
38	AAS38	No	968	1.467	1.935	72	75	79	1,0	1,3	1,7
39	AAS39	No	1.796	2.723	3.591	67	69	71	1,0	1,5	2,0
40	AAS40	No	2.357	3.064	4.041	69	73	76	1,0	1,4	1,8
41	AAS41	No	437	662	873	69	74	79	1,0	1,0	1,5
42	AAS42	No	519	674	889	69	73	97	1,4	1,5	1,5
43	AAS43	No	184	239	315	69	71	73	1,1	1,5	1,8
44	AAS44	No	147	191	252	60	65	67	1,3	1,5	2,0
Average			**723**	**1.056**	**1.458**	**74,45**	**77,55**	**81,50**	**1,11**	**1,42**	**1,79**

Table 2 shows that the highest number of leaves of citronella plants aged 3 months was obtained when cultivated under pine stands, namely 4,316 leaves found in SLH AAS17, with Red Yellow Podzolic soil type and an altitude of 1,000 - 2,000 m asl

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 02 February 2023
DOI: 10.47191/ijcsrr/V6-i2-65, Impact Factor: 5.995
IJCSRR @ 2023
www.ijcsrr.org

compared to when planted on land open, namely 4,041 strands found in SLH AAS40, with a Red Yellow Podzolic soil type and an elevation of 1,000 – 2,000 m above sea level.

Based on the research results, the longest leaf length of citronella plants aged 3 months is found under pine stands that is 195 cm found in SLH AAS1 and AAS3, with the soil type Complex Podzolic Brown, Podsol and Litosol and altitudes of 1,000 – 2,000 m asl compared to when planted in open land, which is 97 cm found in SLH AAS42, with complex soil types of Podzolic Brown, Podsol and Litosol at an altitude of 0 – 1,000 m asl. This is due to the influence of the high intensity of sunlight which results to the shorter the leaf growth. The lower the intensity of sunlight caused by the presence of shade, the longer the leaves of the citronella plant. Shade plants can affect the main crop, namely citronella plants in terms of leaf area, length, and width, as well as total chlorophyll content, plant height, stem diameter, total dry weight, and root to leaf and shoot ratio (Perrin et al., 2013). Shade will result in an increase in the area and shape of the leaves to efficiently capture incoming light so that leaf growth is faster (Li et al., 2016). The intensity of sunlight affects the rate of plant photosynthesis which ultimately affects plant growth (Voriskova et al. 2019).

Table 2 also shows that the leaf width of a 3-month-old citronella plant planted under pine stands and in open land has an optimal leaf width of 2 cm found in SLH AAS2, 4, 6, 12, 15, 17, 22, 26, 28, 32, 34, 36, 39 and 44, with Brown, Podsol and Liosol Complex Podzolic soil types and Red Yellow Podzolic soil types and altitudes of 1,000 – 2,000 m asl. The agronomic characteristics of citronella plants, if cultivated, will form an optimal leaf width of up to 2 cm until the plant is old. For this reason, so that leaf growth can be better, a humid climate is needed. The research results of Sukarno et al. (2022) showed that the daytime air temperature in shaded and non-shaded citronella fields was different, namely 30.6°C in unshaded land and 28.9°C in shaded land. In the afternoon, the air temperature in the two fields did not differ, which was 23°C. So as to produce a different citronella growth. Optimal growth and development can be achieved if the plant photosynthesis process goes well and this is largely determined by the availability of water, CO2, light, temperature and nutrients (Kumar et al., 2020).

1. Citronella Plant Production

a. Weight of Wet and Dry Terna, and Yield

The results showed that the weight of wet and dry herb per clump, and the oil yield of citronella plants grown in open land and pine stands, are presented in Table 3.

Table 3 shows that the production of citronella plants is better planted in open land which shows the highest average wet herb weight, namely 25.88 kg at SLH AAS39, with Red Yellow Podzolic soil type and an altitude of 1 000 – 2000 m asl, compared to when planted under pine stands, which is 25.58 kg at SLH AAS18, with Red Yellow Podzolic soil type and an altitude of 1,000 – 2,000 m asl.

Table 3 also shows that the dry herb weight of citronella plants is higher when planted in open land, the highest average dry herb weight is 15.53 kg in SLH AAS39, with the Red Yellow Podzolic soil type and an altitude of 1,000 – 2,000 m asl. compared to citronella plants planted under pine stands, which is 15.35 kg at SLH AAS18, with red-yellow podzolic soil type and an altitude of 1,000 – 2,000 m asl. The yield of citronella plants is better when planted in open land, the highest average yield is 1.95% at SLH AAS44, with Red Yellow Podzolic soil type and altitude of 1,000 – 2,000 m above sea level, compared to when citronella is planted under pine stands, namely 1.89% in SLH AAS15, with a Red-Yellow Podzolic soil type and an altitude of 1,000 – 2,000 m asl.

Table 3. Weight of Wet and Dry Herb, and Yield of Citronella Plants Cultivated Under Pine Stands and in Open Land in Gayo Lues Regency

No.	SLH	Under the pine stands	Wet Livestock Weight per Clump (kg)	Weight of Terna Keing per Clump (kg)	Yield (%)
1	AAS1.	Yes	0,68	0,41	1,64
2	AAS2.	Yes	0,79	0,47	1,80
3	AAS3.	Yes	12,08	7,25	1,85
4	AAS4.	Yes	11,85	7,11	1,77
5	AAS5.	Yes	14,14	8,48	1,69
6	AAS6.	Yes	13,84	8,30	1,67

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 02 February 2023
DOI: 10.47191/ijcsrr/V6-i2-65, Impact Factor: 5.995
IJCSRR @ 2023
www.ijcsrr.org

7	AAS7.	Yes	7,05	4,23	1,64
8	AAS8.	Yes	6,90	4,14	1,81
9	AAS9.	Yes	2,63	1,58	1,83
10	AAS10.	Yes	2,59	1,55	1,72
11	AAS11.	Yes	12,60	7,56	1,87
12	AAS12.	Yes	12,56	7,54	1,74
13	AAS13.	Yes	9,56	5,74	1,88
14	AAS14.	Yes	9,53	5,72	1,68
15	AAS15.	Yes	13,13	7,88	1,89
16	AAS16.	Yes	13,09	7,85	1,86
17	AAS17.	Yes	25,46	15,28	1,77
18	AAS18.	Yes	25,58	15,35	1,67
19	AAS19.	Yes	6,08	3,65	1,78
20	AAS20.	Yes	5,96	3,58	1,82
21	AAS21.	Yes	1,84	1,10	1,84
22	AAS22.	Yes	1,95	1,17	1,88
Average			**9,54**	**5,72**	**1,78**
23	AAS23.	No	0,71	0,43	1,81
24	AAS24.	No	0,64	0,38	1,69
25	AAS25	No	12,15	7,29	1,71
26	AAS26	No	11,89	7,13	1,87
27	AAS27	No	14,63	8,78	1,88
28	AAS28	No	14,55	8,73	1,80
29	AAS29	No	7,13	4,28	1,70
30	AAS30	No	7,20	4,32	1,69
31	AAS31	No	2,78	1,67	1,76
32	AAS32	No	2,66	1,60	1,76
33	AAS33	No	12,86	7,72	1,81
34	AAS34	No	12,75	7,65	1,80
35	AAS35	No	9,64	5,78	1,70
36	AAS36	No	9,68	5,81	1,73
37	AAS37	No	13,16	7,90	1,65
38	AAS38	No	12,90	7,74	1,77
39	AAS39	No	25,88	15,53	1,91
40	AAS40	No	25,80	15,48	1,63
41	AAS41	No	6,04	3,62	1,84
42	AAS42	No	6,11	3,67	1,76
43	AAS43	No	2,06	1,24	1,68
44	AAS44	No	1,91	1,15	1,95
Average			**9,69**	**5,81**	**1,77**

Yield is a point of success in the field of processing. The results of research by Juliarti et al. (2020) showed that the monoculture cropping pattern of citronella plants was able to increase the yield significantly compared to other cropping patterns, where the monoculture cropping pattern produced a yield of 1.95% and agroforestry 1.50%. In addition, spacing also affects the yield of the oil produced, where the various treatments of spacing produce yields of 0.15 - 0.52% (Slamet et al., 2013) and 0.60 - 1.20% (Sulaswatty et al. al., 2019). The research of Sembiring and Manoi (2015) also show that withering and refining time also affect the yield of the oil produced. The highest yield of oil was obtained from the long treatment of distillation for 4-6 hours, and

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 02 February 2023
DOI: 10.47191/ijcsrr/V6-i2-65, Impact Factor: 5.995
IJCSRR @ 2023
www.ijcsrr.org

oil was obtained at 0.68 - 2.17%. The oil yield is affected by the distillation time, the longer the material is refined, the more oil is produced. In addition to the refining factor, oil yield is also affected by withering. The amount of oil produced from fresh and withered ingredients is different. The yield of fresh citronella oil is 0.28 - 0.69% compared to when the material is withered before being refined 1.30 - 2.17% and the dry matter is 0.96 - 1.42%.

CONCLUSION

The agroforestry system of citronella plants cultivated under pine stands has an impact on the agronomic characteristics of citronella; the number, length and width of leaves are higher than when planted in open land in Gayo Lues Regency. The agroforestry system of citronella cultivated in open land has an impact on the agronomic characteristics of citronella, that are the number of tillers, the weight of wet herb and dry herb weight is higher than when cultivated under pine stands in the Regency. The citronella agroforestry cropping pattern system cultivated in open land has the best oil yield, namely at SLH AAS44 with Red Yellow Podzolic soil type and an altitude of 1,000 – 2,000 m asl.

REFERENCES

1. Afgan, M.I., 2020. *Analisis Perubahan Tutupan Lahan Hutan Pinus (Pinus merkusii) Menjadi Kebun Serai Wangi (Cymbopogon nardus) (Studi Kasus: Kampung Sekuelen, Kampung Penosan, dan Kampung Peparik Gaib Kecamatan Blang Jerango Kabupaten Gayo Luess)*. Fakultas Pertanian. Universitas Syiah Kuala. Banda Aceh.
2. A'yun, Q., Hermana, B. dan Kalsum, U., 2020. Analisis rendemen minyak atsiri serai wangi (Cymbopogon nardus (L.) pada beberapa varietas. *Jurnal Pertanian Presisi*, 4 (2), 160-173.
3. Balitro [Balai Penelitian Tanaman Rempah dan Obat]. 2016. Laporan Tahunan Balai Penelitian Tanaman Rempah dan Obat. Bogor: Balai Penelitian Tanaman Rempah dan Obat.
4. Daswir., 2010. Peran Serai wangi sebagai tanaman konservasi pada pertanaman kakao di lahan kritis. *Balai Penelitian Tanaman Obat dan Aromatik*, 21 (2), pp.117-128.
5. Devi, S. dan Triyatno, T., 2020. Perubahan penutup lahan dan penggunaan lahan kawasan hutan lindung menjadi lahan agroforestri menggunakan metode indeks vegetasi Kecamatan Panti, Kabupaten Pasaman. *Jurnal Buana*, 4(6), pp.1189-1201.
6. Firdaus., Khumaira dan Rosdiana, E., 2021. Analisis finansial usahatani serai wangi di Kabupaten Gayo Lues Provinsi Aceh. *SEMDI UNAYA*, pp.225-235.
7. Juliarti, A., Wijayanto, N. dan Mansur, I., 2021. The Growth of Lemongrass (*Cymbopogon Nardus* (L.) RENDLE) in Agroforestri and monoculture system on post-coal mining revegetation land. *Jurnal Manajemen Hutan Tropika*, 27 (1), pp.15-15.
8. Kumar, A., Gupta, A., Aggarwal, A. dan Bhargav, V., 2020. Efficacy of bioinoculants on biomass, nutritional status and yield of lemon grass, Cymbopogon citratus (DC.) Stapf. *Journal of Spices and Aromatic Crops*. 29 (1), pp.59−66.
9. Li, A.M., Li, S.H., Wu, X.J., Zhang, J., He, A.N., Zhao, G. dan Yang, X., 2016. Effect of light intensityon leaf photosynthetic characteristics and accumulation of flavonoids in Lithocarpus litseifolius(Hance) Chun. (Fagaceae). *Journal Open Journal of Forestry*. 6, pp.445−459.
10. Mulyana, M., Manfarizah, M. dan Karim, A., 2019. Analisis Kesesuaian Lahan untuk Pengembangan Tanaman Serai wangi di Kabupaten Gayo Lues. *Jurnal Ilmiah Mahasiswa Pertanian*, 4(1), pp.655-663.
11. Perrin, P.M., Fraser, J.G. dan Mitchell., 2013. Effects of shade on growth, biomass allocation and leafmorphology in European yew (Taxus baccata L.). *Journal The European Journal of Forest Research*. 132 (2), pp.211−218.
12. Sadewo, P., 2018. *Agroforestri Serai Wangi (Cymbopogon Nardus L.) Generasi M1 Hasil Iradiasi Sinar Gamma Dengan Jati* (*Tectona Granadis* Lin). Departermen Silvikultur Fakultas Kehutanan. Bogor.
13. Sembiring, B. B. R. dan Manoi, F., 2015. Pengaruh pelayuan dan penyulingan terhadap rendemen danmutu minyak serai wangi (*Cymbopogom nardus*). *Prosiding Seminan Nasional SwasembadaPangan Politeknik Negeri Lampung*, 2 (1), pp. 447-452.

International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 06 Issue 02 February 2023
DOI: 10.47191/ijcsrr/V6-i2-65, Impact Factor: 5.995
IJCSRR @ 2023
www.ijcsrr.org

14. Slamet, Supranto, dan Riyanto., 2013. Studi Perbandingan Perlakuan Bahan Baku dan Metode Destilasi terhadap Rendemen dan Kualitas Minyak Atsiri Sereh Dapur (Cymbopogon citratus). *ASEAN Journal of Systems Engineering*, 1(1), 25–31.
15. Sukarno, N., Laelandi, R., Qayim, I. dan Amelya, M. P., 2022. Karakteristik Mikoriza Arbuskula Tanaman Serai Wangi (Cymbopogon nardus L.) di Lapangan Ternaungi dan Tidak Ternaungi. *Jurnal Ilmu Pertanian Indonesia (JIPI)*, 27 (1), pp.109-119.
16. Sulaswatty, A., Rusli, M. S., Abimanyu, H., dan Silvester Tursiloadi. 2019. *Menelusuri Jejak Minyak Serai Wangi dari Hulu sampai Hilir. in: Quo Vadis Minyak Serai Wangi dan Produk Turunannya Lembaga Ilmu Pengetahuan Indonesia (LIPI) Pres*, Jakarta 1–12.
17. Sukmadinata, dan Syaodih, N. 2011. *Metode Penelitian Pendidikan*. Bandung: Remaja Rosdakarya.
18. Syalahuddin, T. 2019. *Distribusi Spasial Tanaman Kopi Arabika dan Serai Wangi serta Hubungannya Dengan RTRW di Kabupaten Gayo Lues*. Program Studi Ilmu Tanah Fakultas Pertanian. Universitas Syiah Kuala. Banda Aceh.
19. Voriskova, A., Jansa, J., Puschel, D., Vosatka, M., Smilauer, P. dan Janouskova, M., 2019. Abiotic contexts consistently influence mycorrhiza functioning independently of the composition of synthetic arbuscular mycorrhizal fungal communities. *Journal Mycorrhiza*. Pp.1−13.
20. Yuliantoro, D., Atmolo, B.A. dan Siswo. (2016). Pohon Sahabat Air. Solo: Balai Penelitian dan Pengembangan Teknologi Pengelolaan Daerah Aliran Sungai.