



OPEN ACCESS

APPROVED BY
Frontiers Editorial Office,
Frontiers Media SA, Switzerland

*CORRESPONDENCE
Rosaria Costa,
✉ costar@unime.it

†These authors share first authorship

RECEIVED 19 December 2022
ACCEPTED 06 June 2023
PUBLISHED 20 June 2023

CITATION
Vadalà R, Cicero N, Dugo G and Costa R
(2023), Corrigendum: Suitability and
eligibility of *Phyllostachys pubescens*
(Moso Bamboo) afforestation for GHG
(greenhouse gases) projects: case study
in central Italy.
Front. Environ. Sci. 11:1127456.
doi: 10.3389/fenvs.2023.1127456

COPYRIGHT
© 2023 Vadalà, Cicero, Dugo and Costa.
This is an open-access article distributed
under the terms of the [Creative
Commons Attribution License \(CC BY\)](#).
The use, distribution or reproduction in
other forums is permitted, provided the
original author(s) and the copyright
owner(s) are credited and that the original
publication in this journal is cited, in
accordance with accepted academic
practice. No use, distribution or
reproduction is permitted which does not
comply with these terms.

Corrigendum: Suitability and eligibility of *Phyllostachys pubescens* (Moso Bamboo) afforestation for GHG (greenhouse gases) projects: case study in central Italy

Rossella Vadalà^{1†}, Nicola Cicero^{1,2}, Giacomo Dugo^{1,2} and Rosaria Costa^{1*†}

¹Dipartimento di Scienze Biomediche, Odontoiatriche e delle Immagini Morfologiche e Funzionali (Biomorf), Università di Messina, Polo Universitario Annunziata, Messina, Italy, ²Science4Life s.r.l., University of Messina, Messina, Italy

KEYWORDS

Phyllostachys pubescens, GHG, carbon farming, computational model, allometric parameters, moso bamboo, central Italy

A Corrigendum on

Suitability and eligibility of *Phyllostachys pubescens* (Moso Bamboo) afforestation for GHG (greenhouse gases) projects: case study in central Italy

by Vadalà R, Cicero N, Dugo G and Costa R (2022). *Front. Environ. Sci.* 10:817177. doi: 10.3389/fenvs.2022.817177

In the published article, there was an error in **Affiliation 2**. The correct affiliation appears above.

In the published article, the following reference “Kuehl, Y., Li, Y., Henley, G. (2013). Impacts of selective harvest on the carbon sequestration potential in Moso bamboo (*Phyllostachys pubescens*) plantations. *Forests, Trees and Livelihoods*, 22, 1-18, doi.org/10.1080/14728028.2013.773652.” was not cited in the article. The citation has now been inserted in sub-section “*Development of computational model*” and in **References** and should read:

“For the quantification of the gross above ground biomass (W), the following equation (Kuehl et al., 2013) was applied.”

In the published article, there was an error in the legend for **Figure 2A** as published. The original legend of the figure consisted of three labels: Density (culm/ha), Population and Effective population. This was redundant and unclear, so the legend was reduced to two entries. The corrected legend and figure appear below.

In the published article, there was an error in the legend for **Figure 2B** as published. The original legend of the figure consisted of two labels: DBH (cm) and H (corrected) (m). This last one has been replaced with H [m] because, in the revision of the computational model (which is proposed in this corrigendum), the corrective factor has not been used anymore (C = 0.32). The corrected legend and figure appear below.

In the published article, there was an error in Figures 2A, B as published. In Figure 2A, the histogram represented the trend of three field parameters (density; population and effective population) over a 0–16 year period. This histogram has been corrected: the timeframe considered has been reduced to 0–15 years, also the values of only two field parameters have been reported: the population (culms/ha) and the actual population net of the cuts expected from the eighth year. This choice was made to make the histogram content clearer to readers. In Figure 2B, the histogram showed the trend of allometric parameters [DBH = diameter breast height (cm) and H culm height (m)] over the 0–16 year period. This histogram has been corrected: the time frame considered has been reduced to 0–15 years. Moreover, the DBH and H values reported in the histogram were obtained respectively by the equations proposed by INBAR protocol (Guomo et al., 2013). In particular, according to Kuehl et al., (2013) for the determination of H values the corrective factor ($C = 0.32$) has not been used anymore. Finally, for the sake of clarity, the scale of values on the y -axis has been corrected with units without decimal places. The corrected Figures 2A, B and its caption appear below.

In the published article, there was an error in Table 1 as published. The values reported in Table 1 were recalculated because there was a formatting error in the formula that was used for the determination of W = gross biomass. This error influenced also the Bw values obtained. In particular, the incorrect formula used for calculating W was as follows:

$$W = -11.496 + 3.046 (5D) + 0.111 (7D)^2$$

Then, according to Kuehl et al., (2013), the gross biomass W was recalculated by the correct formula which is the following

$$W = -11.4970 + 3.0465 \times DBH + 0.1117 \times DBH^2$$

where DBH = diameter at breast height.

Thus, the Bw (gross biomass per hectare) was recalculated, using the correct annual values of W and with the following original formula

$$Bw = W \cdot D$$

where D is the density (culms \cdot ha $^{-1}$).

Finally, the time frame considered has been reduced from 0–16 years to 0–15 years. The corrected Table 1 and its caption appear below.

In the published article, there was an error in Table 2 as published. The values reported in Table 2 were recalculated because they were influenced by the formatting error in the formula for the determination of W which was extensively explained in the previous point. The corrected Table 2 and its caption appear below.

In the published article, there was an error in Figure 3 as published. The error in the formula for calculating the W that was already exhaustively described in previous paragraphs, influenced the values that were reported in the diagram of Figure 3. In fact, the curve showed the net carbon dioxide fraction segregated by the entire moso bamboo plantation after subtraction of the aliquot stored in the cut fraction (20% above ground biomass). Using the correct formula, the maximum amount of captured CO₂ was predicted to be reached on the 12th year (~3651.32 ca. tCO₂e). Therefore, other corrections were necessary: i) the range of values represented by the curve has been reduced from 0–16 years to 0–15 years; ii) According to the results achieved by applying the corrected formula, the range of values reported on the y -axis was

TABLE 1 Correlation of diameter (DBH) and density (D) with the amount of gross biomass above-ground of the entire plantation (W) and of each unit of land (Bw).

Age of plantation (year)	DBH (cm)	D (culms \cdot ha $^{-1}$)	W (Kg.culm $^{-1}$)	Bw (t \cdot ha $^{-1}$)
0	5.20	1,000	7.37	7.37
1	5.81	1,710	9.98	17.07
2	6.48	2,548	12.93	32.96
3	7.17	4,255	16.10	68.49
4	7.85	6,510	19.31	125.74
5	8.49	6,966	22.42	156.17
6	9.05	7,593	25.22	191.50
7	9.50	8,276	27.52	227.72
8	9.80	9,983	29.09	290.45
9	9.93	11,935	29.75	355.09
10	9.84	14,271	29.30	418.08
11	9.51	17,066	27.56	470.42
12	8.90	20,406	24.44	498.81
13	7.97	24,398	19.89	485.19
14	6.70	29,169	13.93	406.39
15	5.05	34,877	6.74	234.95

DBH, diameter at breast height; D, density; W, gross biomass; Bw, gross biomass per hectare.

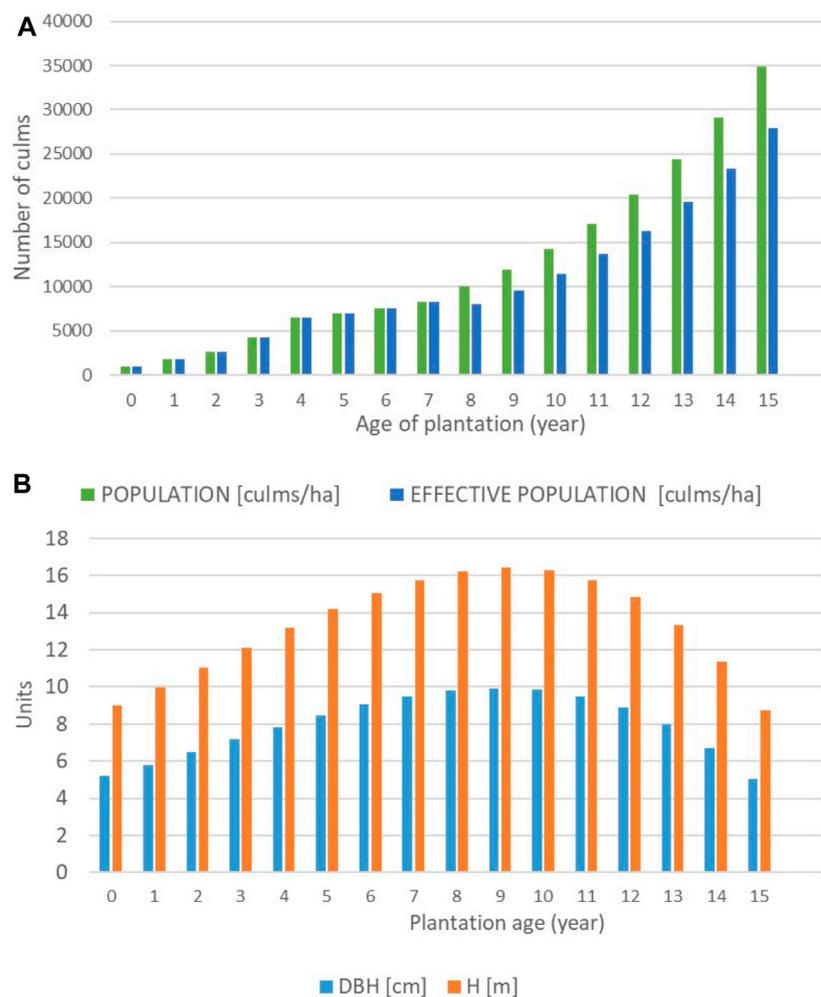


FIGURE 2

(A) Pattern of culm change during a timeframe of 15 years. *Population*: total number of bamboo individuals. *Effective population*: number of culms net of the cut fraction; (B) Culm changes in the time interval 0–15 years of bamboo plantation development. DBH, diameter at breast height; H, culm height.

reduced from 0–30000 tCO₂e to 0–4,000 tCO₂e. The corrected Figure 3 and its caption appear below.

In the published article, there was an error in **Supplementary Table S2**. The values reported in **Supplementary Table S2** were recalculated because they were influenced by the formatting error in the formula for the determination of W which was extensively explained previously. Finally, the time frame considered has been reduced from 0–16 years to 0–15 years. The correct supplementary material appears in the original article.

In the published article, there were errors in the **Abstract**. The corrected passages appear below.

A range of 16 years was too long, and it was preferred to align with the timeframe reported in the literature. Therefore, the timeframe considered has been reduced from 0–16 years to 0–15 years. The corrected sentence appears below:

“In order to evaluate CO₂ capturing potential, a computational study was developed and applied to the bamboo field to predict and

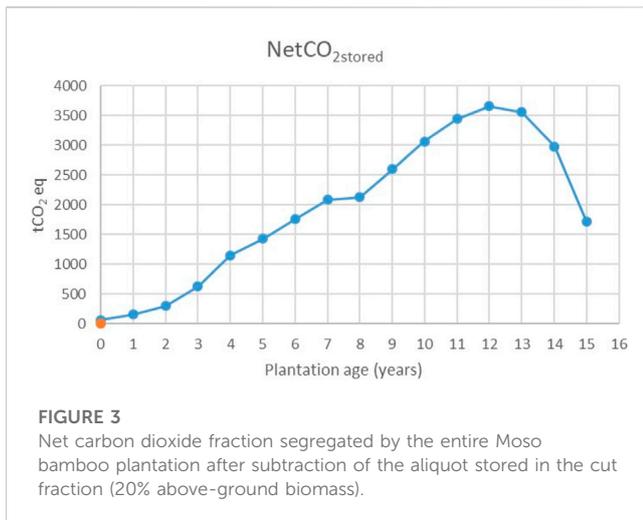
quantify the tons of CO₂ equivalent annually sequestered, during a project range of 15 years.”

Additionally, there was a formatting error in the formula that was used for the determination of W = gross biomass. This error influenced consequently all the calculated values, thus also the highest segregation power of the bamboo plantation. The corrected sentence appears below:

“The highest segregation power of the bamboo plantation equated 3651.32 tCO₂e · yr⁻¹, segregated by the whole field in the 12th year (out of a total timeframe of 15 years).”

In the published article, there was an error in section **Case study: the CO₂ sequestration capacity of a moso bamboo field**. The corrected sentence appears below:

“The model has been processed and applied to the bamboo field in order to evaluate CO₂ capturing potential, and to predict and quantify the tons of CO₂ equivalent annually sequestered, during a project range of 15 years.”



In the published article, there were errors in section **Case study: the CO₂ sequestration capacity of a moso bamboo field**, subsection *Development of Computation Model*. The corrected passages appear below:

“After the seventh year (age of plant’s maturity), the predictive model must take into account an annual cutting intervention that is estimated to remove 20% of mature plants.”

Additionally, in the formula for the determination of the height of the culms, the diameter of breast height (DBH) was erroneously indicated with D, this must be corrected because in the work (D) corresponds to the density of field. Moreover, as specified above, the range of observation must be reduced to from 16 to 15 years, then the correct period is 2016–2031. The corrected sentence appears below:

“For the determination of allometric parameters, namely the average diameters (DBH, diameter at breast height) and heights, of the Moso bamboo population during the period 2016–2031, the following equations from the INBAR protocol were used (Guomo et al., 2013).

$$DBH = 5.2000 + 0.572 T + 0.0452 T^2 - 0.0056 T^3 \quad (R = 0.999)$$

$$H = 0.5702 + 1.6426 DBH - 0.0465 DBH^2 \quad (R = 0.727)$$

where DBH is “diameter at breast height”, H is “height”, T is “plant age” (year). The above parameters are fundamental for the calculation of the parameter W, corresponding to the value of the above ground biomass of each culm (expressed as Kg · culm⁻¹).

A formatting error was detected in the formula for calculating W. This error affected the results obtained. It was necessary to implement in the predictive model the formula with the correct formatting, the one proposed by Kuehl et al., (2013). Thanks to this intervention, the predictive model returned achievements that were very aligned with field data and with the bibliographical evidence. The results obtained show that it is not necessary to correct the allometric parameters with a correction factor (C = 0.32) that was introduced to take into account the geopedoclimatic context. The corrected sentence appears below:

“For the quantification of the gross above ground biomass (W), the following equation (Kuehl et al., 2013) was applied:

$$W = -11.4970 + 3.0465 \times DBH + 0.1117 \times DBH^2 \quad (N = 63; R = 0.915)$$

where DBH = diameter at breast height.

Once calculated the W parameter, it was used for the measurement of the above ground gross biomass per hectare:

$$Bw = W \cdot D$$

where D is the density (culms · ha⁻¹).

TABLE 2 Gross biomass above-ground (Bw), amount of carbon and of carbon dioxide stored in the above-ground biomass (C_{stored} and CO₂ stored).

Age of plantation (year)	Bw (t · ha ⁻¹)	C _{stored} (t · ha ⁻¹)	CO ₂ stored (t · ha ⁻¹)
0	7.37	3.68	13.48
1	17.07	8.53	31.23
2	32.96	16.48	60.31
3	68.49	34.24	125.34
4	125.74	62.87	230.10
5	156.17	78.09	285.79
6	191.50	95.75	350.44
7	227.72	113.86	416.72
8	290.45	145.23	531.53
9	355.09	177.55	649.82
10	418.08	209.04	765.09
11	470.42	235.21	860.88
12	498.81	249.41	912.83
13	485.19	242.60	887.90
14	406.39	203.20	743.70
15	234.95	117.47	429.95

The sentence below was also corrected:

“The calculated CO₂ fraction segregated by the cut biomass has to be subtracted from the CO₂ stored aliquot, in order to obtain the effective number of tCO₂e captured by the entire field during the time interval of 0–15 years.”

In the published article, there were errors in the **Discussion**. The corrected passages appear below.

“Figure 2A reports a provision of the field density increment (the number of culms · ha⁻¹ and the total number of culms in the field) related to the first 15 years of observation, starting from 2016, when the density measured was 1,000 culms · ha⁻¹.”

“Both DBH and W values show an increasing trend up to year 9, while a drop occurs at around the 13th–15th years of plantation age. The parameter D (density) is constantly increasing because of plants propagation, whereas the Bw value decreases from year 13 (485.19 t · ha⁻¹) to year 15 (234.95 t · ha⁻¹).”

In addition to this, the formatting error in the formula for calculating W, influenced all results. In particular, the maximum and average annual value of CO₂eq segregated by the field were incorrect and much higher. The corrected sentence appears below:

“Through the exploitation of the equation set, the gross above ground biomass with correspondent stocks of C and CO₂ for each hectare have been reported in Table 2. As can be seen, all the values gradually increase until year 12, to drop down in the last three years of the period considered. The predictive model provides a maximum of 912.83 tCO₂e · ha⁻¹; according to the model, this value must be reduced to 730.26 tCO₂e · ha⁻¹ since it is necessary to subtract the portion removed by cutting.”

Due to the formatting error in the formula for calculating W, the maximum amount of captured CO₂ occurred on the 13th year. It is not correct because implementing the correct formula in the

predictive model it results that the maximum amount of captured CO₂ occurred on the 12th year. The corrected sentence appears below:

“The maximum amount of captured CO₂ is predicted to be reached on the 12th year (~3651.32 ca. tCO₂e).”

According to the previous points, the comparison with the literature data must be reformulated taking into account that by implementing the correct formula in the predictive model, the results were consistent with those found in bibliography Chen et al. (2018). The corrected sentence appears below:

“For instance, the average value of the above ground biomass (Bw) for moso bamboo reported by Chen et al. (2018) for a DBH of 8.48 cm was about 960 t · ha⁻¹ vs. 156.17 t · ha⁻¹ of our study (year 5, DBH 8.49 cm).”

The sentence below was also corrected:

“However, the correlation between culm density and above ground biomass is in accord with findings by Nath et al. (2015), who observed a constant increase of Bw along with D.”

The authors apologize for these errors and state that this does not change the scientific conclusions of the article in any way. The original article has been updated.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

Reference

Kuehl, Y., Li, Y., and Henley, G. (2013). Impacts of selective harvest on the carbon sequestration potential in Moso bamboo (*Phyllostachys pubescens*) plantations. *For. Trees Livelihoods* 22, 1–18. doi:10.1080/14728028.2013.773652