I J R B A T, Issue (XI) Vol (I) Jan 2023: 16-20
A Double-Blind Peer Reviewed & Refereed Journal
OPEN ACCESS
e-ISSN 2347 – 517X
Original Article
INTERNATIONAL JOURNAL OF RESEARCHES IN BIOSCIENCES, AGRICULTURE AND TECHNOLOGY
 www.ijrbat.in

# GROWTH PERFORMANCE OF PLANTED NATIVE SPECIES AT AFORESTATION SITE

**Ratan Dhanorkar*, Nagesh Bodhe, Esarat Ansari, Prashant Wagh and Mrunal Kale**

Botany Department, Anand Niketan College, Anandwan, Warora – 442914
Corresponding Email:- ratandhanokar07@gmail.com

Communicated :29.08.2022 | Revision: 12.09.2022 & 17.09.2022 Accepted: 02.10.2022 | Published: 30.01.2023

**ABSTRACT:**
The present study represents the growth performance of planted native forest species in two plots of Modified Miyawaki Method of high density plantation obtained by rigorous field observations made throughout the year at Atal Anandwan High Density Plantation Site, Anandwan located in Chandrapur District of Maharashtra, India. Total 10480 native plants belonging to 71 different species were planted in 2.5 acres of land on 19 beds of 100 square meter area each from May to June, 2019. In the present study survival percentage and growth rate of 1,060 plants of 58 different species planted in two plots at the afforestation site were enumerated by recording the number of saplings established, shoot height and stem circumference at specific intervals. All the species planted at the afforestation exhibits 100 percent survival and follows the natural pattern in growth performance.

**Keywords: -** Afforestation, High Density Plantation, Survival rate, Growth rate, Anandwan.

## INTRODUCTION :

Biodiversity is the variability among living organisms from all sources, including terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems". For our survival and existence nature has provide us variety of flora and fauna. Wild foods are an important source of food; in fact, before agriculture existed, the forest was completely fed with food and other sources. They ate a variety of foods such as tubers, roots, leaves, fruits, flowers, peanuts, vegetables, mushrooms, gums, etc. In India, forests plays vital role in the livelihoods of rural people. Agriculture is the most important activity, but forests provide various additional products for cash production and livelihood use. Forests are valued for various reasons and many efforts have been made to protect them. The reduction of forest cover is inevitable due to the growth and development process, but traditionally many practices have been followed that have helped in the preservation of forests; some in their original form. Family gardens, forest gardens are examples of traditional forest conservation practices and greatly enhance the conservation of biodiversity.

'Anandwan', a 'Forest of happiness', located around 5 kilometers from Warora, a Tehsil place in Chandrapur district of Maharashtra, India, is an ashram and a community rehabilitation center which was mainly started for leprosy patients and the disabled from oppressed by sections of society. The project is run by the organization 'Maharogi Seva Samiti' and is spread over 50 Acres.

Concept of 'Atal Anandwan High Density Plantation' is inspired from the rapid and effective afforestation method developed by Akira Miyawaki, a Japanese botanist and expert in plant ecology and specializing seed biology study of natural forest. The Miyawaki method of



http://doi.org/10.29369/ijrbat.2023.010.1.0003

afforestation is the plantation of number of different species of plants close together in a small area. The close planting of random tree species together in a small area enriches the green cover and reinforces the richness of land. This will lead to coexistence of plant and matter of fact each plant drawn from the other vital nutrients and they grow to become strong and healthy plant. In this type of forestation technique the growth of plants is 10 times faster than natural plant growth. At Anandwan, Akira Miyawaki's High Density Plantation technique is adopted and recognized as 'Atal Anandwan Ghanwan Prakalpa'. It is planted in sector 14 of Anandwan (79.0273666; 20.281829). Major steps involved in afforestation using this technique are; Determination of soil texture and quantification of biomass, Selection of plant species, Design of forest and Preparation of area, Plantation. Look after the forest for three years.

The present work aims to study Growth rate and survival percentage of the planted plants in this technique.

**METHODOLOGY :**

Atal Anandwan High Density Plantation Project is established at sector 14 near the village, Majra (Rai) by Maharogi Sewa Samiti, Warora. Plantation drive was started in the month of May and took nearly one month for completion. Close planting of many random trees, sub-tree and shrub species in a small area creates mini dense forest within very short span of four-to five months. Nearly 10,480 plants belonging to 71 different native forest species are planted in 2.5 acres of land. High Density plantation is distributed over 19 plots measuring approximately 20 X 05 square feet in size.

For the present work, two plots (each measuring 20 X 05 square feet in size) designated as 'Plot M' and 'Plot N' were selected to explore. Plantation on these plots was conducted on 25th and 26th May, 2019.

For the present work, planted plants were first tagged with assigned numbers and identified for vernacular names. Field data such as number of planted plants, height of the plant, number of branches, circumference of the main stem, foliage status, flowering/fruiting season and morphological descriptions was collected at an interval of three months.

Observations collected from the sites were used for species identification, growth rate and survival percentage as follows;

- Species identification: From vernacular name and plant description using floras (Jungle Trees of Central India and Flora of Nagpur District and Internet
- Growth Rate and Survival Percentage was calculated from collected field data at an interval of three months using following formulae;

- Growth rate = $\frac{S2-S1}{T}$

  Where, S1 = first measurement, S2 = second measurement, and T = the number of days between each

- Survival rate = $\frac{TOTAL\ NO.\ OF\ PLANTS\ SURVIVED}{TOTAL\ NO.\ OF\ PLANTS\ ORIGINALLY\ PLANTED} \times 100$

- Growth rate of the plants produced in plot 'M' and plot 'N' at Atal Anandwan High Density plantation site during the session 2019-20 was calculated using collected field data



http://doi.org/10.29369/ijrbat.2023.010.1.0003

**RESULTS AND DISCUSSION :**

Growth performance and survival percentage of the plants planted in Atal Anandwan High Density plantation site during the session 2019-20.

| Sr. No. | Family | Botanical Name | Local Name | Average Growth Rate (cm) | Survival Rate (%) |
|---|---|---|---|---|---|
| 1 | Anacardiaceae | *Mangifera indica* | Amba | 0.355 | 100 |
| 2 | Anacardiaceae | *Semecarpus anacardium* | Bibba | 0.115 | 100 |
| 3 | Anacardiaceae | *Buchanania cochinchinensis* | Charoli | 0.27 | 100 |
| 4 | Apocynaceae | *Wrightia tinctoria* | Kala Kuda | 0.51 | 100 |
| 5 | Apocynaceae | *Carissa spinarum* | Karwand | 0.27 | 100 |
| 6 | Bignoniaceae | *Dolichandrone falcata* | Medshing | 0.935 | 100 |
| 7 | Bignoniaceae | *Oroxylem indicum* | Tentu | 0.655 | 100 |
| 8 | Boraginaceae | *Cordia dichotoma* | Bhokar | 0.65 | 100 |
| 9 | Burseraceae | *Commiphora wightii* | Guggul | 0.335 | 100 |
| 10 | Caesalpinaceae | *Cassia fistula* | Bahawa | 0.325 | 100 |
| 11 | Combretaceae | *Terminalia arjuna* | Arjun | 0.92 | 100 |
| 12 | Combretaceae | *Anogeissus latifolia* | Dhawada | 0.635 | 100 |
| 13 | Combretaceae | *Terminalia chebula* | Hirda | 0.16 | 100 |
| 14 | Combretaceae | *Terminalia elliptica* | Yen | 0.735 | 96.15 |
| 15 | Combritaceae | *Terminalia bellirica* | Behada | 0.17 | 100 |
| 16 | Dipterocarpaceae | *Shorea robusta* | Sal | 0.025 | 100 |
| 17 | Ebenaceae | *Diospyrus melanoxylon* | Tendu | 0.05 | 100 |
| 18 | Euphorbiaceae | *Mallotus philippensis* | Sindoori | 0.595 | 100 |
| 19 | Fabaceae | *Hardwickia binata* | Anjan | 0.54 | 100 |
| 20 | Fabaceae | *Bauhinia racemosa* | Apta | 0.535 | 100 |
| 21 | Fabaceae | *Pterocarpus marsupium* | Bija | 0.225 | 100 |
| 22 | Fabaceae | *Dalbergia lanceolaria* | Dhoban | 0.26 | 100 |
| 23 | Fabaceae | *Pongamia pinnata* | Karanji | 0.305 | 100 |
| 24 | Fabaceae | *Butea monosperma* | Palas | 0.04 | 100 |
| 25 | Fabaceae | *Pterocarpus santalinus* | Raktachandan | 0.03 | 100 |
| 26 | Fabaceae | *Dalbergia latifolia* | Shisam | 0.515 | 100 |
| 27 | Fabaceae | *Ougeinia oogeinensis* | Tiwasa | 0.9 | 97.62 |
| 28 | Lamiaceae | *Gmelina arborea* | Shiwansag | 1.23 | 100 |
| 29 | Lecythidaceae | *Careya arborea* | Kumbha | 0.11 | 100 |
| 30 | Loganiaceae | *Strychnos potatorum* | Kuchla | 0.025 | 100 |
| 31 | Lythraceae | *Woodfordia fruticosa* | Dhayati | 0.41 | 100 |
| 32 | Lythraceae | *Lagerstroemia speciosa* | Jarul | 1 | 100 |
| 33 | Malvaceae | *Sterculia urens* | Karu | 0.115 | 100 |
| 34 | Malvaceae | *Bombax ceiba* | Katesawar | 0.295 | 100 |
| 35 | Meliaceae | *Soymida febrifuga* | Rohan | 0.035 | 100 |



http://doi.org/10.29369/ijrbat.2023.010.1.0003

| | | | | | |
|---|---|---|---|---|---|
| 36 | Mimosaceae | *Acacia catechu* | Khair | 0.9 | 100 |
| 37 | Mimosaceae | *Albizia sp* | Shirish | 1.53 | 100 |
| 38 | Moraceae | *Ficus virens* | Pakhad | 0.595 | 100 |
| 39 | Moraceae | *Ficus religiosa* | Pimpal | 1.055 | 100 |
| 40 | Moraceae | *Ficus racemosa* | Umbar | 1.485 | 100 |
| 41 | Moraceae | *Ficus benghalensis* | Wad | 0.345 | 100 |
| 42 | Moraceae | *Ficus tinctoria* | Gachch[ | 0.055 | 100 |
| 43 | Moringaceae | *Moringa concanensis* | Ranshewaga | 1.555 | 85.35 |
| 44 | Musaceae | *Ensete superbum* | Rankeli | 1.145 | 100 |
| 45 | Myrtaceae | *Syzygium cumini* | Jambhul | 0.225 | 100 |
| 46 | Oleaceae | *Nyctanthus arbor-tristis* | Parijatak | 1.17 | 95.83 |
| 47 | Phyllanthaceae | *Emblica officinalis* | Amla | 0.425 | 100 |
| 48 | Rubiaceae | *Gardenia resinfera* | Dikemali | 0.165 | 100 |
| 49 | Rubiaceae | *Haldina cordifolia* | Haldu | 0.39 | 100 |
| 50 | Rubiaceae | *Mytragyna parviflora* | Kadamba | 0.9 | 100 |
| 51 | Rubiaceae | *Ixora pavetta* | Lokhandi | 0.01 | 100 |
| 52 | Rutaceae | *Aegle marmelos* | Bel | 0.23 | 100 |
| 53 | Rutaceae | *Limonia acidissima* | Kawath | 0.06 | 100 |
| 54 | Sapindaceae | *Schleichera oleosa* | Kusum | 0.48 | 100 |
| 55 | Sapindaceae | *Sapindus emarginatus* | Ritha | 0.31 | 100 |
| 56 | Sapotaceae | *Manilkara hexandra* | Khirni | 0.37 | 100 |
| 57 | Sapotaceae | *Madhuca longifolia* | Moha | 0.205 | 100 |
| 58 | Ulmaceae | *Holoptelea integrifolia* | Chirol | 0.705 | 100 |

Present study is to investigate the growth rate and survival percentage of planted native forest species in Atal Anandwan High Density Plantation site and we found positive results as follows; Together, plot 'M' and 'N' represents (58) different plant species belonging to 27 dicotyledonous and 01 monocotyledonous angiosperm families. In this study the maximum growth rate is shown by *Moringa concanensis* and *Ixora pavetta, Shorea robusta* and *Strychnos potatorum* shows minimum growth rate. Almost all planted native forest plant species showed 100% survival rate in representative plots at 'Atal Anandwan High Density Plantation' site.

**REFERENCES:**

D.C. DeLong, 1996. Defining Biodiversity. wildlife Society Bulletin, Wiley on behalf of the Wildlife Society, Vol. 24, No. 4.

A. Miyawaki, 1993. Restoration of native forests from Japan to Malaysia. Tasks for Vegetation Science, 5-24.

A. Miyawaki, 2014. The Japanese and Chinju-no-mori Tsunami-protecting forest after the Great East Japan Earthquake 2011. Phytocoenologia Vol. 44, Issue 3-4, 235–244.

A. Miyawaki, Restoration of urban green environments based on the theories of vegetation ecology, Ecological Engineering 11 1998, 157–165.

P. Kishen, 2013. Jungle Trees of Central India. Penguin Books.

N.R. Ugemuge, 1986. Flora of Nagpur District, Maharashtra, India. U. Rekha for Shree Prakashan.

Ja nosIzsa k a., La szlo Papp b., 2000. A link between ecological diversity indices and



http://doi.org/10.29369/ijrbat.2023.010.1.0003

measures of biodiversity. Ecological Modelling 130, 151–156.

X. F. Guo, Effects of Different Forest Reconstruction Methods on Charateristics of Understory Vegetation and Soil Quality, Applied Ecology and Environmental Research, 2018, 16(6):7501-7517.

B. Schirone, A. Salis, F. Vessella, Effectiveness of the Miyawaki method in Mediterranean forest restoration programs, Landscape Ecological Engineering, 2011, 7:81-92



http://doi.org/10.29369/ijrbat.2023.010.1.0003