



UNIVERSITATEA DE ȘTIINȚE AGRONOMICE
ȘI MEDICINĂ VETERINARĂ – BUCUREȘTI



Registration No: 36 / 07.04.2026

APROVED, LEGAL REPRESENTATIVE, PhD Professor Mihai-Sorin Cimpeanu (name, position, signature)	ENDORSED, ECONOMIC DIRECTOR, Ec. Laura Iosub (name, signature)
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**MINUTES OF INTERNAL APPROVAL OF RESEARCH
AND DEVELOPMENT WORK**

The internal approval committee established by Decision no. 467/20.12.2024 at the Faculty of Biotechnology, examining the work carried out by the Coordinator of the Scientific Collaboration Contract no. 440/11.04.2025, with the Title of the **Demonstrative Experimental Project:** "Comprehensive report of the results and conclusions obtained from research (Final project report)", during the period: 15.04.2025 – 15.04.2026, found the following:

- a) The executed works comply with the contractual clauses;
- b) All documents necessary for carrying out the reports exist and are correctly prepared;
- c) The conclusions of the works, the results obtained, and the data (technical, scientific, experimental, etc.) are presented in the annual/technical/final Reports and in the accompanying documents;
- d) Activities and resources are carried out in accordance with the provisions of the contract and achieve the objective proposed by it.

The commission gives a **FAVORABLE** opinion on the works and documents and considers that the provider **VIVI BAMBÛ ALBANIA Sh.p.k.** can be requested to settle the remaining payment of phase II.

INTERNAL ADVISORY COMMITTEE

POSITION IN COMMITTEE	NAME AND SURNAME	SIGNATURE
PREȘEDINTE	PhD Professor Băbeanu Narcisa	
MEMBERS (at least three specialists)	PhD Professor Israel Roming Florentina	
	PhD Associate Professor Boiu-Sicua Oana-Alina	
	PhD Associate Professor Voaideş Cătălina	
SECRETARY	PhD Senior Lecturer Mărgărit Gabriela	

Note: The project manager or members of the project cannot be part of the approval committee

The data in this Minutes are accurate and in accordance with the provisions of the financing contract no. 440/11.04.2025.



**EXHAUSTIVE REPORT OF THE RESULTS AND CONCLUSIONS
OBTAINED FROM RESEARCH (FINAL PROJECT REPORT)
(PERIOD 15.04.2025 – 15.04.2026)**

Contract no. 440/11.04.2025

PROJECT NAME: "Research on the carbon absorption capacity in giant bamboo plantations and calculating the total amount of sequestered carbon, depending on planting density and fertilization scheme practiced"

PROJECT MANAGER: PhD Senior Lecturer DOBRINOIU Ricuța Vasilica

This report has been prepared as a result of completing Stage II "**Exhaustive Report of the results and conclusions obtained from research (Final Project Report) (Period 15.04.2025-15.04.2026)**" within the framework of Scientific Collaboration Contract No. 440 dated April 11, 2025, concluded between the UNIVERSITY OF AGRICULTURAL SCIENCES AND VETERINARY MEDICINE OF BUCHAREST (USAMV Bucharest), tel.: 0213182564, fax: 0213182888, email: post@info.usamv.ro, represented by the Rector, Prof. univ. Dr. Sorin MiHai Cîmpeanu and Economic Director, ec. Laura MiHaela Iosub, as **provider** and VIVI BAMBŪ ALBANY Sh.p.k., located at Str. Agolli, no. 29, H.1, sector Maqellare, Kercisht i Postem, 8302 Diber, phone: +393357076516, registered under no.: SN-991965-05-24, with tax registration code L91515023M, represented by Administrator Giovanni Bezze, as **beneficiary**.

1. OBJECT OF THE CONTRACT

The subject of this contract consists of the realization of research-development and innovation services "**Research on the carbon absorption capacity in giant bamboo plantations and the calculation of the total amount of carbon sequestered, depending on planting density and the fertilization scheme applied**".

To achieve the objective outlined in the contract, the following partial objectives were targeted:

- Assessment of the dynamics of above-ground biomass accumulation (fresh substance) in moso bamboo (*Phyllostachys pubescens*) and madake bamboo (*Phyllostachys bambusoides*) plantations of different ages;
- Assessment of the dynamics of above-ground biomass accumulation (dry substance) in moso bamboo (*Phyllostachys pubescens*) and madake bamboo (*Phyllostachys bambusoides*) plantations of different ages;
- Evaluation of the carbon sequestration dynamics in moso bamboo plantations (*Phyllostachys pubescens*) and madake bamboo (*Phyllostachys bambusoides*) plantation of different ages;

- Assessment of the level of GHG reduction in moso bamboo plantations (*Phyllostachys pubescens*) and madake bamboo (*Phyllostachys bambusoides*) plantation of different ages.

2. RESEARCH PROTOCOL

The research was carried out in bamboo plantations of different ages, established in various locations in Italy and Albania, with control points (repetitions) of 1 m² set along the diagonal of each plantation. At these points, biometric determinations were made regarding the number of differentiated stems per bamboo plant after 12 months of growth, as well as the height and diameter of the stems.



Figure 1. Satellite images with the locations where the research was conducted

After performing the biometric determinations, destructive plant samples were collected from each predetermined control point in order to determine the dynamics of biomass accumulation, the carbon sequestered in the dry biomass of moso bamboo plants, and the level of CO₂ emission reduction at each plantation.

The number of control points varied depending on the area occupied by each bamboo plantation studied, specifically 2 control points for areas smaller than 1 Ha, 3 control points for areas between 1 - 3 Ha, and 4 or 5 control points for areas larger than 4 Ha.

Destructive sampling of plants was carried out in multiple repetitions by cutting the bamboo stems at ground level, given the plant's extraordinary regenerative capacity, as well as the characteristic of bamboo plants to annually differentiate new stems from vegetative buds present in the root system (rhizomes).

The destructive samples collected were separated into the aerial components of the plants, namely stems, branches, and leaves, were labeled and weighed, thus resulting in the fresh biomass production per unit area.



Figure 2. Collection and labeling of destructive plant samples on biomass components bamboo plantations
(Source: Personal archive)

After determining the fresh biomass, the analysis samples were transferred for the purpose of drying. The drying of the analysis samples was carried out at a temperature of 95°C for 48 hours for stems and branches, and at a temperature of 60°C for 24 hours for leaves.

After drying, these samples were weighed, and the results obtained were recorded for the purpose of determining the dry biomass yield per unit area.

After drying, the analysis samples were reweighed, thus obtaining the dry biomass of the plant components. The values recorded for this parameter serve as the basis for calculating the carbon sequestration dynamics in bamboo plants, as well as for determining the level of CO₂ emission reduction.

3. OBSERVATIONS AND MEASUREMENTS MADE DURING THE RESEARCH

The measurements carried out in the field focused on:

- the stems density per unit area - by counting differentiated stems per m²;
- the stems height (m) by measuring the height of the stems from ground level to their top;

- the stems diameter (cm) by measuring with calipers at the midpoint of the stems.

In the laboratory, the following measurements were made:

- fresh biomass of stems (kg/m²) by weighing with the scale;
- fresh biomass of stem branches (kg/m²) by weighing with the scale;- fresh biomass of leaves (kg/m²) - by weighing with the scale;
- biomass of stems d.m. (kg/m²) - by weighing with the scale;
- biomass of stem branches d.m. (kg/m²) - by weighing with the scale;
- biomass of leaves d.m. (kg/m²) - by weighing with the electronic scale;
- total fresh and dry biomass production (kg/m²) - by summing the biomass of its components, namely stems, branches, and leaves;
- total fresh and dry biomass production (To/Ha) - by relating it to the unit area.



Figure 3. Preparation of destructive plant samples on biomass components for the determination of dry biomass
(Source: Personal archive)

In the case of the madake bamboo (*Phyllostachys bambusoides*) plantation, due to the low planting density practiced at the establishment of the plantation (200 plants/ha), 10 plants were randomly selected along the diagonal of the plantation. Biometric determinations were carried out on these plants regarding the number of stems per plant, the height and diameter of the stems, as well as the biomass and the amount of carbon accumulated in the above-ground parts of the plants, along with the degree of reduction of greenhouse gas emissions. The recorded results were reported per plant and subsequently per unit area in direct correlation with the plant density established at the establishment of the plantation.

To determine the biomass of sequestered organic carbon in moso bamboo plants, the calculation formula proposed by Eggleston et al., 2006, was used.

$$CB = DB \times 0,47 \text{ (To/Ha)}$$

In which:

CB - carbon biomass (ToC/Ha);

DB - dry biomass (To S.U./Ha);

0.47 - carbon fraction for bamboo.

In order to establish the emission reductions generated by moso bamboo plantations, the results obtained from determining the biomass of organic carbon sequestered by the plants were multiplied by the ratio 44/12 (the correlation ratio between the molecular mass of carbon and carbon dioxide CO₂), according to the relation:

$$CO_{2e} = CB \times 44/12 \text{ (ToCO}_{2e}\text{/Ha)}$$

In which:

- CB - carbon biomass (ToC/Ha);
- CO_{2e} - carbon equivalent (To/Ha);
- 44/12 - carbon correlation ratio.

The recording, calculation, analysis, and interpretation of results were carried out separately for each location and for each repetition, strictly adhering to the working methodology established during the development of the research protocol.

4. ANALYSIS AND INTERPRETATION OF RESEARCH RESULTS (15.04.2025-15.04.2026)

4.1. Research results regarding the accumulation of above-ground biomass and carbon in 2-year-old moso bamboo plantations (Vivi Bambù Empowered Srl, Location: Cona, Ferrara Region, Italy) (15.04.2025-15.04.2026)

Company name: Vivi Bambù Empowered Srl
Address: Via A. Gramsci, 11 - 20092 Cinisello Balsamo (MI)
Date of planting: September 2023
Plants density: 1080 plants/Ha
Plantation age: 2 years
Plantation surface: 1 Ha

Research conducted in Cona locality, in the Ferrara Region, Italy, in a 2-year-old moso bamboo plantation with a plant density of 1080 plants/hectare showed, following the determination of biometric parameters, that after 2 years of growth the average number of culms per m² was 11.66, with an average culm height of 2.72 m and an average measured diameter of 1.93 cm (Table 1).

Table 1. Biometric determinations on 2-year-old moso bamboo, Cona-Italy

YEAR	Biometric parameters		
	Stems number/m ²	Stems height (m)	Stems diameter (cm)
2025	11,66	2,72	1,93

After 2 years of vegetation, fresh biomass production reached values of over 9 kg/m², with a total yield per unit area of 93,89 tones/ha, in the total production of fresh biomass with stems contributing 39.36 tones/ha, stem branches contributing 28.15 tones/ha, and leaves contributing 26.28 tones/ha. After 10 years of vegetation, the amount of accumulated fresh biomass can exceed 84 kg/m², with a total production of over 845 tones/ha (Table 2 and Table 3).

Table 2. Aerial biomass accumulated in 2-year-old moso bamboo plantations, Cona-Italy

YEAR OF VEGETATION	Stems fresh biomass (kg/m ²)	Branches fresh biomass (kg/m ²)	Leaves fresh biomass (kg/m ²)	Total fresh biomass (kg/m ²)	Stems dry biomass (kg/m ²)	Branches dry biomass (kg/m ²)	Leaves dry biomass (kg/m ²)	Total dry biomass (kg/m ²)
2 year (2025)	3,936	2,815	2,638	9,389	3,227	2,106	2,394	7,727
3 year (2026)	7,872	5,630	5,276	18,778	6,454	4,212	4,788	15,454
4 year (2027)	11,808	8,445	7,914	28,167	9,681	6,318	7,182	23,181
5 year (2028)	15,744	11,260	10,552	37,556	12,908	8,424	9,576	30,908
6 year (2029)	19,680	14,075	13,190	46,945	16,135	10,530	11,970	38,635
7 year (2030)	23,616	16,890	15,828	56,334	19,362	12,636	14,364	46,362
8 year (2031)	27,552	19,705	18,466	65,723	22,589	14,742	16,758	54,089
9 year (2032)	31,488	22,520	21,104	75,112	25,816	16,848	19,152	61,816
10 year (2033)	35,424	25,335	23,742	84,501	29,043	18,954	21,546	69,543

Dry biomass production determined after 2 years of vegetation recorded values of over 7 kg/m², respectively 77.27 tones/ha, with stems contributing 32.27 tones/ha of dry biomass, stem branches contributing 21.06 tones/ha of dry biomass and leaves contributing 23.94 tones/ha of dry biomass. After 10 years of vegetation, more than 695 tones/ha can be obtained (Table 2 and Table 3).

Table 3. Total biomass accumulated on the unit surface in 2-year-old moso bamboo plantations, Cona-Italy

YEAR OF VEGETATION	Stems fresh biomass (To/Ha)	Branches fresh biomass (To/Ha)	Leaves fresh biomass (To/Ha)	Total fresh biomass (To/Ha)	Stems dry biomass (To/Ha)	Branches dry biomass (To/Ha)	Leaves dry biomass (To/Ha)	Total dry biomass (To/Ha)
2 year (2025)	39,36	28,15	26,38	93,89	32,27	21,06	23,94	77,27
3 year (2026)	78,72	56,30	52,76	187,78	64,54	42,12	47,88	154,54
4 year (2027)	118,08	84,45	79,14	281,67	96,81	63,18	71,82	231,81
5 year (2028)	157,44	112,60	105,52	488,16	129,08	84,24	95,76	309,08
6 year (2029)	196,80	140,75	131,90	469,45	161,35	105,30	119,70	386,35
7 year (2030)	236,16	168,90	158,28	563,34	193,62	126,36	143,64	463,62
8 year (2031)	275,52	197,05	184,66	657,23	225,89	147,42	167,58	540,89
9 year (2032)	314,88	225,20	211,04	751,12	258,16	168,48	191,52	618,16
10 year (2033)	354,24	253,35	237,42	845,01	290,43	189,54	215,46	695,43

After 2 years of growth, the total amount of organic carbon accumulated in the above-ground organs of bamboo plants exceeded 36 ToC/Ha, with an average total of 15.17 ToC/Ha sequestered in the stems, 9.89 ToC/Ha in the branches of the stems, and 11.25 ToC/Ha in the leaves (Table 4).

Table 4. Carbon biomass sequestered in 2-year-old moso bamboo plantations, Cona-Italy

YEAR OF VEGETATION	Carbon sequestered in stems (kgC/m ²)	Carbon sequestered in branches (kgC/m ²)	Carbon sequestered in leaves (kgC/m ²)	Total carbon sequestered (kgC/m ²)	Carbon sequestered in stems (ToC/Ha)	Carbon sequestered in branches (ToC/Ha)	Carbon sequestered in leaves (ToC/Ha)	Total carbon sequestered (ToC/Ha)
2 year (2025)	1,517	0,989	1,125	3,631	15,17	9,89	11,25	36,31
3 year (2026)	3,034	1,978	2,250	7,262	30,34	19,78	22,50	72,62
4 year (2027)	4,551	2,967	3,375	10,893	45,51	29,67	33,75	117,93
5 year (2028)	6,068	3,956	4,500	14,524	60,68	39,56	45,00	145,24
6 year (2029)	7,585	4,945	5,625	18,155	75,85	49,45	56,25	181,55
7 year (2030)	9,102	5,934	6,750	21,786	91,02	59,34	67,50	217,86
8 year (2031)	10,619	6,923	7,875	25,417	106,19	69,23	78,75	254,17
9 year (2032)	12,136	7,912	9,000	29,048	121,36	79,12	90,00	290,48
10 year (2033)	13,653	8,901	10,125	32,679	136,53	89,01	101,25	326,79

The estimates made show that moso bamboo plants can sequester over 326 ToC/Ha in 10 years of growth, with the stems contributing over 136 ToC/Ha to the accumulation of organic carbon, the branches contributing more than 89 ToC/Ha, and the leaves having the capacity to sequester over 101 ToC/Ha, under the pedoclimatic conditions specific to the locality of Cona (Table 4).

Table 5. The level of reduction of CO₂ emissions in 2-year-old moso bamboo plantations, Cona-Italy

YEAR OF VEGETATION	Stems intake (kgCO ₂ e/m ²)	Branches intake (kgCO ₂ e/m ²)	Leaves intake (kgCO ₂ e/m ²)	Emissions degree reduction (kg CO ₂ e/m ²)	Stems intake (ToCO ₂ e/Ha)	Branches intake (ToCO ₂ e/Ha)	Leaves intake (ToCO ₂ e/Ha)	Emissions degree reduction (ToCO ₂ e/Ha)
2 year (2025)	5,552	3,629	4,118	13,299	55,52	36,29	41,18	132,99
3 year (2026)	11,104	7,258	8,236	26,598	111,04	72,58	82,36	265,98
4 year (2027)	16,656	10,887	12,354	39,897	166,56	108,87	123,54	398,97
5 year (2028)	22,208	14,516	16,472	53,196	222,08	145,16	164,72	531,96
6 year (2029)	27,760	18,145	20,590	66,495	277,60	181,45	205,90	664,95
7 year (2030)	33,312	21,774	24,708	79,794	333,12	217,74	247,08	797,94
8 year (2031)	38,864	25,403	28,826	93,093	388,64	254,03	288,26	930,93
9 year (2032)	44,416	29,032	32,944	106,392	444,16	290,32	329,44	1063,92
10 year (2033)	49,968	32,661	37,062	119,691	499,68	326,61	370,62	1196,91

Under the specific pedo-climatic conditions of the locality of Cona, Ferrara Region, it can be observed, based on the results obtained from calculating CO₂e, that by establishing a moso bamboo plantation, after 2 years of vegetation, the plants contribute significantly to the reduction of greenhouse gas (GHG) emissions in the atmosphere by 132.99 ToCO₂e/Ha, with the contribution of the stems in reducing GHG levels being 55.52 ToCO₂e/Ha, the contribution of stem branches being 36.29 ToCO₂e/Ha, and the contribution of leaves being 41.18 ToCO₂e/Ha. After 10 years of vegetation, the plantation has the capacity to reduce GHG levels by over 1196 ToCO₂e/Ha (Table 5).

4.2. Research results regarding the accumulation of above-ground biomass and carbon in 3-year-old moso bamboo plantations (VIVI BAMBÙ ALBANY Sh.p.k, Zona Maqellarë, Districtul Dibër, Albany) (15.04.2025-15.04.2026)

Company name: Vivi Bambù Albania Sh.p.k.

Adress: Rruga Agollli Nd. 29, H.1, Maqellare, Kercisht i Poshtem, 8302, Diber - Albany

Date of planting: September 2022

Plants density: 1200 plants/Ha

Plantation age: 3 years

Plantation surface: 7 Ha

Biometric determinations carried out in 3-year-old moso bamboo plantations established in Diber District, Albania, highlighted that, over a 3 years of growing, the bamboo plants were able to produce more than 9 shoots per square meter, with an average of stems height of 2.72 m and an average of stems diameter of 2.01 cm (Table 6).

Table 6. Biometric determinations on 3-year-old moso bamboo, Dibër-Albany

YEAR	Biometric parameters		
	Stems number/m ²	Stems height (m)	Stems diameter (cm)
2025	9,25	2,72	2,01

The results recorded following the determination of fresh aboveground biomass production made by bamboo plants after 3 years of vegetation demonstrated that the total biomass production exceeding 10 kg/m², with a total production per unit area of 107.56 tons of fresh biomass/ha. In achieving this production, the biomass of stems accounted for 41.31 tons/ha, the biomass of branches 32.67 tons/ha, and the biomass of leaves 33.58 tons/ha, the total aboveground biomass production could exceed 860 tons/ha after 10 years of vegetation (Tables 7 and 8).

Table 7. Aerial biomass accumulated in 3-year-old moso bamboo plantations, Dibër-Albany

YEAR OF VEGETATION	Stems fresh biomass (kg/m ²)	Branches fresh biomass (kg/m ²)	Leaves fresh biomass (kg/m ²)	Total fresh biomass (kg/m ²)	Stems dry biomass (kg/m ²)	Branches dry biomass (kg/m ²)	Leaves dry biomass (kg/m ²)	Total dry biomass (kg/m ²)
3 year (2025)	4,131	3,267	3,358	10,756	3,452	2,605	2,768	8,825
4 year (2026)	8,262	6,534	6,716	21,512	6,904	5,210	5,536	17,650
5 year (2027)	12,393	9,801	10,074	32,268	10,356	7,815	8,304	26,475
6 year (2028)	16,524	13,068	13,432	43,024	13,808	10,420	11,072	35,300
7 year (2029)	20,655	16,335	16,790	53,780	17,260	13,025	13,840	44,125
8 year (2030)	24,786	19,602	20,148	64,536	20,712	15,630	16,608	52,950
9 year (2031)	28,917	22,869	23,506	75,292	24,164	18,235	19,376	61,775
10 year (2032)	33,048	26,136	26,864	86,048	27,616	20,840	22,144	70,600

The production of dried aerial biomass reported after 3 years of vegetation in moso bamboo plantation exceeded 8 kg/m², with a total production per unit area of 88.25 tons/ha, the contribution of the stems to the dry biomass being 34.52 tons/ha, the contribution of the branches representing 26.05 tons/ha, and the leaves contributing 27.68 tons/ha (Table 7 and Table 8). After 10 years of vegetation, the plants can accumulate over 706 tons/ha of dry biomass, of which the dry stem biomass can exceed 276 tons/ha, branch biomass more than 208 tons/ha, and leaf biomass more than 221 tons/ha (Table 8).

Table 8. Total biomass accumulated on the unit surface in 3-year-old moso bamboo plantations, Dibër- Albany

YEAR	Stems fresh biomass (To/Ha)	Branches fresh biomass (To/Ha)	Leaves fresh biomass (To/Ha)	Total fresh biomass (To/Ha)	Stems dry biomass (To/Ha)	Branches dry biomass (To/Ha)	Leaves dry biomass (To/Ha)	Total dry biomass (To/Ha)
3 year (2025)	41,31	32,67	33,58	107,56	34,52	26,05	27,68	88,25
4 year (2026)	82,62	65,34	67,16	215,12	69,04	52,10	55,36	176,50
5 year (2027)	123,93	98,01	100,74	322,68	103,56	78,15	83,04	264,75
6 year (2028)	165,24	130,68	134,32	430,24	138,08	104,20	110,72	353,00
7 year (2029)	206,55	163,35	167,90	537,80	172,60	130,25	138,40	441,25
8 year (2030)	247,86	196,02	201,48	645,36	207,12	156,30	166,08	529,50
9 year (2031)	289,17	228,69	235,06	752,92	241,64	182,35	193,76	617,75
10 year (2032)	330,48	261,36	268,64	860,48	276,16	208,40	221,44	706,00

The total biomass of carbon sequestered in 3-year-old moso bamboo plants reached 41.34 ToC/ha, with the culms sequestering 16.09 ToC/ha, the culm branches 12.24 ToC/ha, and the leaves 13.01 ToC/ha (Table 9).

Table 9. Carbon biomass sequestered in 3-year-old moso bamboo plantations, Dibër- Albany

YEAR OF VEGETATION	Carbon sequestered in stems (kgC/m ²)	Carbon sequestered in branches (kgC/m ²)	Carbon sequestered in leaves (kg /m ²)	Total carbon sequestered (kgC/m ²)	Carbon sequestered in stems (ToC/Ha)	Carbon sequestered in branches (ToC/Ha)	Carbon sequestered in leaves (ToC/Ha)	Total carbon sequestered (ToC/Ha)
3 year (2025)	1,609	1,224	1,301	4,134	16,09	12,24	13,01	41,34
4 year (2026)	3,218	2,448	2,602	8,268	32,18	24,48	26,02	82,68
5 year (2027)	4,827	3,672	3,903	12,402	48,27	36,72	39,03	124,02
6 year (2028)	6,436	5,508	5,204	17,148	64,36	55,08	52,04	171,48
7 year (2029)	8,045	6,885	6,505	21,435	80,45	68,85	65,05	214,35
8 year (2030)	9,654	8,262	7,806	25,722	96,54	82,62	78,06	257,22
9 year (2031)	11,263	9,639	9,107	30,009	112,63	96,39	91,07	300,09
10 year (2032)	12,872	11,016	10,408	34,296	128,72	110,16	104,08	342,96

Estimates regarding the dynamics of organic carbon accumulation in 3-year-old moso bamboo plants indicate that, over 10 years of growth, the plants can sequester more than 342 ToC/Ha in their aerial organs, with the culms contributing over 128 ToC/Ha to carbon accumulation, the culm branches potentially sequestering over 110 ToC/Ha, and the leaves having the capacity to sequester over 104 ToC/Ha (Table 9).

Table 10. The level of reduction of CO₂ emissions in 3-year-old moso bamboo plantations, Dibër- Albany

YEAR OF VEGETATION	Stems intake (kgCO ₂ /m ²)	Branches intake (kgCO ₂ /m ²)	Leaves intake (kgCO ₂ /m ²)	Emissions degree reduction (kg CO ₂ /m ²)	Stems intake (ToCO ₂ /Ha)	Branches intake (ToCO ₂ /Ha)	Leaves intake (ToCO ₂ /Ha)	Emissions degree reduction (ToCO ₂ /Ha)
3 year (2025)	5,889	4,479	4,761	15,129	58,89	44,79	47,61	151,29
4 year (2026)	11,778	8,958	9,522	30,258	117,78	89,58	95,22	302,58
5 year (2027)	17,667	13,437	14,283	45,387	176,67	134,37	142,83	453,87
6 year (2028)	23,556	17,916	19,044	60,516	235,56	179,16	190,44	605,16
7 year (2029)	29,445	22,395	23,805	75,645	294,45	223,95	238,05	756,45
8 year (2030)	35,334	26,874	28,566	90,774	353,34	268,74	285,66	907,74
9 year (2031)	41,223	31,353	33,327	105,903	412,23	313,53	333,27	1059,03
10 year (2032)	47,112	35,832	38,088	121,032	471,12	358,32	380,88	1210,32

Under the pedo-climatic conditions specific to the Maqellarë area, Dibër District, the 3-year-old moso bamboo plantation managed to reduce the level of greenhouse gas emissions by 151.29 ToCO₂e/Ha, with the stems decreasing GHG levels by 58.89 ToCO₂e/Ha, the branches by 44.79 ToCO₂e/Ha, and the leaves by 47.61 ToCO₂e/Ha, estimating that after 10 years of growth the plantation will have the capacity to reduce greenhouse gas emissions by more than 1210 ToCO₂e/Ha (Table 10).

4.3. Research results regarding the accumulation of above-ground biomass and carbon in 4-year-old moso bamboo plantations (VIVI BAMBÛ ALBANY Sh.p.k, Zona Maqellarë, Districtul Dibër, Albany) (15.04.2025-15.04.2026)

Company name: Vivi Bambù Albania Sh.p.k.

Adress: Rruga Agollli Nd. 29, H.1, Maqellare, Kercisht i Poshtem, 8302, Diber - Albany

Date of planting: September 2021

Plants density: 1200 plants/Ha

Plantation age: 4 years

Plantation surface: 4 Ha

The biometric determinations carried out in bamboo plantations highlighted the fact that the average number of stems was 28.67 stems/m², with an average stem height after 4 years of vegetation of 3.73 m, and an average stem diameter of 2.47 cm (Table 11).

Table 11. Biometric determinations on 4-year-old moso bamboo, Dibër- Albany

YEAR	Biometric parameters		
	Stems number/m ²	Stems height (m)	Stems diameter (cm)
2025	28,67	3,73	2,47

The total fresh aerial biomass production determined after 4 years of vegetation in moso bamboo plants was 16.115 kg/m², thus exceeding the level of 161 tons of biomass/ha. In achieving the total fresh biomass production, the stems contributed over 69 tons of biomass/ha, the branches

contributed over 45 tons of biomass/ha, and the leaves contributed over 46 tons of biomass/ha (Tables 12 and 13).

Table 12. Aerial biomass accumulated in 4-year-old moso bamboo plantations, Dibër- Albany

YEAR OF VEGETATION	Stems fresh biomass (kg/m ²)	Branches fresh biomass (kg/m ²)	Leaves fresh biomass (kg/m ²)	Total fresh biomass (kg/m ²)	Stems dry biomass (kg/m ²)	Branches dry biomass (kg/m ²)	Leaves dry biomass (kg/m ²)	Total dry biomass (kg/m ²)
4 year (2025)	6,917	4,513	4,685	16,115	6,236	3,851	4,095	14,182
5 year (2026)	13,834	9,026	9,370	32,230	12,472	7,702	8,190	28,364
5 year (2027)	20,751	13,539	14,055	48,345	18,708	11,553	12,285	42,546
7 year (2028)	27,668	18,052	18,740	64,460	24,944	15,404	16,380	56,728
8 year (2029)	34,585	22,565	23,425	80,575	31,180	19,255	20,475	70,910
9 year (2030)	41,502	27,078	28,110	96,690	37,416	23,106	24,570	85,092
10 year (2031)	48,419	31,591	32,795	112,805	43,652	26,957	28,665	99,274

Results of determinations carried out after 4 years of vegetation showed that in moso bamboo plantation, a total amount of 14.182 kg/m² of dry biomass was accumulated. The total dry aboveground biomass production per unit area exceeded 141 tons/ha, with the largest contribution to the production of dry matter coming from the stems (62.36 tons of dry matter/ha), followed by the leaves (40.95 tons of dry matter/ha) and branches (38.51 tons of dry matter/ha) (Tables 12 and 13).

Table 13. Total biomass accumulated on the unit surface in 4-year-old moso bamboo plantations, Dibër- Albany

YEAR OF VEGETATION	Stems fresh biomass (To/Ha)	Branches fresh biomass (To/Ha)	Leaves fresh biomass (To/Ha)	Total fresh biomass (To/Ha)	Stems dry biomass (To/Ha)	Branches dry biomass (To/Ha)	Leaves dry biomass (To/Ha)	Total dry biomass (To/Ha)
4 year (2025)	69,17	45,13	46,85	161,12	62,36	38,51	40,95	141,82
5 year (2026)	138,34	90,26	93,70	322,30	124,72	77,02	81,90	283,64
5 year (2027)	207,51	135,39	140,55	483,45	187,08	115,53	122,85	425,46
7 year (2028)	276,68	180,52	187,40	644,60	249,44	154,04	163,80	567,28
8 year (2029)	345,85	225,65	234,25	805,75	311,80	192,55	204,75	709,10
9 year (2030)	415,02	270,78	281,10	966,90	374,16	231,06	245,70	850,92
10 year (2031)	484,19	315,91	327,95	1128,05	436,52	269,57	286,65	992,74

After 4 years of growth, moso bamboo plants had the capacity to accumulate 6.665 KgC/m², thus sequestering over 66 ToC/Ha, with the distribution of carbon biomass in the vegetative organs of the plants as follows: in stems 29.31 ToC/Ha, in stem branches 18.09 ToC/Ha, and in leaves 19.25 ToC/Ha (Table 14).

Table 14. Carbon biomass sequestered in 4-year-old moso bamboo plantations, Dibër- Albany

YEAR OF VEGETATION	Carbon sechestrate d in stems (kgC/m ²)	Carbon sechestrate d in branches (kgC/m ²)	Carbon sechestrate d in leaves (kgC/m ²)	Total carbon sechestrate d (kgC/m ²)	Carbon sechestrate d in stems (ToC/Ha)	Carbon sechestrate d in branches (ToC/Ha)	Carbon sechestrate d in leaves (ToC/Ha)	Total carbon sechestrate d (ToC/Ha)
4 year (2025)	2,931	1,809	1,925	6,665	29,31	18,09	19,25	66,65
5 year (2026)	5,862	3,618	3,850	13,330	58,62	35,18	38,50	133,30
5 year (2027)	8,793	5,427	5,775	19,995	87,93	54,27	57,75	199,95
7 year (2028)	11,724	7,236	7,700	26,660	117,24	72,36	77,00	266,60
8 year (2029)	14,655	9,045	9,625	33,325	146,55	90,45	96,25	333,25
9 year (2030)	17,586	10,854	11,550	39,990	175,86	108,54	115,50	399,90
10 year (2031)	20,517	12,663	13,475	46,655	205,17	126,63	134,75	466,55

After 10 years of growth the moso bamboo plantation had the capacity to accumulate over 466 ToC/Ha, with the following distribution: over 205 ToC/Ha in stems, over 126 ToC/Ha in stem branches, and over 134 ToC/Ha in leaves (Table 14).

Table 15. The level of reduction of CO₂ emissions in 4-year-old moso bamboo plantations, Dibër- Albany

YEAR OF VEGETATION	Stems intake (kgCO _{2e} /m ²)	Branches intake (kgCO _{2e} /m ²)	Leaves intake (kgCO _{2e} /m ²)	Emissions degree reduction (kg CO _{2e} /m ²)	Stems intake (ToCO _{2e} /Ha)	Branches intake (ToCO _{2e} /Ha)	Leaves intake (ToCO _{2e} /Ha)	Emissions degree reduction (ToCO _{2e} /Ha)
4 year (2025)	10,727	6,621	7,046	24,394	107,27	66,21	70,46	243,94
5 year (2026)	21,454	13,242	14,092	48,788	214,45	132,42	140,92	487,88
5 year (2027)	32,181	19,863	21,138	73,182	321,81	198,63	211,38	731,82
7 year (2028)	42,908	26,484	28,184	97,576	429,08	264,84	281,84	975,76
8 year (2029)	53,635	33,105	35,230	121,970	536,35	331,05	352,30	1219,70
9 year (2030)	64,362	39,726	42,276	146,364	643,62	397,26	422,76	1463,64
10 year (2031)	75,089	46,347	49,322	170,758	750,89	463,47	493,22	1707,58

Following the assessment of the plantation's capacity to reduce CO₂ emissions into the atmosphere, it was found that after 4 years of vegetation, the level of emission reduction exceeded 243 ToCO_{2e}/Ha, with bamboo plantation being capable, after 10 years of vegetation, of reducing GHG levels by over 1707 ToCO_{2e}/Ha (Table 15).

4.4. Research results regarding the accumulation of above-ground biomass and carbon in 5-year-old moso bamboo plantations (Società Agricola Kida Srl, Provincia Ferrara, Italy) (15.04.2025-15.04.2026)

Company name: Società Agricola Kida Srl
Address: Via Argine Ducale, 29 - 44122 Ferrara
Date of planting: September 2020
Plants density: 1800 plants/Ha
Plantation age: 5 years
Plantation surface: 3 Ha

In the moso bamboo plantation, established at a planting density of 1800 plants/ha, the average number of stems measured per unit area after 5 years of vegetation was 43.7 stems/m², with an average height of 1.77 m and stems with an average diameter of 0.88 cm (Table 16).

Table 16. Biometric determinations on 5-year-old moso bamboo, Ferrara, Italy

YEAR	Biometric parameters		
	Stems number/m ²	Stems height (m)	Stems diameter (cm)
2025	43,7	1,77	0,88

After 5 years of vegetation moso bamboo plants accumulated in the aerial organs 27.751 kg/m² of fresh biomass, which represents a total aerial biomass production of over 277 tons of biomass/ha, the contribution of the stems to the total biomass production exceeding 175 tons/ha, the stem branches contributing over 50 tons/ha, and the leaves over 52 tons/ha.

After 10 years of vegetation, the probable production of fresh biomass per unit area could exceed 1665 To/Ha (Table 17 and Table 18).

Table 17. Aerial biomass accumulated in 5-year-old moso bamboo plantations, Ferrara, Italy

YEAR OF VEGETATION	Stems fresh biomass (kg/m ²)	Branches fresh biomass (kg/m ²)	Leaves fresh biomass (kg/m ²)	Total fresh biomass (kg/m ²)	Stems dry biomass (kg/m ²)	Branches dry biomass (kg/m ²)	Leaves dry biomass (kg/m ²)	Total dry biomass (kg/m ²)
5 year (2025)	17,524	5,026	5,201	27,751	10,838	3,671	3,193	17,702
6 year (2026)	35,048	10,052	10,402	55,502	21,676	7,342	6,386	35,404
7 year (2027)	52,572	15,078	15,603	83,253	32,514	11,013	9,579	53,106
8 year (2028)	70,096	20,104	20,804	111,004	43,352	14,684	12,772	70,808
9 year (2029)	87,620	25,130	26,005	138,755	54,190	18,355	15,965	88,510
10 year (2030)	105,144	30,156	31,206	166,506	65,028	22,026	19,158	106,212

The dry biomass production determined after 5 years of growth of moso bamboo plants was over 17 kg/m², respectively over 177 tons/ha, the distribution of dry biomass in the aerial organs of the plants being as follows: 108.38 tons/ha in stems, 36.71 tons/ha in stem branches, and 31.93 tons/ha in leaves; after 10 years of growth, the dry biomass production could exceed 1062 tons/ha (Table 17 and Table 18).

Table 18. Total biomass accumulated on the unit surface in 5-year-old moso bamboo plantations, Ferrara, Italy

YEAR OF VEGETATION	Stems fresh biomass (To/Ha)	Branches fresh biomass (To/Ha)	Leaves fresh biomass (To/Ha)	Total fresh biomass (To/Ha)	Stems dry biomass (To/Ha)	Branches dry biomass (To/Ha)	Leaves dry biomass (To/Ha)	Total dry biomass (To/Ha)
5 year (2025)	175,24	50,26	52,01	277,51	108,38	36,71	31,93	177,02
6 year (2026)	350,48	100,52	104,02	555,02	216,76	73,42	63,86	354,04
7 year (2027)	525,72	150,78	156,03	832,53	325,14	110,13	95,79	531,06
8 year (2028)	700,96	201,04	208,04	1110,04	433,52	146,84	127,72	708,08
9 year (2029)	876,20	251,30	260,05	1387,55	541,90	183,55	159,65	885,10
10 year (2030)	1051,44	301,56	312,06	1665,06	650,28	220,26	191,58	1062,12

By ensuring a planting density of 1800 plants/ha, after 5 years of vegetation moso bamboo plants captured from the atmosphere 8.32 kgC/m², respectively over 83 ToC/Ha, with the contribution of the stems being 50.94 ToC/Ha, the stem branches capturing 17.25 ToC/Ha, and 15.01 ToC/Ha being sequestered in the leaves (Table 19).

Table 19. Carbon biomass sequestered in 5-year-old moso bamboo plantations, Ferrara, Italy

YEAR OF VEGETATION	Carbon sequestered in stems (kgC/m ²)	Carbon sequestered in branches (kgC/m ²)	Carbon sequestered in leaves (kgC/m ²)	Total carbon sequestered (kgC/m ²)	Carbon sequestered in stems (ToC/Ha)	Carbon sequestered in branches (ToC/Ha)	Carbon sequestered in leaves (ToC/Ha)	Total carbon sequestered (ToC/Ha)
5 year (2025)	5,094	1,725	1,501	8,32	50,94	17,25	15,01	83,20
6 year (2026)	10,188	3,451	3,001	16,64	101,88	34,51	30,01	166,40
7 year (2027)	15,282	5,176	4,502	24,96	152,82	51,76	45,02	249,60
8 year (2028)	20,375	6,901	6,003	33,28	203,75	69,01	60,03	332,80
9 year (2029)	25,469	8,627	7,504	41,60	254,69	86,27	75,04	416,00
10 year (2030)	30,563	10,352	9,004	49,92	305,63	103,52	90,04	499,20

Estimations regarding the total amount of carbon that can be accumulated in bamboo plants have shown that, after 10 years of growth, the values of this parameter can exceed 499 ToC/Ha (Table 19).

Table 20. The level of reduction of CO₂ emissions in 5-year-old moso bamboo plantations, Ferrara, Italy

YEAR OF VEGETATION	Stems intake (kgCO ₂ /m ²)	Branches intake (kgCO ₂ /m ²)	Leaves intake (kgCO ₂ /m ²)	Emissions degree reduction (kg CO ₂ /m ²)	Stems intake (ToCO ₂ /Ha)	Branches intake (ToCO ₂ /Ha)	Leaves intake (ToCO ₂ /Ha)	Emissions degree reduction (ToCO ₂ /Ha)
5 year (2025)	18,695	6,331	5,509	30,535	186,95	63,31	55,09	305,35
6 year (2026)	37,390	12,662	11,018	61,070	373,90	126,62	110,18	610,70
7 year (2027)	56,085	18,993	16,527	91,605	560,85	189,93	165,27	916,05
8 year (2028)	74,780	25,324	22,036	122,140	747,80	253,24	220,36	1221,40
9 year (2029)	93,475	31,655	27,545	152,675	934,75	316,55	275,45	1526,75
10 year (2030)	112,170	37,986	33,054	183,210	1121,70	379,86	330,54	1832,10

Following the evaluation of the plantation's capacity to reduce CO₂ emissions from the atmosphere, it was found that after 5 years of vegetation, the emission reduction rate exceeded 305 ToCO₂/Ha, the 5-year-old bamboo plantation being capable of reducing GHG levels by over 1832 ToCO₂/Ha after 10 years of vegetation (Table 20).

4.5. Research results regarding the accumulation of above-ground biomass and carbon in 4-year-old madake bamboo plantations (Società Agricola Kida Srl, Provincia Ferrara, Italy) (15.04.2025-15.04.2026)

Company name: Società Agricola Kida Srl

Address: Via Argine Ducale, 29 - 44122 Ferrara

Date of planting: September 2021

Plants density: 200 plants/Ha

Plantation age: 4 years

Plantation surface: 2 Ha

The results obtained from biometric determinations carried out in 2025 in the madake bamboo plantation demonstrated that after 4 years of vegetation, the average number of differentiated stems was 35.5 stems/plant, with an average height of 3.02 m and a diameter measured at the middle of the stems of 2.27 cm (Table 21).

Table 21. Biometric determinations on 4-year-old madake bamboo, Ferrara, Italy

YEAR	Biometric parameters		
	Stems number/m ²	Stems height (m)	Stems diameter (cm)
2025	35,5	3,02	2,27

Fresh aerial biomass production determined after 4 years of vegetation exceeded 278 kg/plant, resulting in a total production per unit area of over 55 tons of biomass/ha, with stems contributing over 28 tons/ha, branches contributing over 12 tons/ha and leaves contributing over 15 tons/ha (Table 22).

Table 22. Aerial biomass accumulated in 4-year-old madake bamboo plantations, Ferrara, Italia

YEAR OF VEGETATION	Stems fresh biomass (kg/plant)	Branches fresh biomass (kg/plant)	Leaves fresh biomass (kg/plant)	Total fresh biomass (kg/plant)	Stems dry biomass (kg/plant)	Branches dry biomass (kg/plant)	Leaves dry biomass (kg/plant)	Total dry biomass (kg/plant)
4 year (2025)	141,432	60,672	76,692	278,796	120,348	40,044	47,076	207,468
5 year (2026)	165,004	70,784	89,474	325,258	140,406	46,718	54,922	242,046
6 year (2027)	188,576	80,896	102,256	371,728	160,464	53,392	62,768	276,624
7 year (2028)	212,148	91,008	115,038	418,194	180,522	60,066	70,614	311,202
8 year (2029)	235,720	101,120	127,820	464,660	200,580	66,740	78,460	345,780
9 year (2030)	265,185	113,760	143,797	522,742	225,653	75,083	88,268	389,004
10 year (2031)	294,650	126,400	159,774	580,824	250,726	83,426	98,076	432,228

Following the research conducted, after 4 years of vegetation of madake bamboo plants, a total dry biomass production per unit area of over 41 To/Ha was obtained, the distribution of dry biomass in the aerial organs of the plants being as follows: over 24 To/Ha accumulated in stems, and over 8 To/Ha of fresh biomass accumulated in stem branches and over 9 To/Ha in leaves, with the possibility of exceeding 86 To/Ha after 10 years of vegetation (Table 23).

Table 23. Total biomass accumulated on the unit surface in 4-year-old madake bamboo plantations, Ferrara

YEAR OF VEGETATION	Stems fresh biomass (To/Ha)	Branches fresh biomass (To/Ha)	Leaves fresh biomass (To/Ha)	Total fresh biomass (To/Ha)	Stems dry biomass (To/Ha)	Branches dry biomass (To/Ha)	Leaves dry biomass (To/Ha)	Total dry biomass (To/Ha)
4 year (2025)	28,284	12,132	15,336	55,752	24,072	8,010	9,414	41,496
5 year (2026)	32,998	14,154	17,892	65,044	28,084	9,345	10,983	48,412
6 year (2027)	37,712	16,176	20,448	74,336	32,096	10,680	12,552	55,328
7 year (2028)	42,426	18,198	23,004	83,628	36,108	12,015	14,121	62,244
8 year (2029)	47,140	20,220	25,560	92,920	40,120	13,350	15,690	69,160
9 year (2030)	53,033	22,748	28,755	104,536	45,135	15,019	17,651	77,805
10 year (2031)	58,926	25,276	31,950	116,152	50,150	16,688	19,612	86,450

The research results regarding the amount of organic carbon accumulated in the dry biomass of madake bamboo plants after 4 years of growth showed that the plants accumulated over 19 ToC/Ha in the aerial organs, while the plants have the capacity to sequester over 40 ToC/Ha after 10 years of growth, by practicing a planting density of 200 plants/Ha (Table 24).

Table 24 Carbon biomass sequestered in 4-year-old madake bamboo plantations, Ferrara, Italy

YEAR OF VEGETATION	Carbon sequestered in stems (kgC/plant)	Carbon sequestered in branches (kgC/plant)	Carbon sequestered in leaves (kgC/plant)	Total carbon sequestered (kgC/plant)	Carbon sequestered in stems (ToC/Ha)	Carbon sequestered in branches (ToC/Ha)	Carbon sequestered in leaves (ToC/Ha)	Total carbon sequestered (ToC/Ha)
4 year (2025)	56,562	18,822	22,128	97,512	11,34	3,78	4,44	19,56
5 year (2026)	65,989	21,959	25,816	113,764	13,23	4,41	5,18	22,82
6 year (2027)	75,416	25,096	29,504	130,016	15,12	5,04	5,92	26,08
7 year (2028)	84,843	28,233	33,192	146,268	17,01	5,76	6,66	29,43
8 year (2029)	94,270	31,370	36,880	162,520	18,90	6,40	7,40	32,70
9 year (2030)	106,054	35,291	41,490	182,835	21,26	7,20	8,33	36,79
10 year (2031)	117,838	39,212	46,100	203,150	23,62	8,00	9,26	40,88

Table 25. The level of reduction of CO₂ emissions in 4-year-old madake bamboo plantations, Ferrara, Italy

YEAR OF VEGETATION	Stems intake (kgCO ₂ /m ²)	Branches intake (kgCO ₂ /m ²)	Leaves intake (kgCO ₂ /m ²)	Emissions degree reduction (kg CO ₂ /m ²)	Stems intake (ToCO ₂ /Ha)	Branches intake (ToCO ₂ /Ha)	Leaves intake (ToCO ₂ /Ha)	Emissions degree reduction (ToCO ₂ /Ha)
4 year (2025)	207,582	69,078	81,210	357,870	41,58	13,86	16,32	71,76
5 year (2026)	242,179	80,591	94,745	417,515	48,51	16,17	19,04	83,72
6 year (2027)	276,776	92,104	108,280	477,160	55,44	18,48	21,76	95,68
7 year (2028)	311,373	103,617	121,815	536,805	62,37	20,79	24,48	107,64
8 year (2029)	345,970	115,130	135,350	596,450	69,30	23,10	27,20	119,60
9 year (2030)	233,529	129,521	152,269	671,006	77,96	25,99	30,60	134,55
10 year (2031)	259,477	143,912	169,188	572,577	86,62	28,88	34,00	149,50

The madake bamboo plantation after 4 years of growth had the capacity to reduce greenhouse gas emissions by over 71 ToCO₂/Ha, with the potential to contribute to a reduction of GHG levels by over 149 ToCO₂/Ha after 10 years of growth (Table 25).

4.6. Research results regarding the accumulation of above-ground biomass and carbon in 7-year-old moso bamboo plantations (Az. Agricola Camomilla di Zuffa Dr.ssa Ilaria, Bagnara di Romagna locality, Province of Ravenna, Italy) (15.04.2025-15.04.2026)

Company name: Azienda Agricola Camomilla di Zuffa Dott.ssa Ilaria

Adress: Via Trupatello, 20 - 48031 Bagnara di Romagna (RA)

Date of planting: April 2018

Plants density: 1200 plants/Ha

Plantation age: 7 years

Plantation surface: 4,3 Ha

The biometric determinations carried out in moso bamboo plantation, established in the locality of Bagnara di Romagna, Province of Ravenna, Italy, highlighted that in 7 years of vegetation an average number of 8.5 stems/m² were differentiated, with an average shoot height of 9.52 m and an average diameter of 7.73 cm (Table 26).

Table 26. Biometric determinations on 7-year-old moso bamboo, Bagnara di Romagna, Ravenna, Italy

YEAR	Biometric parameters		
	Stems number/m ²	Stems height (m)	Stems diameter (cm)
2025	8,5	9,52	7,73

Table 27. Aerial biomass accumulated in 7-year-old moso bamboo plantations, Bagnara di Romagna, Italy

YEAR OF VEGETATION	Stems fresh biomass (kg/m ²)	Branches fresh biomass (kg/m ²)	Leaves fresh biomass (kg/m ²)	Total fresh biomass (kg/m ²)	Stems dry biomass (kg/m ²)	Branches dry biomass (kg/m ²)	Leaves dry biomass (kg/m ²)	Total dry biomass (kg/m ²)
7 year (2025)	49,369	8,107	9,872	67,348	43,536	5,394	6,913	55,843
8 year (2026)	98,738	16,214	19,744	134,696	87,072	10,788	13,826	111,686
9 year (2027)	148,107	24,321	29,616	202,044	130,608	16,182	20,739	167,529
10 year (2028)	197,476	32,428	39,488	269,392	174,144	21,576	27,652	223,372

During the growing season, an intense rate of biomass accumulation was recorded in the aerial organs of 7-year-old moso bamboo plants, amounting to over 67 kg/m², with the total fresh above-

ground biomass recorded after 7 years of growth being 673.48 To/Ha, with 493.69 To/Ha accumulated in the stems, 81.07 To/Ha in stem branches, and 98.72 To/Ha in leaves, the total fresh biomass production can exceed 2693 To/Ha after 10 years of growth (Table 27 and Table 28).

Table 28. Total biomass accumulated on the unit surface in 7-year-old moso bamboo plantations, Bagnara di Romagna, Italy

YEAR OF VEGETATION	Stems fresh biomass (To/Ha)	Branches fresh biomass (To/Ha)	Leaves fresh biomass (To/Ha)	Total fresh biomass (To/Ha)	Stems dry biomass (To/Ha)	Branches dry biomass (To/Ha)	Leaves dry biomass (To/Ha)	Total dry biomass (To/Ha)
7 year (2025)	493,69	81,07	98,72	673,48	435,36	53,94	69,13	558,43
8 year (2026)	987,38	162,14	197,44	1346,96	870,72	107,88	138,26	1116,86
9 year (2027)	1481,07	243,21	296,16	2020,44	1306,08	161,82	207,39	1675,29
10 year (2028)	1974,76	324,28	394,88	2693,92	1741,44	215,76	276,52	2233,72

After 7 years of vegetation, more than 55.843 kg/m² of aerial dry biomass was accumulated in moso bamboo plants, with a total dry biomass production per unit area being over 558 To/Ha, the contribution of the stems to the total dry biomass production was 435.36 To/Ha, the contribution of stem branches was 53.94 To/Ha, and the contribution of leaves was 69.13 To/Ha. After 10 years of growth, the aerial dry biomass production can exceed 2233 To/Ha (Table 27 și Table 28).

Under the pedo-climatic conditions characteristic of the Ravenna province, moso bamboo plants exhibited an intense rate of organic carbon accumulation in the aerial organs so that, after 7 years of growth, the carbon reservoir reached 264.46 ToC/Ha, with the following distribution: 204.62 ToC/Ha sequestered in the stems, 25.35 ToC/Ha in the stem branches, and 32.49 ToC/Ha in the leaves (Table 29).

Table 29. Carbon biomass sequestered in 7-year-old moso bamboo plantations, Bagnara di Romagna, Italy

YEAR OF VEGETATION	Carbon sequestered in stems (kgC/m ²)	Carbon sequestered in branches (kgC/m ²)	Carbon sequestered in leaves (kg /m ²)	Total carbon sequestered (kgC/m ²)	Carbon sequestered in stems (ToC/Ha)	Carbon sequestered in branches (ToC/Ha)	Carbon sequestered in leaves (ToC/Ha)	Total carbon sequestered (ToC/Ha)
7 year (2025)	20,462	2,535	3,249	26,246	204,62	25,35	32,49	264,46
8 year (2026)	40,924	5,070	6,498	52,492	409,24	50,70	64,98	524,92
9 year (2027)	61,386	7,605	9,747	78,738	613,86	76,05	97,47	787,38
10 year (2028)	81,848	10,140	12,996	104,984	818,48	101,40	129,96	1049,84

Based on the evaluation of the carbon accumulation dynamics in the 7-year-old bamboo plantation, it is estimated that after a period of 10 years of growth, the plantation can sequester over 104 KgC/m², with a total amount of carbon sequestered per unit area of over 1049 ToC/Ha, the stems potentially sequestering over 818 ToC/Ha, the stem branches capable of capturing over 101 ToC/Ha from the atmosphere, and the leaves over 129 ToC/Ha (Table 29).

Under the pedo-climatic conditions specific to the locality of Bagnara di Romagna, Province of Ravenna, Italy, research results have shown that by establishing a moso bamboo plantation, after 7 years of growth, the bamboo plants significantly contribute to reducing greenhouse gas (GHG) emissions in the atmosphere, by 963.23 ToCO_{2e}/Ha, with the contribution of the stems in reducing GHG levels being 750.96 ToCO_{2e}/Ha, the contribution of the stem branches being 93.03 ToCO_{2e}/Ha, and the contribution of the leaves being 119.24 ToCO_{2e}/Ha.

Table 30. The level of reduction of CO₂ emissions in 7-year-old moso bamboo plantations, Bagnara di Romagna, Ravenna, Italy

YEAR OF VEGETATION	Stems intake (kgCO ₂ /m ²)	Branches intake (kgCO ₂ /m ²)	Leaves intake (kgCO ₂ /m ²)	Emissions degree reduction (kg CO ₂ /m ²)	Stems intake (ToCO ₂ /Ha)	Branches intake (ToCO ₂ /Ha)	Leaves intake (ToCO ₂ /Ha)	Emissions degree reduction (ToCO ₂ /Ha)
7 year (2025)	75,778	9,303	11,924	96,323	750,96	93,03	119,24	963,23
8 year (2026)	151,556	18,606	23,848	194,010	1515,56	186,06	238,48	1940,10
9 year (2027)	227,334	27,909	35,772	291,015	2273,34	279,09	357,72	2910,15
10 year (2028)	303,112	37,212	47,696	388,020	3031,12	372,12	476,96	3880,20

After 10 years of growth, the plantation could have the capacity to reduce GHG levels by more than 3880 ToCO₂/Ha (Table 30).

4.7. Research results regarding the accumulation of above-ground biomass and carbon in 8-year-old moso bamboo plantations (SOCIETA AGRICOLA MANG Srl, Sant'Egidio Locality, Ferrara Province, Italy) (15.04.2025-15.04.2026)

Company name: Società Agricola Mang Srl

Address: Via P. Paruta, 24 - 00179 Roma

Date of planting: April 2017

Plants density: 1200 plants/Ha

Plantation age: 8 years

Plantation surface: 5 Ha

After 8 years of growth, the density of the stems per unit area in moso bamboo plantation was 8.5 stems/m², with an average height of 12.41 m and an average diameter measured at the middle of the stems of 12.47 cm (Table 31).

Table 31. Biometric determinations on 8-year-old moso bamboo, Sant'Egidio, Ferrara, Italy

YEAR	Biometric parameters		
	Stems number/m ²	Stems height (m)	Stems diameter (cm)
2025	8,5	12,41	12,47

Following research conducted on moso bamboo plantation established in the locality of Sant'Egidio in the Province of Ferrara, it was found that after 8 years of vegetation, a total fresh aboveground biomass production of 81.298 kg/m² was obtained, representing a total production per unit area of over 812 tons/ha, with the contribution of the stems to the production of fresh aerial biomass being 601.73 tons/ha, the contribution of stem branches being 97.91 tons/ha, and the contribution of leaves being 113.34 tons/ha, with the probability that the level of fresh biomass production exceed 4244 tons/ha after 10 years of vegetation (Table 32 and Table 33).

Table 32. Aerial biomass accumulated in 8-year-old moso bamboo plantations, Sant'Egidio, Ferrara, Italy

YEAR OF VEGETATION	Stems fresh biomass (kg/m ²)	Branches fresh biomass (kg/m ²)	Leaves fresh biomass (kg/m ²)	Total fresh biomass (kg/m ²)	Stems dry biomass (kg/m ²)	Branches dry biomass (kg/m ²)	Leaves dry biomass (kg/m ²)	Total dry biomass (kg/m ²)
8 year (2025)	60,173	9,791	11,334	81,298	50,111	6,431	7,223	63,765
9 year (2026)	120,346	19,582	22,668	162,596	100,222	12,862	14,446	127,530
10 year (2027)	361,038	29,373	34,002	424,413	150,333	19,293	21,669	191,295

Determinations carried out after 8 years of vegetation showed that bamboo plants produced an average dry biomass of 637.65 tons/ha, of which stem biomass amounted to 501.11 tons/ha, leaf biomass was 72.23 tons/ha, and stem branches contributed 64.31 tons of dry biomass/Ha (Table 33).

Table 33. Total biomass accumulated on the unit surface in 8-year-old moso bamboo plantations, Sant'Egidio, Ferrara, Italy

YEAR OF VEGETATION	Stems fresh biomass (To/Ha)	Branches fresh biomass (To/Ha)	Leaves fresh biomass (To/Ha)	Total fresh biomass (To/Ha)	Stems dry biomass (To/Ha)	Branches dry biomass (To/Ha)	Leaves dry biomass (To/Ha)	Total dry biomass (To/Ha)
8 year (2025)	601,73	97,91	113,34	812,98	501,11	64,31	72,23	637,65
9 year (2026)	1203,46	195,82	226,68	1625,96	1002,22	128,62	144,46	1275,30
10 year (2027)	3610,38	293,73	340,02	4244,13	1503,33	192,93	216,69	1912,95

The research results on the dynamics of organic carbon accumulation in the aerial organs of moso bamboo plants demonstrated the carbon stock after 8 years of vegetation being 299.7 ToC/Ha, with 235.52 ToC/Ha accumulated in stems, 30.23 ToC/Ha in stem branches, and 33.95 ToC/Ha in leaves (Table 34).

Table 34. Carbon biomass sequestered in 8-year-old moso bamboo plantations, Ferrara, Italy

YEAR OF VEGETATION	Carbon sequestered in stems (kgC/m ²)	Carbon sequestered in branches (kgC/m ²)	Carbon sequestered in leaves (kgC/m ²)	Total carbon sequestered (kgC/m ²)	Carbon sequestered in stems (ToC/Ha)	Carbon sequestered in branches (ToC/Ha)	Carbon sequestered in leaves (ToC/Ha)	Total carbon sequestered (ToC/Ha)
8 year (2025)	23,55	3,02	3,39	29,96	235,52	30,23	33,95	299,70
9 year (2026)	47,10	6,04	6,78	59,92	471,04	60,46	67,90	599,40
10 year (2027)	70,65	9,06	10,17	89,88	706,56	90,69	101,85	899,10

The results of the assessments regarding the evolution of carbon accumulation in 10 years of vegetation predict that the plantation could sequester over 899 ToC/Ha (Table 34).

Table 35. The level of reduction of CO₂ emissions in 8-year-old moso bamboo plantations, Ferrara, Italy

YEAR OF VEGETATION	Stems intake (kgCO ₂ e/m ²)	Branches intake (kgCO ₂ e/m ²)	Leaves intake (kgCO ₂ e/m ²)	Emissions degree reduction (kg CO ₂ e/m ²)	Stems intake (ToCO ₂ e/Ha)	Branches intake (ToCO ₂ e/Ha)	Leaves intake (ToCO ₂ e/Ha)	Emissions degree reduction (ToCO ₂ e/Ha)
8 year (2025)	86,44	11,09	12,46	109,99	864,36	110,94	124,59	1099,89
9 year (2026)	172,87	22,19	24,92	219,98	1728,71	221,88	249,18	2199,77
10 year (2027)	259,31	33,28	37,38	329,97	2593,07	332,82	373,77	3299,66

The research results demonstrated that, by establishing a moso bamboo plantation, the plantation has the capacity to reduce CO₂ emissions from the atmosphere after 8 years of vegetation by 1099.98 ToCO₂e/Ha, with the stems contributing to the reduction of GHGs by 864.36 ToCO₂e/Ha, the stem branches by 110.94 ToCO₂e/Ha and the leaves by 124.59 ToCO₂e/Ha, with the probability that after 10 years of vegetation the moso bamboo plantation to contributing to the reduction of GHG level by over 3299 ToCO₂e/Ha (Table 35).

GENERAL CONCLUSIONS:

Based on the observations and determinations carried out during the period April 2025 - April 2026 in bamboo plantations of different ages and located in different geographical areas, the following conclusions can be drawn:

1. Conclusions regarding the dynamics of aboveground biomass and carbon accumulation in 2-year-old moso bamboo plantations (Vivi Bambu Empowered Srl, Cona Locality, Ferrara Province, Italy) (15.04.2025-15.04.2026):

- During the research period, under the pedo-climatic conditions specific to Cona, Ferrara Province, after 2 years of growth, the average density of culms in 2-year-old moso bamboo plants was 11.66 culms/m², with a height of 2.72 m and a diameter of 1.93 cm.
- The total fresh aboveground biomass production determined after 2 years of growth was 93.89 To/Ha, and the total dry biomass production was 77.27 To/Ha, with the possibility of exceeding 845 To/Ha of fresh biomass and over 695 To/Ha of dry biomass in 10 years of growth.
- The amount of organic carbon accumulated after 2 years of growth in the dry biomass of 2-year-old moso bamboo plants was 36.31 ToC/Ha, with 2-year-old bamboo plantations thus reducing CO₂ emissions in the atmosphere (GHG) by over 132 ToCO_{2e}/Ha, with the potential to accumulate over 326 ToC/Ha in 10 years of growth, thereby having the capacity to reduce GHG levels by over 1196 ToCO_{2e}/Ha.

2. Conclusions regarding the dynamics of aboveground biomass and carbon accumulation in 3-year-old moso bamboo plantations (VIVI BAMBÛ ALBANY Sh.p.k, Maqellarë Area, Dibër District, Albany) (15.04.2025-15.04.2026):

- Under the pedo-climatic conditions specific to the Maqellarë area, Dibër District, Albania, the average number of shoots present on moso bamboo plants in 2025 was 9.25 shoots/m², shoots that reached an average height of 2.72 m and an average diameter of 2.01 cm.
- As a result of achieving a total fresh biomass production of over 107 To/Ha and an average dry biomass production of over 88 To/Ha per unit area, the moso bamboo plants accumulated over 41 ToC/Ha after 3 years of growth, thus having the capacity, within 10 years of growth, to sequester from the atmosphere, according to estimates, over 342 ToC/Ha.

3. Conclusions regarding the dynamics of aboveground biomass and carbon accumulation in 4-year-old moso bamboo plantations (VIVI BAMBÛ ALBANY Sh.p.k, Maqellarë Area, Dibër District, Albany) (15.04.2025-15.04.2026):

- The research results demonstrated that moso bamboo plants developed more than 28 stems/m² after 4 years of growth, with an average stem height of 3.73 m and a stem diameter of 2.47 cm.
- Moso bamboo plants achieved after 4 years of growth a total fresh aboveground biomass production of over 161 To/Ha, which represents over 141 To/Ha of dry aboveground biomass, thus making it possible to obtain after 10 years of growth over 1128 To/Ha of fresh biomass, and over 992 To/Ha of dry biomass.
- The total amount of carbon accumulated in the dry biomass of moso bamboo plants in the 4th year of growth exceeded 66 ToC/Ha, with the stems contributing over 29 ToC/Ha, stem

branches contributing over 18 ToC/Ha, and leaves contributing over 19 ToC/Ha and, according to estimates, in 10 years of growth, the total amount of organic carbon that can be sequestered may exceed 466 ToC/Ha.

4. Conclusions regarding the dynamics of aboveground biomass and carbon accumulation in 5-year-old moso bamboo plantations (Società Agricola Kida Srl, Ferrara Province, Italy) (15.04.2025-15.04.2026):

- Under the pedo-climatic conditions characteristic of the Province of Ferrara, in the 5-year-old moso bamboo plantation, the average number of stems determined per unit area in 2025 was over 43 stems/m², with an average height of 1.77 m and an average diameter of 0.88 cm.
- With a total fresh aboveground biomass production of over 277 To/Ha and a total dry aboveground biomass production of over 177 To/Ha determined in 2025 year, the plantation has the capacity to achieve, according to estimates, a total fresh biomass production of over 1665 To/Ha, and over 1062 To/Ha of dry aboveground biomass after 10 years of growth.
- Research conducted in 2025 highlighted that by ensuring a planting density of 1200 plants/ha, moso bamboo plants can sequester over 83 ToC/Ha after 5 years of growth, thus reducing GHG levels by over 305 ToCO_{2e}/Ha, with a potential for organic carbon accumulation estimated to exceed 499 ToC/Ha after 10 years of growth, thereby contributing to a reduction in GHG levels by over 1832 ToCO_{2e}/Ha.

5. Conclusions regarding the dynamics of aboveground biomass and carbon accumulation in 4-year-old madake bamboo plantations (Società Agricola Kida Srl, Ferrara Province, Italy) (15.04.2025-15.04.2026):

- Following the research conducted in the madake bamboo plantation, it was found that after 4 years of growth, the plants had developed more than 35 shoots per plant, with an average shoot height of 3.02 m and an average shoot diameter of 2.27 cm.
- After 4 years of growth, the madake bamboo plants had accumulated more than 278 kg/plant of fresh aboveground biomass, and over 207 kg/plant of dry biomass, which represents, based on a planting density of 200 plants/ha, 55 To/Ha of fresh aboveground biomass and 41 To/Ha of dry biomass.
- Using a planting density of 200 plants/ha, the madake bamboo plants accumulated 19 ToC/Ha after 4 years of growth, with the plant shoots sequestering 11.34 ToC/Ha, 3.78 ToC/Ha accumulating in the shoot branches, and 4.44 ToC/Ha in the plants leaves.

6. Conclusions regarding the dynamics of aboveground biomass and carbon accumulation in 7-year-old moso bamboo plantations (Az. Agricola Camomilla di Zuffa Dr.ssa Ilaria, Bagnara di Romagna Locality, Ravenna Province, Italy) (15.04.2025-15.04.2026):

- Under the pedo-climatic conditions specific to the Province of Ravenna, after 7 years of growth, the average number of stems present per moso bamboo plant was 8.5 stems/m², with an average stem height of 9.25 m and an average diameter of 7.73 cm.
- After 7 years of growth, the total aboveground biomass production exceeded 673 To/Ha of fresh biomass, representing over 558 To/Ha of dry biomass, with the total aboveground biomass production potentially exceeding 2693 To/Ha of fresh biomass, and over 2233 To/Ha of dry biomass after 10 years of growth, according to estimates.

- The total amount of organic carbon accumulated in the dry biomass of moso bamboo plants after 7 years of growth exceeded 264 ToC/Ha, with over 204 ToC/Ha accumulated in stems, over 25 ToC/Ha in stem branches, and over 32 ToC/Ha in leaves, the plants has the potential to sequester over 1049 ToC/Ha after 10 years of growth, thus contributing to reducing GHG levels by over 963 ToCO_{2e}/Ha, and by 3880 ToCO_{2e}/Ha after 10 years of growth.

7. Conclusions regarding the dynamics of aboveground biomass and carbon accumulation in 8-year-old moso bamboo plantations (SOCIETA AGRICOLA MANG Srl, Sant'Egidio Locality, Ferrara Province, Italy) (15.04.2025-15.04.2026):

- Research conducted in 2025 year highlighted that, under the specific pedo-climatic conditions of Ferrara Province, after 8 years of vegetation the average number of culms present on the moso bamboo plants was 8.5 culms/m², with culms reaching an average height of 12.41 m and an average diameter measured at the middle of the culms of 12.47 cm.
- After 8 years of growth, a total fresh aboveground biomass production of over 812 To/Ha and a dry aboveground biomass production of over 637 To/Ha were obtained, with the plantation having the capacity to achieve, after 10 years of growth, a total fresh aboveground biomass production that can exceed 2438 To/Ha, and over 1912 To/Ha of dry aboveground biomass.
- In the dry biomass of bamboo plants, the total amount of carbon accumulated after 8 years of growth exceeded 299 ToC/Ha, with the contribution of stems to the carbon biomass exceeding 29 ToC/Ha, the contribution of branches being over 30 ToC/Ha, and the leaves contributing over 33 ToC/Ha, with moso bamboo plants thus reducing GHG levels by more than 1099 ToCO_{2e}/Ha with the possibility, according to estimates, that after 10 years of growth, moso bamboo plants to can sequester over 899 ToC/Ha, there by contributing to a reduction in GHG levels of over 3299 ToCO_{2e}/Ha.

Date:

7 April 2026

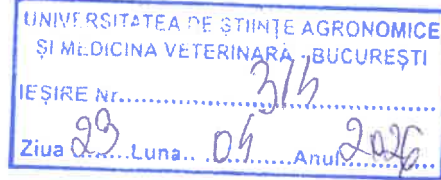
PROJECT MANAGER:

PhD Senior Lecturer **DOBRINOIU Ricuța Vasilica**





UNIVERSITATEA DE ȘTIINȚE AGRONOMICE ȘI MEDICINĂ VETERINARĂ – BUCUREȘTI



MINUTES OF ACCEPTANCE OF WORKS UNDER THE CONTRACT FOR THE PROJECT/RESEARCH-DEVELOPMENT AND INNOVATION SERVICES

NO. 440 FROM 11.04.2025

Concluded today, 15.04.2026,

1. UNIVERSITY OF AGRONOMIC SCIENCES AND VETERINARY MEDICINE OF BUCHAREST, located at 59 Mărăști Blvd., sector 1, Bucharest, postal code 011464, telephone: 021/318.25.64, fax: 021/318.28.88, e-mail: rectorat@usamv.ro, fiscal code 4602041, represented by Prof. Univ. Dr. Sorin Mihai CÎMPEANU - Rector and Ec. Laura Mihaela Iosub - Economic Director, in the capacity of **Provider**

And

2. VIVI BAMBÛ ALBANIA Sh.p.k., located at 29 Agolli St., H.1, Maqellare sector, Kercisht i Postem, 8302 Diber, telephone: +393357076516, registered under no.: SN-991965-05-24, having fiscal registration code L91515023M, represented by Administrator Giovanni Bezze, in the capacity of **Beneficiary**,

on the occasion of delivering the results of the project/services for research-development and innovation for the period 15.04.2025 – 15.04.2026 according to Contract No. 440 from 11.04.2025, regarding: "Research on the carbon absorption capacity in giant bamboo plantations and calculating the total amount of sequestered carbon, depending on planting density and the fertilization scheme applied," the following was observed:

- a) The project results/Research development and innovation services carried out comply with the contractual clauses.
- b) All the necessary documents for making the payment are available and properly prepared.

This receipt report has been drawn up in 2 (two) copies, one for each party.

On behalf of the Provider, University of Agronomic
Sciences and Veterinary Medicine of Bucharest

On behalf of the Beneficiary, VIVI BAMBÛ
ALBANIA Sh.p.k.

Project Manager,
PhD Senior Lecturer DOBRINOIU Ricuța Vasilica

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