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RESEARCH ARTICLE

Carbon Sequestration by Standing Trees at the Amrai Park of Sangli City (Maharashtra) - India

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ABSTRACT

Plants are known to absorb the atmospheric carbon by photosynthesis. This absorbed carbon is stored in various organic forms and helps to produce the biomass. The absorption of the atmospheric carbon is depend on the structure and life form of the plants. Trees dominate this process. Greater and taller is the size of the tree more is the amount of carbon fixed. Hence trees are the major plant forms to absorb maximum atmospheric carbon and biomass production. Thus, the present investigation was carried out to calculate the carbon sequestration of 22 standing tree species in Amrai Park of Sangli city. The biomass and total organic carbon of standing trees is estimated by the non-destructive method. The population of *Swietenia mahagoni* (C) Jacq. is more in the campus and it sequestrates the 77509.25 lbs carbon/year.

Keywords: Carbon sequestration, Amrai Park Sangli, Standing trees

INTRODUCTION

The current environmental disasters like global warming is creating havoc in the behaviour of all the living organisms including man on the earth. Today's global warming is the outcome of lot of unnatural processes taking place since last many decades. Many manmade gases are responsible to disturb the natural form of air and atmosphere. Among all these gases, dominance of Carbon dioxide is mainly responsible for global warming. Maintaining the optimum level of CO^2 in the atmosphere is the major challenge in today's modern world FSI (2009).

Trees play an important role in lowering the atmospheric level of CO^2. They not only maintains the CO^2 level but also helps for ecosystem functioning. Trees absorb 50 % CO^2 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). Patil and Co-workers (2013) have estimated the carbon sequestration of Shivaji University, Kolhapur campus. According to Myers and Goreau, (1991) tropical tree plantations of pine and eucalyptus can sequester an average of 10 tons of carbon per hectare per year.

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 Amrai Park of Sangli city.

MATERIALS AND METHODS

Study area : Amrai Park of Sangli city. (Dist. Sangli.) Maharashtra is situated at N 16°51'52" to 74°34'20" E and has about 15 acre campus (Fig. 1). It is 125 years old and created by the then rulers of the Sangli State. It is the only dominant vegetation patch in the city. It is reach in diversity of plants and dependant fauna. In this study, the amount of carbon in standing woody biomass of trees in the Amrai Park of Sangli city was calculated. The trees were sampled by random counting at different sites (Plate I). Carbon sequestration was calculated by using the formula given by Georgia Forestry Commission (1986) and Chavan (2010).

Formula: $W = 0.15D^2H$ (For trees with D›=11 inches)

($W = 0.25D^2H$ for trees with D‹11 inches)

W × 120% = A

A × 72.5% = B

B × 50% = C

C × 3.6663 = D

Where W = above ground height of tree

D = Diameter of tree trunks in inches

H = height of tree in feet

(Biomass and sequestration percentage relation as per Georgia Forestry Commission, 1986)

(Courtesy: Earth Google)

Fig 1: Satellite image of Amrai Park

OBSERVATIONS & RESULTS

The present study has calculated the standing biomass of the above-ground woody parts of the trees in the Amrai Park of Sangli city mentioned in Table.1, where it depicts the species-wise carbon sequestration of the study area. In Amrai Park of Sangli city trees of 22 species are present. The organic carbon sequestrated in some common species like *Ficus benghalensis* L. - 120641.7 lbs/year, *Swietenia mahagoni* (C) Jacq.- 77509.25 lbs/year, *Cassia siamea* Lamk. -7499 lbs/year. The population of *Swietenia mahagoni* (C) Jacq. is comparatively more in the Amrai Park (Fig. 2).

CONCLUSION

It can be strongly concluded that the parks like Amrai Park of Sangli city are functioning as the lungs of the city hence they should be strictly protected from the human encroachment. It can be suggested that during afforestation, tree species like *Semaruba glauca* L., *Ficus religiosa* L., *F. bengalensis* L., *Swietenia mahagoni* (C) Jacq., *Mangifera indica* L., *Cassia siamea* Lamk. and *Samanea saman* L. should be planted more.

All these have a high potential to sink atmospheric carbon which will help to reduce the green house effect. These data are also helpful to estimate the organic carbon stock present in Amrai Park and forest covers by using a non-destructive method.

ACKNOWLEDGEMENT

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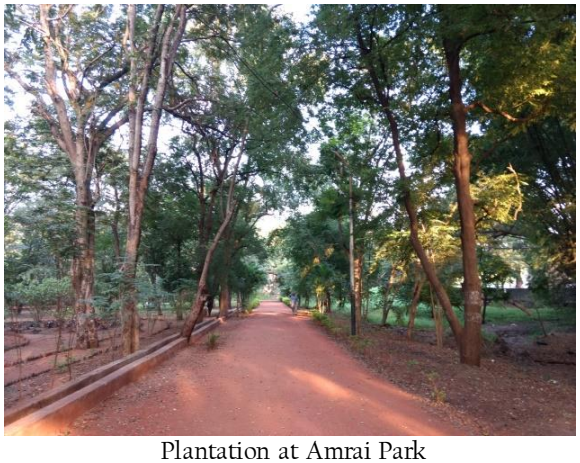
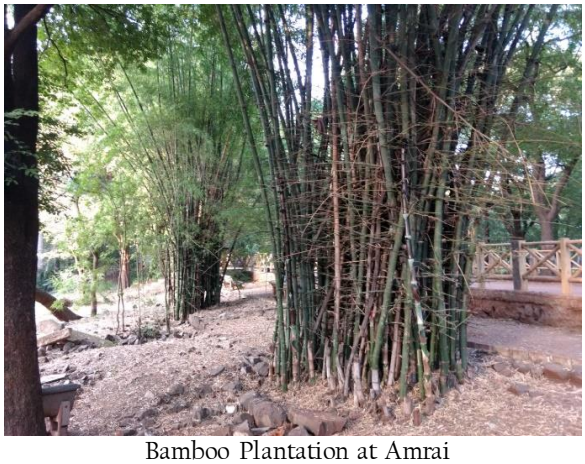
PLATE I : MAJOR PLANTATION IN AMRAI



Plantation at Amrai Park



Bamboo Plantation at Amrai

Sterculia foetida L. at Amrai

Adansonia digitata L. at Amrai

Table 1 : Field data and Carbon Sequestration in the Amrai Park of Sangli City

Sr. No.	Name of plant species	Average Height (Feet)	Average Sequestration (lbs)	Average Carbon (lbs)
1.	*Mangifera indica* L.	35	19291.2	5261.76
2.	*Swietenia mahagoni* (C) Jacq.	40	77509.25	21141
3.	*Gliricidia maculate* H.B & K.	35	25328.1	6908.34
4.	*Kigelia pinnata* L.	72	158733.94	43296.77
5.	*Caesalpinia pulcherrima* L.	20	1076.52	293.63
6.	*Cassia siamea* Lamk.	43	7499	2045.39
7.	*Delonix regia* (Hook) Rel.	45	38754.6	10571
8.	*Saraca asoka* (Roxb) Willd.	20	2990.32	815.7
9.	*Tamarindus indica* L.	75	46667	12728.7
10.	*Coccus nucifera* L.	40	18525.7	5052.96
11.	*Albizia lebbeck*(L) Willd.	80	180070.25	49114.98
12.	*Pithecellobium dulce* (Roxb.)Benth.	25	723.7	197.4
13.	*Terminalia catapa* L.	65	30104.2	8211.1
14.	*Jacarandus acutifolia* Humb. Bonpl.	65	82864.3	22601.6
15.	*Ficus benghalensis* L.	75	120641.7	32905.6
16.	*Ficus religiosa* L.	78	179207.1	48879.6
17.	*Roystonea regia* (Cook.)	35	50940.8	13894.3
18.	*Bambusa arundinacea* (Retz.) Willd.	50	4784.5	1305
19.	*Polyalthia longifolia* (Sonn.) Thw. L.	38	7127.1	1943.95
20.	*Sterculia foetida* L.	105	116149	31680.2
21.	*Limonia acidissima* L.	52	47373.4	13466.9
22.	*Casurina equisetifolia* L.	60	91862.81	25056
		Total	**242.422 (tones)**	**61.585 (tones)**

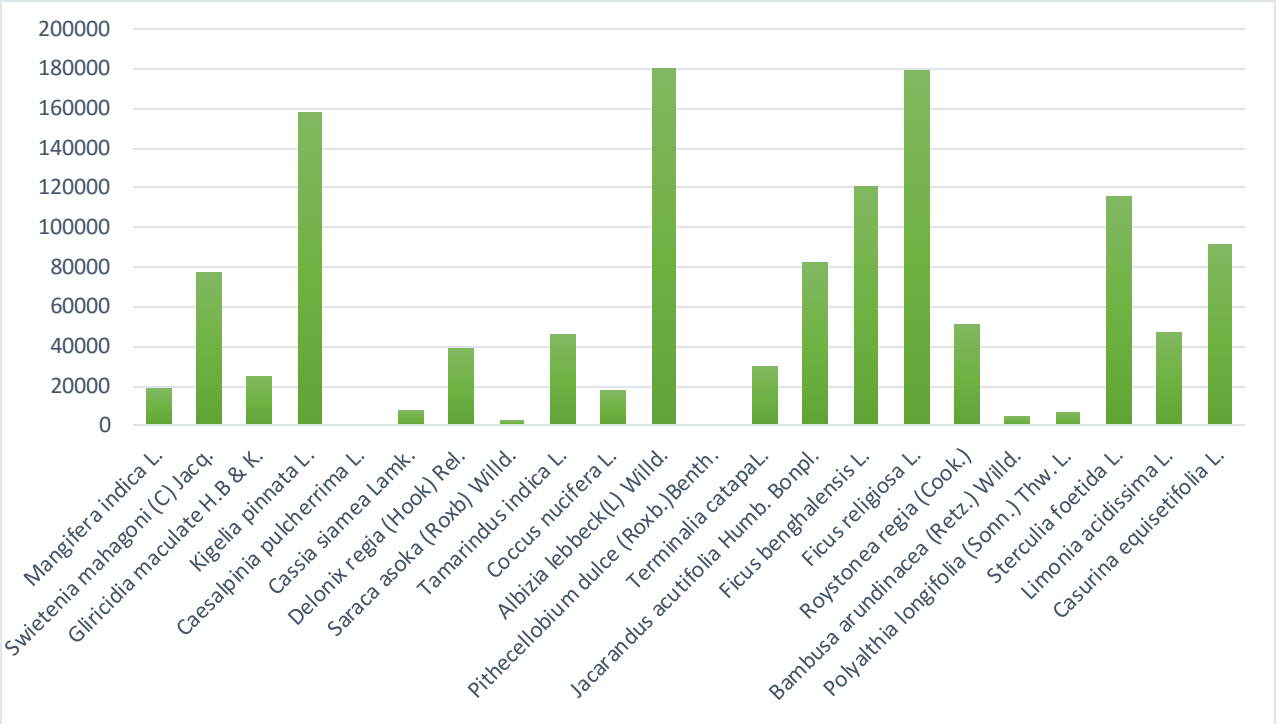


Fig. 2: Carbon Sequestration (lbs) by the trees in the Amrai Park

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