



Carbon Sequestration in the Standing Trees at Campus of Shivaji University, Kolhapur

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ABSTRACT

Trees remove atmospheric carbon through photosynthesis, that stores a tremendous amount of carbon in their structures. They act as a major CO₂ sink which captures carbon from the atmosphere and stores it in the form of fixed biomass. Therefore, growing trees in the urban areas having a potential role regarding the accumulation of atmospheric CO₂ in the form of biomass. Thus, the present investigation was carried out to calculate the carbon sequestration of 38 standing tree species in Shivaji University campus. The biomass and total organic carbon of standing trees is estimated by the non destructive method. The population of *Gliricidia maculate* is more in the university campus but it sequesters the carbon in very less amount (0.329 tones/year) while the *Ficus racemosa* species sequestered more carbon (65.367 tones/year).

INTRODUCTION

The current hot issue of climate change, is widely accepted not just as an environmental issue but one with severe socioeconomic implications across the globe. The main reason for changing climate is greenhouse gases. The principal greenhouse gases are carbon dioxide, methane, nitrous oxide, and fluorinated gases that enter into the atmosphere due to the anthropogenic activities. Among all of these, carbon dioxide is the most significant greenhouse gas and its emission is hypothetically strongest contributory factor in global warming. So, escalating carbon emission is one of today's major apprehension.

Trees are most important elements on the earth as they play a significant role in ecosystem dynamics. They absorb carbon dioxide, reduces their level, improve the property value and contribute to aesthetic beauty. The plants are important sinks for atmospheric carbon as they have about 50% carbon dioxide in their standing biomass (Ravindranath et al. 1997). Importance of forested areas in carbon sequestration is already accepted, and well documented (FSI 1988, Tiwari & Singh 1987). However, in the modern era due to industrial and technological advancement the vegetation has undergone destruction and degradation by human activities. This development has resulted in emissions of carbon in the atmosphere. Therefore, there is an urgent need to deal with environmental issues. In appreciation of the importance of trees an attempt has been made to study the sequestered carbon in trees of Shivaji University campus.

MATERIALS AND METHODS

Study area: The Shivaji University, Kolhapur is situated at

N 160°43'02" to 740°14'0" and has about 874 acre campus.

In this study, the amount of carbon in standing woody biomass of trees in the University campus was calculated. The trees were sampled by putting a quadrat of size 20m × 20m at different sites. Carbon sequestration was calculated by using the formula given by Chavan (2010).

Formula: $W = 0.15D^2H$

$W \times 120\% = A$

$A \times 72.5\% = B$

$B \times 50\% = C$

$C \times 3.6663 = D$

D = is the carbon sequestration in plants.

Where W = Above ground height of tree

D = Diameter of tree trunks in inches

H = height of tree in feet

RESULTS AND DISCUSSION

The present study has calculated the standing biomass of the above ground woody parts of the trees in the campus of Shivaji University, Kolhapur. Table 1 depicts the specieswise carbon sequestration of the study area. In university campus 1314 trees of 38 species are present. The organic carbon sequestered in some common species like *Ficus racemosa* is 65.367 tones/year, *Ficus benghalensis* 19.805 tones/year, *Parkia biglandulosa* 13.330 tones/year, *Swietenia mahagoni* 7.207 tones/year, *Acacia nilotica* 4.412 tones/year, *Cassia siamea* 4.602 tones/year and *Samanea saman* 4.336 tones/year.

The average standing stock of organic carbon in 38 well grown species is about 158.268 tones. The population of *Gliricidia maculate* is comparatively more in the university

Table 1: Field data and carbon sequestration in the campus of Shivaji University, Kolhapur.

Sr No	Name of plant species GBH (Inch)	Average Height (Feet)	Average Sequestration in tones/year	Average carbon (Tonnes)
1	<i>Acacia longifolia</i> Willd.	19.4	20.1	1.369
2	<i>Acacia nilotica</i> (L) Willd.	30.27	25.0	4.412
3	<i>Albizialebeck</i> (L) Willd.	27.23	30.8	2.478
4	<i>Anacardium occidentale</i> L.	13.30	12	0.230
5	<i>Annona squamosa</i> L.	7.24	14.8	0.140
6	<i>Azadirachta indica</i> Juss.	20.73	51.15	2.387
7	<i>Butea monosperma</i> (Lamk) Jacob.	15.59	21.61	0.569
8	<i>Bougainvillea spectabilis</i> Willd.	13.4	14.4	0.280
9	<i>Caesalpinia pulcherrima</i> L.	12.2	18.4	0.297
10	<i>Cassia fistula</i> L.	20.18	22.4	0.989
11	<i>Cassia siamea</i> Lamk.	22.62	82.90	4.602
12	<i>Cassia surattensis</i> Burm, F.	8.2	19.4	0.955
13	<i>Delonix regia</i> (HOOK) Rel.	29.55	22.39	2.121
14	<i>Eucalyptus globulus</i> Labill. Rel.	14.74	39.22	0.924
15	<i>Ficus benghalensis</i> L.	52.62	65.92	19.805
16	<i>Ficus racemosa</i> L.	122.08	40.42	65.367
7	<i>Ficus religiosa</i> L.	15.32	38.39	0.977
18	<i>Gliricidia maculate</i> H.B & K.	12.25	24.11	0.392
19	<i>Lagerstroemia indica</i> L.	19.23	24.24	0.972
20	<i>Leucaena latisiliqua</i> (L.) Gills	22.85	28.22	1.598
21	<i>Mangifera indica</i> L.	19.70	32.82	1.382
22	<i>Michelia champaca</i> L.	9.62	14.22	0.237
23	<i>Mimusops elagi</i> L.	11.5	19.82	0.510
24	<i>Muntingia calabura</i> L.	20.54	20.40	0.203
25	<i>Parkia biglandulosa</i> Wt. & Arn.	65.72	28.45	13.330
26	<i>Peltophorum pterocarpum</i> (DC)	21.14	30.40	1.510
27	<i>Pithecellobium dulce</i> (Roxb.) Benth.	30.52	32.82	3.317
28	<i>Pterocarpus marsupium</i> Roxb.	20.25	38.20	1.699
29	<i>Samanea saman</i> (Jacq.) Mero.	30.60	42.68	4.336
30	<i>Santalum album</i> L.	10.66	25.42	0.522
31	<i>Swietenia mahagoni</i> (C) Jacq.	38.90	42.80	7.027
32	<i>Syzygium cumini</i> (L.) Skeels	13.60	24.40	0.489
33	<i>Spathodea campanulata</i> P.Beauv.	24.49	39.45	2.561
34	<i>Tamarindus indica</i> L.	15.23	29.80	0.750
35	<i>Tectona grandis</i> L.	19.64	32.89	1.376
36	<i>Terminalia catapa</i> L.	8.98	28.90	0.421
37	<i>Roystonea regia</i> (H.B&K Cook)	29.08	29.80	2.734
38	<i>Ziziphus</i> sp.	11.8	22.80	0.344
				Total = 158.268

campus but it sequestered the carbon in much less amount (0.329 tones/year) in comparison to other plants.

CONCLUSION

It can be strongly concluded that during afforestation, tree species like *Ficus racemosa*, *F. bengalensis*, *Parkia biglandulosa*, *Swietenia mahagoni*, *Acacia nilotica*, *Cassia siamea* and *Samanea saman* should be planted more. All these have a high potential to sink atmospheric carbon which will help to reduce the greenhouse effect. These data are also helpful to estimate the organic carbon stock present in Kolhapur city and forest covers by using a non-destructive method.

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