

Study of Root-Shoot Growth in *Tinospora cordifolia* under Control Condition Practices

Dr. Bhupendra K. Dorkar

Associate Professor, Department of Botany, Shree Shivaji Science College, Amravati

Abstract: *Tinospora cordifolia* (Willd.) Miers ex Hook F & Thoms, commonly known as Giloe or Guduchi has many medicinal important in folk as well as modern medicine. Plants different parts were used in many ailments and facing over exploitation due to use from wild sources. The demands is more which cant not fulfilled only from wild sources and hence needs to cultivate this wild plants. The current work is based on the cultivation of wild medicinal plants *Tinospora cordifolia* which helps to cover demands of drug preparation. The plants subject into control garden cultivation in departments and shoot or stem growth and root growth rates were studied. The tubular and graphical data helps to understand the growth pattern like time and length which helps to understand time and maturity during harvesting.

Key words: *Tinospora cordifolia*, Cultivation, Medicinal Plant, Guduchi, Vegetation, Height of Stem and Growth of Root.

INTRODUCTION

In India, thousands of Ayurvedic drug manufacturing companies in which around 700 are working in Maharashtra (Wankhade et al., 2013) and around 2,50,000 registered medical practitioners who practiced under Ayurvedic system used medicinal plants in their treatments (Ganesan et al., 2016). Most of them utilize several plants or its parts as raw material obtained from the wild as well as from cultivated plant. The *Tinospora* shows good therapeutic activity therefore, it required in large quantity but available in wild forms only. Due to the importance of *Tinospora*, National Medicinal Plant Board (NMPB) in India launched a concerted effort for mass multiplication of plant (Handique, 2014). As per the needs of market demand volume of production will increases for the preparation of different Ayurvedic formulations (NMPB, 2012 and Handique, 2014).

Tinospora cordifolia (Willd.) Miers ex Hook F & Thoms, is one of the important medicinal plant widely used for medicinal purposes. The whole plant is containing medicinal value. However stem of *Tinospora cordifolia* is main constituents of ayurvedic medicine preparations that used in fever, dyspepsia, and urinary diseases (Singh et al., 2003). Leaves are used for the treatment of ulcers, gout, and in erysipels. Plant leaves rich in protein and used as good fodder for cattle.



Flower



Habit



Seed



Cultivation

Tinospora cordifolia

Powdered fruit are use as a tonic and in the treatment of rheumatism and jaundice. The root watery extract is used as antidote, in diabetes, leprosy, chronic cough and chronic fever (Kirtikar and Basu, 1975; Anonymous, 1976). The innumerable properties of Tinospora drug are described in ancient scripts of Ayurveda, like Rasayana, , Tridoshshamaka, Dahnashaka, Agnideepana, Jwarhara, Krimihara etc. and also confirmed its scientific validity (Srinivasan et al., 2008, Upadhyay et al., 2010, , Sereena and Remashree, 2014).

MATERIAL AND METHODS

Tinospora cordifolia is emerging as a multipurpose plant with diverse use. It traditionally used from the wild source due to its demands it's important to cultivate plants in large scale. To achieve this goal study were designed to find pattern of cultivation as per plants height of shoot and root. This helps to understand the maturity and harvesting stages of plants with its various parts.

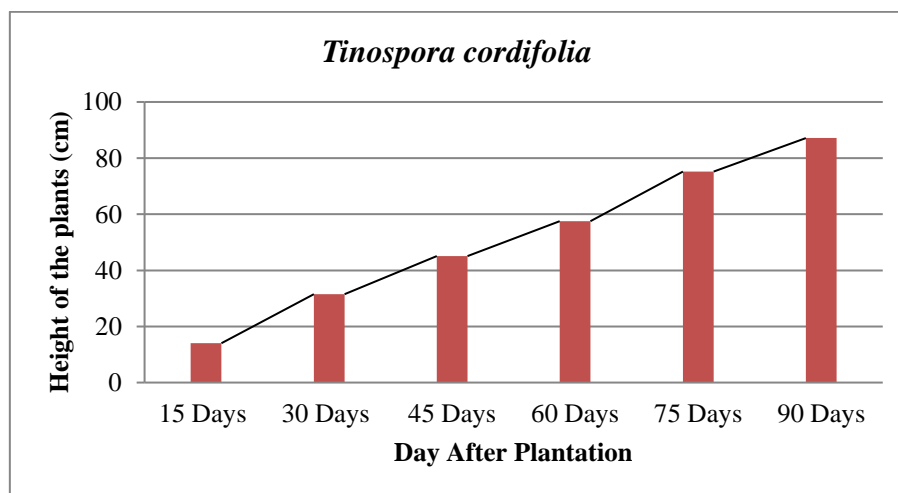
The height of the plant was measured in centimeter (cm) by a scale of suitable length from collar up to the base of topmost fully expanded leaf. Average height (shoot length) of plant was measured at 15, 30, 45, 60, 75, and 90, day after sowing (DAS). Root length was also measured at different intervals i-e. 15, 30, 45, 60, 75, and 90, in centimeters after sowing respectively.

RESULT AND DISCUSSION

Height of the plant for Tinospora cordifolia by its shoot length was measured in intervals for 15-90 days plant. Total growth rates for stem or shoot growth was recorded, it found that's 3.349±0.10 cm per day growth in Tinospora cordifolia (Table 1 and Graph 1).

Replicate of Plant	15 Days	30 Days	45 Days	60 Days	75 Days	90 Days	Total	Per Day Growth (cm)
Replicate 1	12.5	30.2	44.5	58.3	74.5	98.5	99	3.5
Replicate 2	13.5	31.5	46.9	58.5	74.1	70.1	70	3.3
Replicate 3	13.8	32.5	44.5	56.9	75.2	95.2	95	3.5
Replicate 4	13.9	33.5	44.2	56.7	73.8	68.8	69	3.2
Replicate 5	14.1	30.9	44.9	58.2	73.4	78.4	78	3.3
Replicate 6	12.5	30.0	46.7	57.0	75.6	79.5	80	3.3
Replicate 7	12.9	32.2	45.5	57.8	76.6	95.5	96	3.6
Replicate 8	14.5	29.5	44.0	58.2	77.7	98.5	99	3.6
Replicate 9	16.8	32.0	44.5	57.6	76.5	94.3	94	3.6
Replicate 10	15.8	33.2	44.8	56.1	74.0	92.5	93	3.5
Total	14.03	31.54	45.05	57.53	75.14	87.13	87.13	3.449

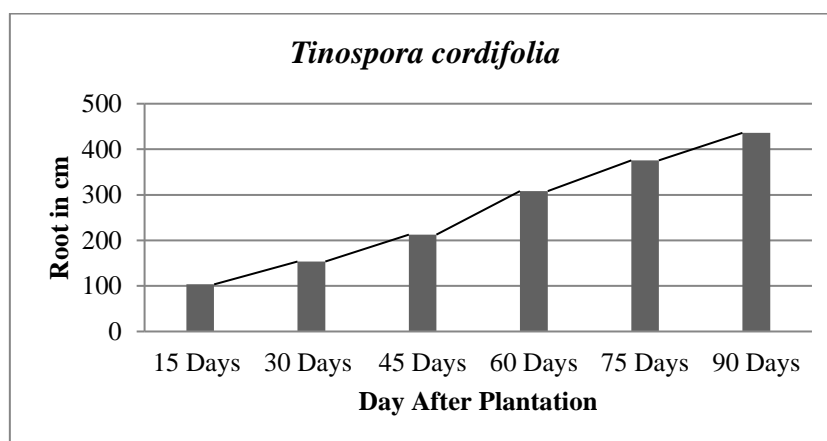
Growth Rate Per Day with SD = 3.449±0.10



Graph no. 2. Height of the plants in Tinospora cordifolia

Replicate of Plant	Table 2. <i>Tinospora cordifolia</i> (Thunb.) Miers Root length in cm (Stem cutting as a Propagules)							Per Day Growth (cm)
	15 Days	30 Days	45 Days	60 Days	75 Days	90 Days	Total	
Replicate 1	102	151	215	310	425	562	562	19.611
Replicate 2	103	152	210	315	395	415	415	17.667
Replicate 3	102	151	215	325	394	412	412	17.767
Replicate 4	104	152	211	305	394	416	416	17.578
Replicate 5	103	155	215	306	350	410	410	17.100
Replicate 6	108	150	214	312	375	420	420	17.544
Replicate 7	103	160	210	302	354	415	415	17.156
Replicate 8	102	161	218	309	351	408	408	17.211
Replicate 9	103	152	220	296	369	501	501	18.233
Replicate 10	104	149	195	299	351	401	401	16.656
Total	103.4	153.3	212.3	307.9	375.8	436	436	17.652

Root Growth Rate Per Day with SD = 17.652±0.812



Graph no. 2. Root/Tubers length in *Tinospora cordifolia*

In *Tinospora cordifolia* root length were recorded after 90 days of plants growth to measure per day growth in cm by comparing mean of all ten replicates. It was observed that 17.65±0.81 cm per day growth in roots of *Tinospora cordifolia* are found as per given tabular and graphical representation data (Table 2. and Graph 2.).

ACKNOWLEDGEMENT

Author is thankful to department of Botany Shri Shivaji Science College Amravati for providing departmental facilities and Botanical garden for current work and for their encouragement for work by all staff.

REFERENCES

- [1]. Anonymous (1976). Wealth of India: Raw materials, Vol X. New Delhi: CSIR.
- [2]. Ganesan AK, Marichamy, Thagamariappan J (2016). Development of medicinal plants sector in India –An empirical study. International Journal of Engineering Technology, Management and Applied Sciences. 4(1):82-88.
- [3]. Handique PJ (2014). In vitro propagation and medicinal attributes of *Tinospora cordifolia*: A Review. Austin J Biotechnol Bioeng. 1 (5):1-5.
- [4]. Kirtikar KR, Basu BD, (1975). Indian Medicinal Plants, Vol 1. 2nd ed. New Connaught Place, Dehra Dun: M/S Bishen Singh, Mahendra Pal Singh.
- [5]. NMPB (2012). Voluntary certification scheme for medicinal plants brochure, QCI.
- [6]. Sereena K, Remashree AB (2014). Histological, histochemical, phytochemical studies of the raw drug Amrita from different raw drug markets of Kerala. International Journal of Interdisciplinary and Multidisciplinary Studies (IJIMS). 1 (5):182-191.
- [7]. Singh SS, S.C. Pandey, S. Srivastava, V.S. Gupta, B. Patro. and A.C. Ghosh (2003). Chemistry and Medicinal Properties of *Tinospora cordifolia* (Guduchi). Indian Journal of Pharmacology 2003; 35: 83-91.
- [8]. Srinivasan GV, Unnikrishnan KP, Rema Shree AB, Balachandran I (2008). HPLC estimation of berberine in *Tinospora cordifolia* and *Tinospora sinensis*. Indian J Pharm Sci. 70 (1):96-99.
- [9]. Upadhyay Avnish K, Kaushal Kumar, Arvind Kumar, Hari S. Mishra (2010). *Tinospora cordifolia* (Willd.) (Guduchi)- Validation of the Ayurvedic pharmacology through experimental and clinical studies. Int J Ayurveda Res. 1 (2):112-121.
- [10]. Wankhade SG, Sarode RB, Gholap SV (2013). Strategies for development of medicinal plants sector in Maharashtra. PKV Res. J. 37 (1&2):1-7.