ABOVE AND BELOW GROUND BIOMASS OF ACACIA HYBRID INDIVIDUAL TREE AT LA NGA FORESTRY COMPANY LIMITED, DONG NAI PROVINCE

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SUMMARY

The study was conducted to determine the above and below ground biomass of Acacia hybrid (*Acacia auriculiformis*Acacia mangium*) of different diameter classes at La Nga Forestry Company Limited in Dong Nai. A typical standard tree survey method was used to measure fresh biomass, the study cut down 45 trees of different ages and diameters for measuring the fresh biomass with 4 parts including trunk, branches, leaves (above-ground biomass), and roots (below-ground biomass). The analysis of dry biomass was conducted by oven method at 105^0C (for stems, roots and branches) and 80^0C (for leaves). The results showed that the above and below ground biomass of individual trees at different diameter and ages were significantly different. On average, dry biomass above ground of individual plants accounted for 82%, and below ground biomass accounted for 18%. The percentage of biomass of all parts of Acacia hybrid was mainly in the trunk (69%), followed by the roots (18%), branches (10%), and finally the leaves (3%). The total biomass of individual plants fluctuated strongly between diameter classes and increased with diameter, dry biomass was 6.7 - 484 kg corresponding to diameters classes from 4 to 24 cm. The total dry biomass of an individual tree with a diameter of 14 cm and a height of 16.9 m averaged 141.7 kg/plant, of which the above ground part reached 118.0 kg/tree and the below-ground part reached 23.7 kg/tree.

Keywords: Above-ground biomass, Acacia hybrid, Below-ground biomass, individual tree, La Nga - Dong Nai Forestry Company Limited.

1. INTRODUCTION

Climate change is the result of global warming. Climate change is harmful to all components of the environment such as high sea level, increased drought, flooding, changing in climates, increasing diseases, water shortages, biodiversity loss and increasing extreme weather (UNFCCC, 2005). One of the solutions to mitigate climate change is the ability of forests to absorb carbon (Cheng et al., 2015; Xu et al., 2007). Forest storage is about 60% above ground carbon and 40% below ground carbon (IPCC, 2003). Therefore, forest ecosystems play an important role in the global carbon cycle and in balancing the CO_2 concentration of the earth (Chaiyo et al., 2011; Houghton, 2007; Pugh et al., 2019). Carbon storage tank in forest ecosystems vary with age and diameter class (Clark et al., 2004; Kurz and Apps, 1995), and it also depends on the forest type and species composition in the ecosystem (Knohl et al., 2003).

According to FAO (2016), plantation forest was covered about 291 million hectares, accounts for 7% of the global forest area. Because of the efficient carbon storage, plantation forests are considered as a solution against increasing atmospheric CO_2 concentrations (Sands et al., 1999; Hunter, 2001; Kurz et al., 2009). In statistic of the Ministry of Agriculture and Rural Development (2020), Vietnam's planted forest area was about 4.4 million hectares, accounting for 30% of the country's forest area. With a relatively large planted forest area, the priority of research directions on forestry is increasing, especially

the calculation method of biomass and carbon accumulation capacity of plantations (Brown, 1986). Plantation biomass has been carried out by many researchers in the world (Brown et al., 1986; FAO, 1997; Fang et al., 2001; Zhang et al., 2012;) and in Vietnam (Vu Van Thong, 1998; Ngo Dinh Que et al., 2006; Vo Dai Hai et al., 2009; Vu Tan Phuong, 2011; Tran Thi Ngoan and Nguyen Tan Chung, 2019; Cuong et al., 2020). In general, the studies on biomass of planted forests were carried out in many localities, varying by different tree species, soil class and ages.

Acacia hybrid has been identified as one of the key species that bring great value to the forestry sector in Vietnam (Le Dinh Kha and Ha Huy Thinh, 2016). It is concentratedly planted at La Nga Forestry Company with a total area of about 2,071 ha (La Nga Forestry Company Limited, 2020). It has been many studied on biomass of Acacia hybrid forest in there, but the number of studies on underground biomass is still very small. Up to now, in the area, there has not been any formal researches on the above and below ground biomass of Acacia hybrid plantations, especially biomass associated with specific diameter and ages. Therefore, the study on Acacia hybrid biomass was carried out to provide important information as a basis for estimating the carbon sequestration capacity of forests, as well as a scientific basis for the valuation of Acacia hybrid forests in Vietnam.

2. RESEARCH METHODOLOGY

2.1. Study site

The study area was carried out at La Nga Forestry Company Limited in Dong Nai province with geographical coordinates in range of 11^0 - 11^023 North latitude and from 107^0 to $107^022'$ East longitude, total area is about 14,658.55 ha under administrative management of Thanh Son and Ngoc Dinh communes, Dinh Quan district, Dong Nai province. The climate of study area is a tropical sub-equatorial monsoon climate, the average annual temperature is 25^0C, the average rainfall is 3293 mm, the average annual humidity is 83%. The terrain is located in the transition zone from the South Central Highlands to the plain, in the form of rolling hills with the highest absolute height of 272 m and the lowest height is 60 m. In the study area, it has some soil types including gray basalt soil accounting for 16%, red basalt soil accounting for 13%, red-yellow fertility soil developed on schist accounting for 62% and alluvium soil accounting for 9%. Plantation forest in the study area by 2020 was 14,658.55 ha, of which the area of Acacia hybrid *(Acacia auriculiformis*Acacia mangium)* was about 2,071 ha (MARD, 2020).

2.2. Reseach methods

The study was conducted on Acacia hybrids from the age of 2 to 10 years old at La Nga Forestry Company Limited in Dong Nai. The study focused on determining the biomass above and below ground of Acacia hybrids at different diameters and ages, including biomass by parts: above ground (trunk, branches, leaves) and below ground (stump, roots).

2.2.1. Field data collection

To estimate above and below-ground biomass, the research used a destructive method based on the diameter and age of the tree. 45 trees were cut for estimating biomass for all ages, from 3 to 6 trees/age. The diameter class of all trees was in the range of 4 – 22 cm, each diameter class was spaced 2 cm. The above ground portions were separated into trunk wood, branches wood and leaves. To measure the below ground biomass, stump and roots were dug up. Total collected samples were 6 sample/tree (3 trunk samples, 3 samples of branch, leaves and roots). Each sample was about 0.5 - 1 kg. Samples were separately labeled and analyzed in the laboratory.

2.2.2. Estimation of above and below ground biomass

Estimation of dry biomass determined by oven method at 105^0C. Biomass samples were brought into the laboratory, dried at 105^0C for trunks, branches and roots; dried at 80^0C for leaves until constant weight, dried in laboratory for 72 hours (weighed three times with constant value). After drying, the samples were weighed again to determine the ratio between dry biomass and fresh biomass, based on ratio to determine the dry biomass weight for each plant part.

2.2.3. Data analyzing

The data processing method was mainly run on software Excel and Statgraghic centurion XVI.

(a) Determination of the conversion coefficient of fresh biomass to dry biomass (P):

- *Determine the ratio of fresh biomass to dry biomass (P):* Based on the biomass analysis samples in the laboratory, the conversion factor from fresh biomass to dried biomass was calculated according to the formula as:

$$Pi = \frac{Wki}{Wti} \qquad (1)$$

In which: Wki is the dry mass of i simple at 105^OC for trunks, branches and roots; at 80^0C for leaves; Wti is fresh biomass of i simple before drying.

- Determine the ratio of dry biomass of each parts by diameters class distribution: equal to the average value of the ratio between the dry biomass/fresh biomass of each part of samples in the same diameter class.

- Determination of total dry biomass of a tree: equal to the total value of dry biomass of all parts.

- Determination of dry biomass conversion factor: equal to the average value of dry biomass ratio by diameter class divided by 100.

(b) Biomass of tree: equal fresh biomass, dry biomass (trunk, branches, leaves and roots), total above and below ground biomass based on the principle of IPCC, 2006 (IPCC, 2006).

3. RESULT AND DISCUSSION

3.1. Fresh biomass of tree

3.1.1. Fresh biomass of Acacia hybrid in different diameter class

The result showed the biomass of tree increased with diameter class (4-24 cm). it included AGB and BGB (biomass of trunk, branches, leaves and roots).

Table 1. Fresh biomass of different parts of Acacia hybrid in different diameter classes

No	DBH (cm)	Hvn (m)	Fresh biomass of different parts of tree (kg)					Total (kg)	ABG (%)	BGB (%)
			AGB	Trunk	Branch	Leaves	Roots (BGB)			
1	4	6.2	10.6	7.1	1.3	2.2	3.6	14.2	74.9	25.1
2	6	9.5	18.2	14.7	2.0	1.6	5.0	23.3	78.4	21.6
3	8	12.0	31.1	23.7	4.2	3.3	8.5	39.6	78.6	21.4
4	10	14.7	68.7	54.0	9.0	5.7	19.0	87.6	78.4	21.6
5	12	14.8	90.3	69.4	13.0	7.9	18.7	108.9	82.8	17.2
6	14	17.8	145.6	121.7	15.5	8.5	35.8	181.4	80.2	19.8
7	16	18.9	208.6	170.7	26.1	11.9	40.3	248.9	83.8	16.2
8	18	21.0	274.0	226.1	31.9	16.0	63.0	337.0	81.3	18.7
9	20	23.0	329.2	289.2	27.9	12.2	72.0	401.1	82.1	17.9
10	22	21.9	449.9	372.4	48.5	29.1	103.0	552.9	81.4	18.6
11	24	26.5	744.1	637.5	87.3	19.3	128.0	872.1	85.3	14.7
Avg	**14**	**16.9**	**215.5**	**180.6**	**24.2**	**10.7**	**45.2**	**260.6**	**80.2**	**19.8**

The data from table 1 illustrates that, the trunk biomass reached the highest percentage, ranging from 7.1 kg to 637.5 kg, an average of 180.6 kg, accounting for 84% of the total fresh biomass of above ground and 69% of the total fresh biomass of Acacia hybrids. In which biomass of roots, branches and leaves accounted for 17%, 9% and 4% respectively of the total fresh biomass of individual tree.

In terms of diameter classes from 4 to 24 cm, the branches biomass varied from 1.3 kg to 87.3 kg, averaging 24.2 kg, accounting for 11% of the total above ground biomass; leaves biomass fluctuated from 2.2 to 19.3 kg, averaging 10.7 kg, accounting for 5% of the total above ground biomass; the last was the average roots biomass of 45.2 kg, accounting for 21% of the total above ground biomass.

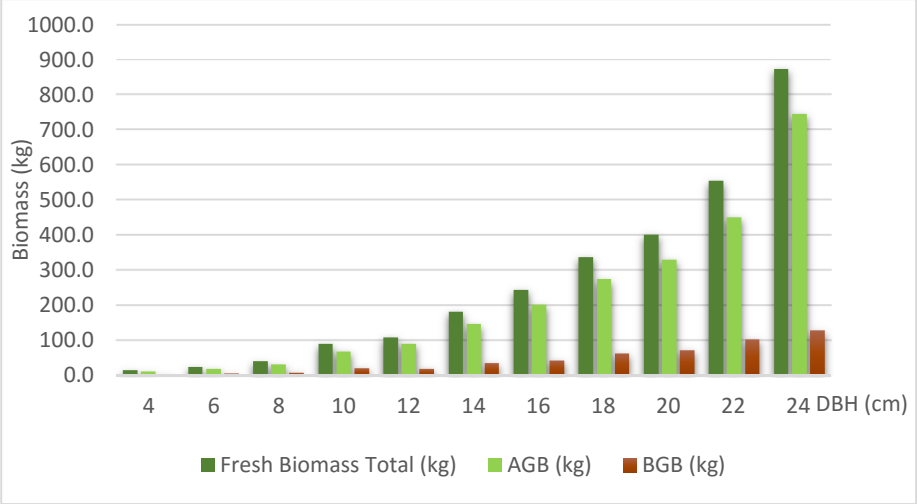

Figure 1. Above and below fresh biomass of Acacia hybrid

Data from table 1 and figure 1 shows that the total fresh biomass of individual plants increased from 14.2 kg (4 cm diameter class) to 181.4 kg (14 cm diameter class) and reached the highest level of 872.1 kg (24 cm diameter class). In which, fresh above ground biomass was greater than below ground biomass, the highest proportion was 85.3% (24 cm diameter class), the lowest proportion was 74.9% (4 cm diameter class), average proportion was 80.2%. The percentage of fresh below ground biomass of individual plant was low, averaging 19.8%, and the highest at the diameter class of 4 cm (25.1%), the lowest at the diameter class of 24 cm (14.7%).

Overall, the trunk biomass percentage of Acacia hybrid tended to increase with increasing diameter class, accounting for a large proportion of the total above ground biomass (84%) and also in the total biomass of trees (69%). Compared with the results on Acacia hybrid by Tran Quang Bao and Vo Thanh Phuc (2019) in Ba Ria - Vung Tau province, this rate was nearly 10% higher, similarly it was higher than the trunk biomass of some other species such as *Acacia mangium* (60%), *Pinus latteri* (52%) (Vo Dai Hai, 2008).

3.1.2. Fresh biomass of Acacia hybrid in different age

Total fresh biomass of Acacia hybrid increased in increasing of age, ranging from 22.9 kg (age 2) to 242 kg (age 6) and reached the highest at 441.5 kg (age 10) (table 2).

Table 2. Fresh biomass of different parts of Acacia hybrid in different age

Age (year)	DBH (cm)	Hvn (m)	Fresh biomass of different parts of tree (kg)					Total (kg)	ABG (%)	BGB (%)
			AGB	Trunk	Branch	Leaves	Roots (BGB)			
2	6.2	8.7	18.9	14.9	2.1	1.9	3.9	22.9	82.8	17.2
3	9.3	12.3	56.4	39.2	10.7	6.5	12.0	68.5	82.4	17.6
4	11.2	14.3	89.6	70.5	11.7	7.4	27.8	117.4	76.3	23.7
5	12.2	15.2	122.5	96.5	16.0	10.0	30.5	152.9	80.1	19.9
6	15.8	16.8	201.7	164.8	20.5	16.5	40.2	242.0	83.4	16.6
7	15.2	19.1	202.1	166.9	23.1	12.1	48.8	250.9	80.5	19.5
8	16.4	20.0	241.0	202.3	28.7	9.9	51.3	292.3	82.4	17.6
9	17.8	22.3	322.2	271.5	33.9	16.9	62.5	384.7	83.8	16.2
10	18.9	23.0	364.1	312.3	38.2	13.7	77.4	441.5	82.5	17.5
Avg	**13.7**	**16.9**	**179.8**	**148.8**	**20.5**	**10.5**	**39.4**	**219.2**	**81.6**	**18.4**

Data in table 2 shows that the Acacia hybrid biomass was concentrated mainly above ground, accounting for a high percentage (81.6%) while it was 18.4% below ground. The above ground biomass was the highest at the age 9 (83.8%), the lowest at the age 4 (76.3%), The percentage of fresh below ground biomass showed the highest 23.7% (age 4 the lowest 16.2% (age 9).

At different ages, biomass was concentrated mainly in trunk (83%) then roots (21%), branches (11%), leaf biomass accounted for the smallest biomass percentage (5%). This result is consistent with the study on fresh biomass of Acacia hybrid in Vietnam by Vo Dai Hai (2008).

3.2. Dry biomass of tree

3.2.1. Biomass conversion coefficient

The percentage of dry biomass of trunk, branches and leaves did not change much between diameter classes (table 3).

Table 3. Biomass conversion coefficient of Acacia Hybrid

DBH (cm)	Hvn (m)	Dry biomass percentage (%)					Average (kg)
		Dry above ground biomass				Dry below ground biomass	
		Total ABG	Trunk (Wsk)	Branches (Wbrk)	Leaves (Wlk)	Roots (Wrk)	
4	6.20	47.2	47.1	55.6	38.9	50.2	48.7
6	9.46	46.4	50.5	53.7	34.8	50.1	48.2
8	12.00	47.2	51.8	54.5	35.2	49.9	48.5
10	14.74	49.4	55.3	56.9	35.9	48.4	48.9
12	14.78	49.1	54.9	56.7	35.6	49.9	49.5
14	17.78	48.7	56.0	53.9	36.3	51.1	49.9
16	18.86	48.5	54.4	54.5	36.6	58.4	53.4
18	20.97	49.8	54.1	60.0	35.2	54.3	52.1
20	23.00	49.8	56.5	56.9	36.0	47.3	48.6
22	21.85	48.4	55.6	54.4	35.1	56.0	52.2
24	26.50	53.9	55.0	68.0	38.7	52.0	53.0
Average		**48.9**	**53.8**	**56.8**	**36.2**	**51.6**	**49.6**
Biomass conversion coefficient		**0.49**				**0.52**	**0.50**

The proportion of dry and fresh biomass of trunk was 53.8% in average. This proportion of branch was larger (average 56.8%) ranged from 53.7% to 68%. The average percentage of dry leaves biomass was 36.2%, ranging from 34.8 to 38.7%. In general, the proportion of dry and fresh aboveground biomass of Acacia hybrids ranged from 46.4 to 53.9%, with an average of 49%. This percentage in below ground accounted for 52%, average 50%. This result is approximately 4% larger than the dry/fresh biomass ratio of Vo Dai Hai (2008) when studying Acacia hybrid in Vietnam and 3% for it in Dong Nai province (Tran Thi Ngoan, 2019). It can be explained that the above those studies were averaged from 3 - 4 soil classes and were carried out on a large scale.

3.2.2. Dry biomass of Acacia hybrid

3.2.2.1. Dry biomass of Acacia hybrid in different diameter class

The fresh biomass in different diameter class of Acacia hybrid at La Nga Forest Company Limited were summarized in table 4.

Table 4. Dry biomass of different parts of Acacia hybrid in different diameter classes

No.	DBH (cm)	Hnv (m)	Dry biomass of different parts of tree (kg)					Total (kg)	ABG (%)	BGB (%)
			AGB	Trunk	Branch	Leaves	Roots (BGB)			
1	4	6.2	4.9	3.3	0.7	0.9	1.8	6.7	73.4	26.6
2	6	9.5	9.0	7.4	1.1	0.6	2.5	11.5	78.2	21.8
3	8	12.0	15.7	12.3	2.3	1.2	4.2	19.9	79.0	21.0
4	10	14.7	37.1	29.9	5.1	2.1	9.3	46.5	79.9	20.1
5	12	14.8	47.9	37.9	7.2	2.8	9.3	57.3	83.7	16.3
6	14	17.8	80.2	68.6	8.5	3.1	18.2	98.4	81.5	18.5
7	16	18.9	112.4	94.0	14.1	4.3	23.4	135.8	82.8	17.2
8	18	21.0	146.9	122.4	18.9	5.6	34.2	181.2	81.1	18.9
9	20	23.0	182.3	162.6	15.4	4.4	34.2	216.6	84.2	15.8
10	22	21.9	244.2	207.3	26.6	10.2	56.4	300.6	81.2	18.8
11	24	26.5	417.5	350.6	59.4	7.5	66.6	484.0	86.2	13.8
Avg	**14**	**16.9**	**118.0**	**99.7**	**14.5**	**3.9**	**23.7**	**141.7**	**80.5**	**19.5**

The data in table 4 shows that the total dry biomass of Acacia hybrid increased gradually from 4cm diameter class (6.7 kg/tree) to 14cm diameter class (98.4 kg/tree) and 24cm diameter class (484.0 kg/tree). Similar to fresh biomass, dry above ground biomass accounted for a high rate (80.5%), 61% higher than that of dry below ground biomass. The dryabove ground biomass accounted for the largest percentage at the diameter class of 24cm (86.2%), the lowest at the diameter class of 4cm (73.4%), this result was in contrast to the percentage of dry below ground biomass.

The dry biomass of trunk reached the highest value, averaging 99.7 kg/tree, ranging from 3.3 to 350.6 kg/tree. The dry biomass of branches increased gradually from 0.7 to 59.4 kg/tree from 4 to 24 cm in diameter class. The average dry biomass of leaves was 3.9 kg/tree and dry biomass of roots was 23.7 kg/tree. Calculation results showed that the proportion of dry biomass of Acacia hybrid in different diameter class was mainly concentrated on the trunk (average 70%), then on the roots (average 17%),

followed by branches (average 10%), the smallest were leaves (average 3%).

3.2.2.2. Dry biomass of Acacia hybrid in different age

Total dry biomass of Acacia hybrid varied with age, increasing gradually from 11.5 kg (age 2) to 238.2 kg (age 10) (table 5, figure 2).

Table 5. Dry biomass of different parts of Acacia hybrid in different age

No.	Age (Year)	DBH (cm)	Hnv (m)	Dry biomass of different parts of tree (kg)					Total (kg)	ABG (%)	BGB (%)
				AGB	Trunk	Branch	Leaves	Roots (BGB)			
1	2	6.2	8.7	9.4	7.6	1.1	0.7	2.1	11.5	82.0	18.0
2	3	9.3	12.3	28.8	20.7	5.7	2.4	5.5	34.3	84.0	16.0
3	4	11.2	14.3	45.7	36.4	6.8	2.5	15.0	60.7	75.3	24.7
4	5	12.2	15.2	63.2	50.8	8.8	3.6	14.4	77.7	81.4	18.6
5	6	15.8	16.8	105.7	87.8	12.0	5.9	25.6	131.3	80.5	19.5
6	7	15.2	19.1	109.4	91.6	13.4	4.3	27.7	137.1	79.8	20.2
7	8	16.4	20.0	138.1	119.9	14.6	3.6	26.8	164.8	83.7	16.3
8	9	17.8	22.3	182.5	158.3	18.3	5.9	33.6	216.1	84.4	15.6
9	10	18.9	23.0	199.4	170.5	24.0	5.0	38.8	238.2	83.7	16.3
Avg	**6**	**13.7**	**16.9**	**98.0**	**82.6**	**11.6**	**3.8**	**21.1**	**119.1**	**81.6**	**18.4**

With the increasing of age, diameter and height of tree also increased proportionally, the average dry biomass of 10 years was 119.1 kg/tree, which concentrated mainly above ground (81.6%), below ground accounted for a low percentage (18.4%) (Figure 3). The proportion of above and below ground biomass ranged from 18-33%, with an average of 22%. Based on this results, this rate is approximately 23.6% compared with the research of Vo Dai Hai (2008).

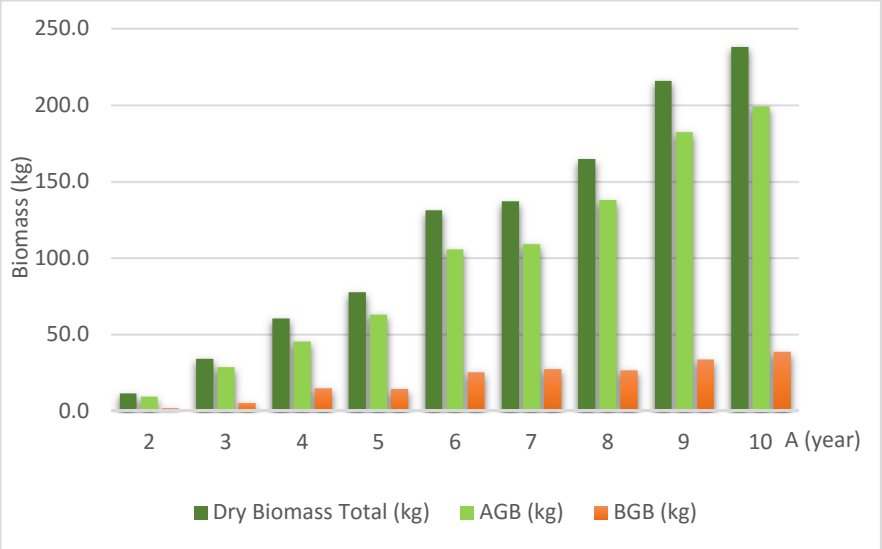

Figure 2. Dry biomass of different parts of Acacia hybrid

Data from table 5 illustrates that the dry biomass of tree was mainly concentrated in the trunk (average 82.6 kg/tree), increasing gradually from the age 2 (7.6 kg) to the age 10 (170.5 kg). In following, dry biomass of roots gradually increased from 2.1 kg (age 2) to 38.8 kg (age 10), averaging 21.1 kg. Then the dry biomass of branches increased by 22.9 kg from the age 2 to age 10; on average, it was lower than the trunk and roots (71 kg/tree and 9.4 kg/tree respectively) an was higher than that of the leaves (8 kg/tree). Finally, the smallest dry biomass was on leaves with average 3.8 kg/tree, increasing by 4.3 kg from the age 2 to age10, however, there was no clear increase or decrease in different ages.

3.2.2.3. The dry biomass proportion of different parts of Acacia hybrid

The dry biomass proportion of different parts of tree based on analyzing 45 sample trees was showed in figure 3.

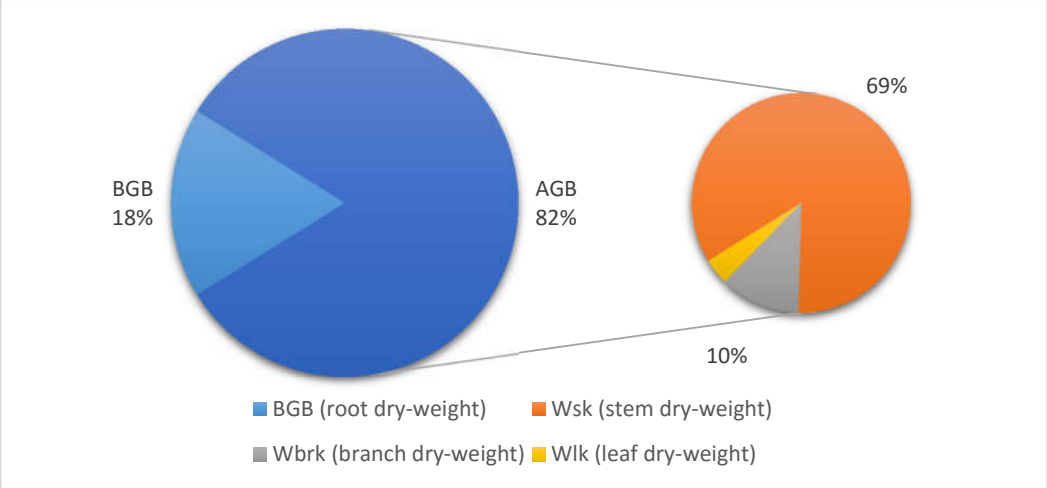

Figure 3. The dry biomass proportion of different parts of Acacia hybrid

Dry above ground biomass was 4.4 times higher than below ground biomass, in which the percentage of dry biomass of each parts were different. The percentage of dry trunk biomass was highest (69%), followed by the roots (18%), the branches (10%) and finally the leaves (3%). The percentage of dry biomass of trunk and branches was higher than that of fresh biomass, and other parts was lower, especially in leaves. It was appropriate because fresh leaves have the highest amount of water, so dry biomass ratio is the lowest.

Research results have shown that the biomass of Acacia hybrid at La Nga Forest Company limited changed greatly with age. Above and below ground biomass of tree in different diameter classes was significant difference. The average dry biomass of Acacia hybrid in age 6 and age 10 were 31.3 kg/tree and 238.2 kg/tree, respectively. In which 79.8% (109.3 kg/tree) and 83.7% (199.4kg/tree) were above ground biomass, respectively.

According to Vo Dai Hai (2008), when studying Acacia hybrid in the North, North Central and South East, the total dry biomass at the age 6 was 100.8 kg/tree on average. In Dong Nai province, the total above ground biomass of Acacia hybrid in three soil classes reached 72.5 kg/tree (age 6) and 175.2 kg/tree (age 10) on average (Tran Thi Ngoan and Nguyen Tan Chung, 2019). In Ba Ria - Vung Tau, when studying Acacia hybrid stands from 2-6 years

old with a density ranging from 1500-1820 trees/ha, the biomass above ground reached 72.1 kg/tree (age 6) (Tran Quang Bao and Vo Thanh Chung, 2019). In Ba Ria - Vung Tau, research on Acacia hybrid in 2-6 years old with a density ranging from 1500-1820 trees/ha, the biomass above ground reached 72.1 kg/tree (age 6) (Tran Quang Bao and Vo Thanh Chung, 2019). In other study on different species, at age 10, the largest total dry biomass was recorded in *Acacia mangium* (154.33 kg/tree), following by *Acacia auriculiformis* (140.81 kg/tree) and the smallest was *Pinus massoniana* Lamb (53.6 kg/tree) (Vo Dai Hai et al., 2009).

These research represents total biomass for Acacia hybrid synthesized different by authors. The author's research results at La Nga Forestry Company Limited are higher than those reported by Vo Dai Hai (2008); Tran Thi Ngoan and Nguyen Tan Chung (2019) and Tran Quang Bao and Vo Thanh Chung (2019). Compared with biomass of *Acacia mangium, Acacia auriculiformis and Pinus massoniana* Lamb (53.6 kg/tree) (Vo Dai Hai et al., 2009), biomass of Acacia hybrid in study area is higher. This difference is explained by differences in geographical location and site conditions, in sampling methods, forest care and other silvicultural techniques.

4. CONCLUSION

The research represent fresh and dry biomass of Acacia hybrid changed markedly with age and diameter class. Fresh biomass of tree in 4-24 cm diameter class ranged from 14.2 kg/tree to 872.1 kg/tree and gradually increased from 22.9 kg (age 2) to 441.5 kg (age 10). At different ages, biomass was concentrated mainly in trunk (83%) then roots (21%) and biomass in branches and leaves was 11% and 5% respectively.

The dry biomass conversion coefficient was 0.5 on average, so further studies can use this coefficient to quickly calculate the dry biomass from fresh biomass of Acacia hybrid. The total biomass of tree gradually increased from 4cm diameter class (6.7 kg/tree) to 24cm diameter class (484.0 kg/tree); increased from 11.5 kg (age 2) to 238.2 kg (age 10). Dry above ground biomass accounted for 82%, dry below ground biomass accounted for 18%. It biomass was mainly on the trunk (accounted for the most part with 69 %), followed by roots (18%), branches (10%) and leaves (3%). The ratio of dry biomass below and above ground biomass on average was 22%, it can be used to estimate below ground biomass when above ground biomass is known. Based on these results, forest owners can estimate the forest stand biomass and carbon sequestration capacity of Acacia hybrid plantations when the forest density is known.

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SINH KHỐI TRÊN MẶT ĐẤT VÀ DƯỚI MẶT ĐẤT CÂY CÁ THỂ KEO LAI TẠI CÔNG TY TNHH MTV LÂM NGHIỆP LA NGÀ, TỈNH ĐỒNG NAI

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TÓM TẮT

Nghiên cứu tiến hành xác định sinh khối trên mặt đất và dưới mặt đất của cây cá thể Keo lai ở các tuổi và cỡ đường kính khác nhau tại Công ty Lâm Nghiệp Lâm nghiệp La Ngà, Đồng Nai. Phương pháp điều tra cây tiêu chuẩn điển hình được sử dụng để đo đếm sinh khối tươi, nghiên cứu đã chặt hạ 45 cây tiêu chuẩn ở các tuổi và cỡ kính khác nhau để phân tích và cân đo sinh khối với 4 bộ phận gồm thân, cành, lá (sinh khối trên mặt đất) và rễ (sinh khối dưới mặt đất). Phân tích sinh khối khô được thực hiện theo phương pháp sấy ở nhiệt độ 105^0C (đối với thân, rễ và cành) và 80^0C (đối với lá). Kết quả nghiên cứu cho thấy sinh khối trên mặt đất và dưới mặt đất của cây cá thể ở các cỡ kính và tuổi khác nhau có sự khác biệt đáng kể. Sinh khối khô trên mặt đất của cây cá thể trung bình chiếm 82%, sinh khối dưới mặt đất chiếm 18%. Tỉ lệ sinh khối các bộ phân của cây Keo lai phần lớn nằm trong bộ phận thân (69%), tiếp đến là bộ phận rễ (18%), bộ phận cành (10%) và cuối cùng là bộ phận lá (3%). Tổng sinh khối cây cá thể có sự biến động mạnh giữa các cỡ kính và tăng dần theo cỡ kính, sinh khối khô là 6,7 – 484 kg tương ứng với cỡ kính từ 4 – 24 cm. Tổng sinh khối khô của cây cá thể trung bình với đường kính 14 cm, chiều cao 16,9 m thì đạt 141,7 kg/cây, trong đó bộ phận trên mặt đất đạt 118,0 kg/cây và dưới mặt đất đạt 23,7 kg/cây.

Từ khoá: cây cá thể, Công ty Lâm nghiệp La Ngà - Đồng Nai, Keo lai, sinh khối dưới mặt đất, sinh khối trên mặt đất.

Received : 26/10/2021
Revised : 25/11/2021
Accepted : 06/12/2021