Plant Archives Vol. 26, Supplement 1, 2026 pp. 2571-2577 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org
DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2026.v26.supplement-1.344

GROWTH AND YIELD PERFORMANCE OF SELECTED GILOY (*TINOSPORA CORDIFOLIA*) GENOTYPES

Amit Kumar[1], Kaushal Kumar[1*], Sunil kumar[2], C.S. Singh[3], Arnab Roy Chowdhury[4], P.R. Oraon[5] and Anil Kumar[5]

[1]Department of Forest Products and Utilization, Faculty of Forestry, Birsa Agricultural University, Ranchi, India
[2]Department of Genetics and Plant Breeding, Faculty of Agriculture, Birsa Agricultural University, Ranchi, India
[3]Department of Agronomy, Faculty of Agriculture, Birsa Agricultural University, Ranchi, India
[4]ICAR-National Institute of Secondary Agriculture, Namkum, Ranchi, India
[5]Department of Silviculture and Agroforestry, Faculty of Forestry Birsa Agricultural University, Ranchi, India
*Corresponding author E-mail: kaushal.herbal@gmail.com
(Date of Receiving : 24-10-2025; Date of Acceptance : 02-01-2026)

ABSTRACT

Giloy is a most potential and commercial crop due to highly demanded in India and Global market due to their potential therapeutic action particularly as antipyretic and immunomodulatory effect. In present study there are 7 genotypes having IC-0639890, IC-0639896, IC-0639898, IC-0639899, IC-0639908, IC-0639910 & IC-0639914. It has been observed in present study and the data obtained on various qualitative parameters of Giloy which analyzed that IC-0639899 is the most suitable genotype for agro climatic conditions of Jharkhand, due to the traits like mean collar diameter (32.10 mm), stem thickness (19.27 mm), number of primary branches (3.80), number of secondary branches (5.97), fresh stem weight/plant (1319.6 gm), and Giloy-Satva% (4.74 %) were highly significantly superior comparatively other genotype of Giloy. The study useful for the farmers and medicinal plants grower who are interested for commercial cultivation of Giloy.

Keywords **:** Giloy, *Tinospora cordifolia*, Genotype, growth, yield.

Introduction

Giloy [*Tinospora cordifolia* (Wild.) Miers ex Hook.f.& Thoms.] stem is scientifically proven most important and potential medicinal plants due to their therapeutic, curative and potent action activities as immunomodulatory ,antipyretic and as rejuvenating (Kumar, 2023). It is large, glabrous, deciduous climbing shrub belonging to the family Menispermaceae (Anon; 2003; Amia, 2003;Vaidya, 1994). It is one of the important deciduous plants distributed throughout the tropical Indian subcontinent and China, ascending to an altitude of 300m. It is heart-leaved moonseed and is found in India, Burma, China, Myanmar, and Sri Lanka. Guduchi, Amrita, Guduchika, chinnobhava, Vatsadani, Kundalini, Gurcha (Hindi), Gala (Gujarat), Amrutavalli (Kannada), Gilo (Punjab), Seendal, SeendilKodi (Tamil), and Amarlata (Assamese) are additional synonymous and common names It is the most important plant in terms of both medicinally and economically. It is native to the tropical regions of the Indian subcontinent and certain parts of China (Udayan *et al.,* 2009). The stem of Giloy are fleshy and filiform with long aerial roots that extend from the nodes. *Tinospora cordifolia* male flowers are clustered, and the females are solitary. The flowering season expands over summers and winters (Upadhyay *et al*., 2010). Fruits develop during the winter, and their seeds are curved in shape (Shetty *et al*., 2010). The colour of the bark ranges from creamy white to grey. The wood is white, porous, and soft. when exposed to air, the pale-yellow viscous sap that flows out of the cut surface of the freshly cut stem immediately takes on a yellow tinge. Because glycosides are present, this sap has an

offensively bitter taste (Chopra *et al.,* 1982). The stem is the official medicine as listed by the Ayurvedic Pharmacopoeia of India (1989). Giloy stem extract is used potentiaaly for reducing fever (Bhatt and Sabin, 1987) Stem starch, also known as *satva*, utilized the form of powder or Giloy tablets, Giloy juice and tea is also available easily in the market. Giloy potentially used for enhancement of immunity in humans. It is worth using *Tinospora cordifolia* because it is very effective on different diseases with having very less side effects and is very much affordable for all (Tomar *et al*., 2021). The starch obtained from the stem which is known as "Guduchi- satva" is highly potentials (Mia *et al*., 2009) for human health. *Tinospora cordifolia* is traditionally used for the treatment of asthma, and the juice is also employed for the treatment of chronic coughs (Spelman, 2001). *Tinospora cordifolia* has recently attracted the attention of many scientists worldwide due to their medicinal properties, including anti-periodic, anti-inflammatory, anti-arthritic, antioxidant, anti-allergic, hepatoprotective, immunomodulatory (Soham and Shyamasree, 2012) It contains diverse phytochemicals, including alkaloids, tannins, glycosides, tinosporaside, and other mixed chemical compounds (Upadhyay *et al*., 2010). During COVID-19 epidemic in India; many incidences of liver injury were reported from people who used *Tinospora cordifolia* as an "immunity booster" (Murkute *et al*., 2022)

Materials and Methods

There are 30 IC Accessions numbers of Giloy have allotted by ICAR-NBPGR on the germplasm that was extensively collected from various locations in India and characterized under AICRP-Medicinal and Aromatic Plants ongoing at Department of Forest Products & Utilization, Faculty of Forestry, BAU sponsored by the ICAR-Directorate of Medicinal and Aromatic Plants Research, Anand, Gujarat. Among the above 30 IC Accessions, seven of them are chosen because they are the most promising and well performed. The experimental site is at AICRP research farm Birsa Agricultural University, Kanke, Ranchi Located in the eastern plateau and hill region of Jharkhand. Geographically, it is located at 23°26'30" N latitude and 85°18'20" E longitude in Chota Nagpur Plateau, situated in north- eastern part of India and at an altitude of 646 m above the mean sea level. The experimental site is almost plain with mild slope towards western side. The soil of the site is lateritic, developed from granite-gneiss, sandy loam in texture, sedentary in nature and well drained with low water holding capacity and poor consistency. The soil of the site belongs to broad soil association 'Red yellow light grey catenary soil' placed in mixed, hyperthermic, typic haplustalfs as per recent taxonomy. The temperature varies from 23.0ºC to 37.9ºC and humidity varies from 69.82 to 86.32 %. The annual rainfall of this area is approximately1400 mm. The plant Giloy (*Tinospora cordifolia*) was planted in Randomized Block Design (RBD) with 7 treatments and 3 replications in a plot size of 3m x 3m at spacing of 100 cm x 100 cm. The numbers of plants kept in a treatments was 9. Details of *Tinospora cordifolia* genotypes T_1 (IC-0639890), T_2 (IC-0639896), T_3 (IC-0639898), T_4 (IC-0639899), T_5 (IC-0639908), T_6 (IC-0639910) & T_7 (IC-0639914). The analytical works have been worked at Center for Giloy Processing and Research, Department of Forest Products & Utilization, Faculty of Forestry, Birsa Agricultural University, Ranchi.

Results and Discussion

This research work was carried out to find out the best growth and yield performance of selected genotypes of Giloy plant (*Tinospora cordifolia*). Technically find out the maximum stem diameter of Giloy plant. The mean collar diameter of 7 Giloy genotypes showed significant difference with each other. The maximum mean collar diameter was observed for T_4, IC-0639899 (32.10 mm) which was significantly superior to rest 6 Giloy genotypes. Treatment T_3 IC-0639898 had shown mean collar diameter of 27.32 mm, which was *at par* with treatment T_6 IC-0639910 (24.76 mm) and T_2 IC-0639896 (23.26 mm). Again the treatment T_2 was found *at par* with T_1 IC-0639890 (21.29 mm). Minimum value of mean collar diameter was recorded for T_5 IC-0639908 (19.21 mm), which was significantly inferior with all remaining 6 genotypes of Giloy followed by T_7 IC-0639914 (20.35 mm). It was seen that the collar diameter value is higher than the value observed by Kumari *et al.* 2024 in which genotype was treated with organic fertilizers.

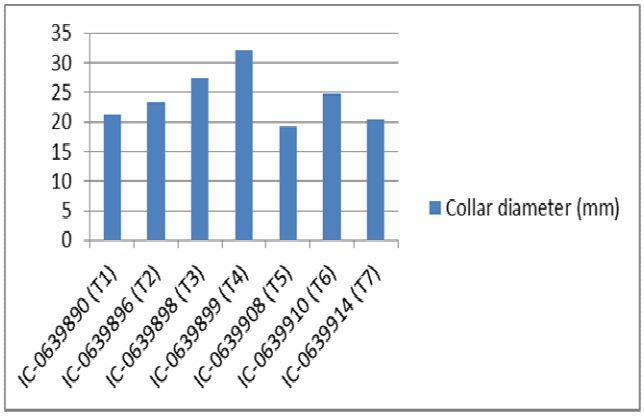

Fig. 1: Showing the collar diameter (mm).

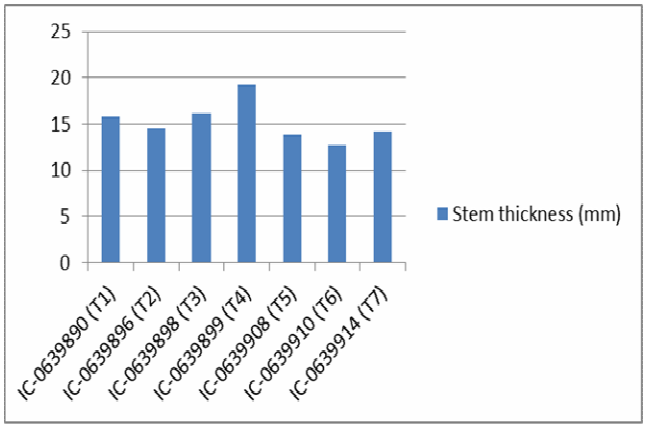

Fig. 2 : Showing the Stem thickness (mm).

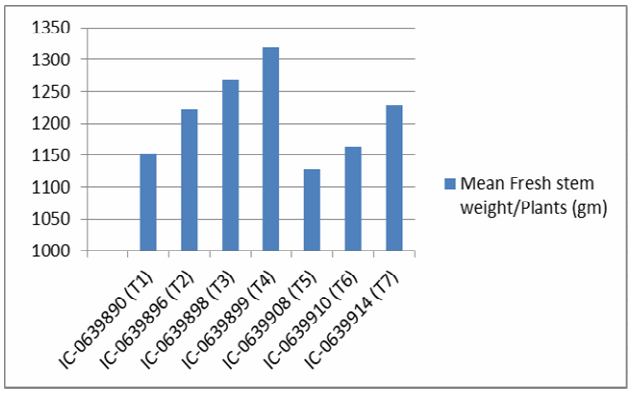

Fig. 3 : Showing the Fresh stem weight/plant (gm).

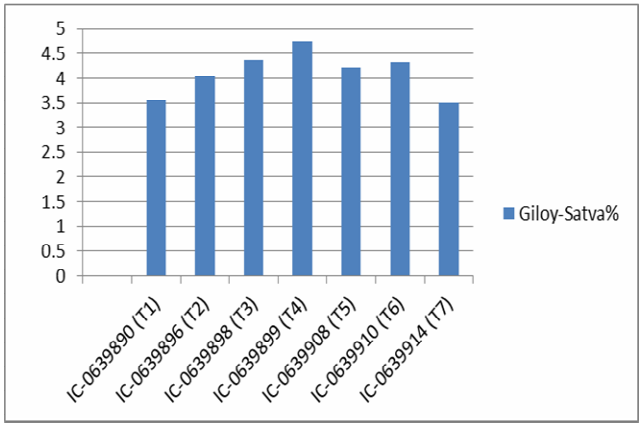

Fig. 4 : Showing the Giloy-Satva (%)

The mean stem thickness of 7 Giloy genotypes showed significant difference with each other. The maximum mean stem thickness was observed for T_4, IC-0639899 (19.27 mm) which was significantly superior to rest 6 Giloy genotypes. Treatment T_3 IC-0639898 had shown mean stem thickness of 16.19 mm, which was *at par* with treatment T_1 IC-0639890 (15.84 mm) and T_2 IC-0639896 (14.58 mm). Again the treatment T_2 was found *at par* with T_7 IC-0639914 (14.18 mm). Minimum value of mean stem thickness was recorded for T_6 IC-0639910 (12.72 mm), which was significantly inferior with all remaining 6 genotypes of Giloy followed by T_5 IC-0639908 (13.80 mm). The stem thickness value was higher in comparison to the findings of Kumari *et al* 2024 in which the genotypes were treated with organic fertilizers.

Plate 1 : Stem of Giloy plant

Plate 2: Leaves of Giloy plants

Plate 3 : Flowers of Giloy plant

Plate 4 : Fruits of Giloy plant

The mean number of primary branches of 7 Giloy genotypes showed significant difference with each other. The maximum mean number of primary branches was observed for T_4, IC-0639899 (3.80) & T_3 IC-0639898 (3.80) which was significantly superior to rest 5 Giloy genotypes. Treatment T_2 IC-0639896 had shown mean number of primary branches of 3.53, which was *at par* with treatment T_7 IC-069914 (3.33) and T_1 IC-0639890 (3.27). Minimum value of mean number of primary branches was recorded for T_5 IC-0639908 (2.87), which was significantly inferior with all remaining 6 genotypes of Giloy followed by T_6 IC-0639910 (3.20).

The mean number of secondary branches of 7 Giloy genotypes showed significant difference with each other. The maximum mean number of secondary branches was observed for T_4, IC-0639899 (5.97) which was significantly superior to rest 6 Giloy genotypes. Treatment T_3 IC-0639898 had shown mean number of secondary branches of 5.47, which was *at par* with treatment T_6 IC-0639910 (4.53) and T_2 IC-0639896 (4.27). Minimum value of mean number of secondary branches was recorded for T_5 IC-0639908 (3.83), which was significantly inferior with all remaining 6 genotypes of Giloy followed by T_1 IC-0639890 (4.00) & T_7 IC-069914 (4.00).

The mean internodal distance (cm) of 7 Giloy genotypes showed significant difference with each other. The maximum mean internodal distance (cm) was observed for T_4, IC-0639899 (14.66 cm) which was significantly superior to rest 6 Giloy genotypes. Treatment T_7 IC-0639914 had shown mean internodal distance (cm) of 13.34 cm, which was *at par* with treatment T_3 IC-0639898 (13.31 cm) & T_6 IC-0639910 (13.25 cm). Again the treatment T_6 was found *at par* with T_2 IC-0639896 (12.17 cm). Minimum value of mean internodal distance (cm) was recorded for T_1 IC-0639890 (10.88 cm), which was significantly inferior with all remaining 6 genotypes of Giloy followed by T_5 IC-0639908 (11.75 cm). The internodal distance was observed higher than the findings of Kumari *et al*. 2024 (14.43cm) in which the genotypes were treated with organic fertilizers.

Table 1 : Collar diameter (mm), mean stem thickness (mm), Number of primary branches, Number of secondary branches and Internodal distance (cm), Days to 50% flowering, Fresh stem weight/plant (gm) and *Giloy-Satva* % of selected genotypes of Giloy.

Sl. No.	Treatments details	Collar diameter (mm)	Stem thickness (mm)	Number of primary branches	Number of secondary branches	Internodal distance (cm)	Days to 50% flowering	Fresh stem weight/ plant (gm)	*Giloy-Satva* %
1.	T_1 : IC-0639890	21.29	15.84	3.27	4.00	10.88	121.47	1152.7	3.56
2.	IC-0639896 (T_2)	23.26	14.58	3.53	4.27	12.17	125.73	1221.6	4.06
3.	IC-0639898 (T_3)	27.32	16.19	3.73	5.47	13.31	127.53	1269.1	4.36
4.	IC-0639899 (T_4)	32.10	19.27	3.80	5.97	14.66	128.67	1319.6	4.74
5.	IC-0639908 (T_5)	19.21	13.80	2.87	3.83	11.75	127.40	1128.3	4.21
6.	IC-0639910 (T_6)	24.76	12.72	3.20	4.53	13.25	130.00	1162.9	4.32
7.	IC-0639914 (T_7)	20.35	14.18	3.33	4.00	13.34	128.27	1229.6	3.50
SEm ±		1.15	0.65	0.14	0.14	0.63	1.46	36.7	0.14
CD (p=0.05)		3.58	2.04	0.45	0.45	1.98	4.56	114.4	0.43
C.V. (%)		8.28	7.44	7.33	7.33	8.61	1.99	5.2	5.80

The mean days to 50% flowering of 7 Giloy genotypes showed significant difference with each other. The maximum mean days to 50% flowering was observed for T_6, IC-0639910 (130.00 days) which was significantly superior to rest 6 Giloy genotypes. Treatment T_4 IC-0639899 had shown mean days to 50% flowering of 128.67 days, which was *at par* with treatment T_7 IC-0639914 (128.27 days) & T_3 IC-0639898 (127.53 days). Again the treatment T_3 was found *at par* with T_5 IC-0639908 (127.40 days). Minimum value of mean days to 50% flowering was recorded for T_1 IC-0639890 (121.47 days), which was significantly inferior with all remaining 6 genotypes of Giloy followed by T_2 IC-0639896 (125.73 days). In this parameter the value observed by kumari et al 2024 was significantly lower than the present findings of this research work.

The mean fresh stem weight/plant (gm) of 7 Giloy genotypes showed significant difference with each other. The maximum mean fresh stem weight/plant (gm) was observed for T_4, IC-0639899 (1319.6 gm) which was significantly superior to rest 6 Giloy genotypes. Treatment T_3 IC-0639898 had shown mean fresh stem weight/plant (gm) of 1269.1 gm, which was *at par* with treatment T_7 IC-0639914 (1229.6 gm) & T_2 IC-0639896 (1221.6 gm). Minimum value of mean fresh stem weight/plant (gm) was recorded for T_5 IC-0639908 (1128.3 gm), which was significantly inferior with all remaining 6 genotypes of Giloy followed by T_1 IC-0639890 (1152.7 gm) & T_6 IC-0639910 (1162.9 gm). In this parameter the value observed by Devi, G. (2020) the plant yields about (10-15 q /ha) 1500 kg of fresh woody stem, reduced to 300 kg of dry weight per hectare in about two years.

The mean Giloy-Satva % of 7 Giloy genotypes showed significant difference with each other. The maximum mean Giloy-Satva % was observed for T_4, IC-0639899 (4.74 %) which was significantly superior to rest 6 Giloy genotypes. Treatment T_3 IC-0639898 had shown mean Giloy-Satva % of 4.36, which was *at par* with treatment T_6 IC-0639910 (4.32 %) & T_5 IC-0639908 (4.21 %). Minimum value of mean Giloy-Satva % was recorded for T_7 IC-0639914 (3.50 %), which was significantly inferior with all remaining 6 genotypes of Giloy followed by T_1 IC-0639890 (3.56 %) & T_2 IC-0639896 (4.06 %). The Giloy-Satva % was observed higher than the findings of Kachhap, N. N. (2022). from the treatment combination of (mid-April 3m × 3m; 3.67%). Giloy-Satva % is observed by Sharma *et al*., (2013) the Giloy-Satva % is 3.8% .

Growth attributing characters of *Tinospora cordifolia* genotypes:

Significant differences were noticed in collar diameter among different Giloy genotypes and maximum collar diameter was recorded for IC-0639899 (32.10mm) followed by IC-0639898 (27.32mm) and IC-0639910 (24.76mm) and minimum collar diameter was recorded for IC-0639908 (19.21mm). Significant differences were also observed in stem thickness of different Giloy genotypes and its maximum value was recorded for IC-0639899 (19.27mm) followed by IC-0639898 (16.19mm) and IC-0639890 (15.84mm) and minimum value was recorded for IC-0639910 (12.72mm).

The differences significantly noticed in number of primary branches among different Giloy genotypes and maximum primary branches was recorded for IC-0639899 (3.80) and IC-0639898 (3.80) followed by IC-0639896 (3.53) and minimum primary branches was recorded for IC-0639908 (2.87). Significant differences were observed in case of number of secondary branches among different Giloy genotypes and maximum secondary branches was recorded for IC-0639899 (5.97) followed by IC-0639898 (5.47) and IC-0639910 (4.53) and minimum secondary branches was recorded for IC-0639908 (3.83).

Significant differences were also appeared in case of days to 50% flowering among different Giloy genotypes and maximum numbers of days to 50% flowering was recorded for IC-0639910 (130.00) followed by IC-0639899 (128.67) and IC-0639914 (128.27) and minimum numbers of days to 50% flowering was recorded for IC-0639890 (121.47). This indicates considerable variability in flowering time, with IC-0639910 and IC-0639899 identified as late-flowering and superior genotypes, while IC-0639890 and IC-0639896 were early flowering and considered inferior; the remaining genotypes fell in the medium range. In case of internodal distance, maximum value was recorded for IC-0639899 (14.66cm) followed by IC-0639914 (13.34cm) and IC-0639898 (13.31cm) and minimum internodal distance was recorded for IC-0639890 (10.88cm).

In fresh stem weight/plant significant differences were recorded among different Giloy genotypes and maximum fresh stem weight/plant was recorded for IC-0639899 (1319.6 gm) followed by IC-0639898 (1269.1 gm) and IC-0639914 (1229.6 gm). However, its minimum value was recorded for IC-0639908 (1128.3 gm). Giloy-Satva percentage (%) was recorded maximum for IC-0639899 (4.74%) followed by IC-0639898 (4.36%) and IC-0639910 (4.32%), while its

minimum value was recorded for IC-0639914 (3.50%).

Conclusion

The present study, conducted under the specific agro-climatic conditions of Ranchi, Jharkhand, revealed substantial genetic variability among seven selected genotypes of Giloy (*Tinospora cordifolia*.). The genotype IC-0639899 consistently exhibited superior performance across all evaluated growth and yield parameters, including collar diameter (32.10 mm), stem thickness (19.27 mm), number of primary (3.80) and secondary branches (5.97), intermodal distance (14.66 cm), and the highest fresh stem weight per plant (1319.6 gm). It also recorded the maximum Giloy-Satva content at 4.74%, indicating a higher concentration of bioactive compounds essential for medicinal purposes. Genotype IC-0639898 followed closely, showing commendable values across similar parameters, thus establishing itself as the second most promising variety. These genotypes demonstrated not only robust vegetative growth but also a higher yield of medicinally important phytochemicals, making them highly suitable for cultivation in Jharkhand's red-lateritic soils and semi-humid subtropical climate.

Furthermore, the study underscores the practical implications of genotype selection for commercial cultivation, particularly in regions with similar edapho-climatic conditions. Genotypes such as IC-0639908 and IC-0639890 recorded lower performance in terms of both growth vigor and biomass yield, making them less desirable for large-scale propagation. The results emphasize the importance of selecting region-specific high-yielding and phytochemically rich genotypes to ensure economic viability for farmers and consistent raw material supply for the herbal and pharmaceutical industries. The variation observed among the genotypes also opens avenues for future genetic improvement, value addition, and targeted breeding programs. By identifying superior genotypes like IC-0639899 and IC-0639898, the study provides a scientific foundation for sustainable cultivation practices, conservation of medicinal plant biodiversity, and promotion of Giloy-based therapeutic products in India and beyond.

Acknowledgements

Authors are thankful to the Dean, Faculty of Forestry, Director Research, Birsa Agricultural University, Kanke, Ranchi for providing facilities for the works.

References

Aima, R. K. (2003). Pictorial guide to plants. *Dehradun: Natraj Publishers*, 454-455.

Anonymous (2003). Wealth of India: A dictionary of Indian Raw Materials and Industrial Products. CSIR- Govt. of India, New Delhi, India.

Anonymous (1989). The Ayurvedic Pharmacopoeia of India, Part-I, vol.-I, first English ed., Government of India, New Delhi.

Bhatt, R. P., & Sabnis, S. D. (1987). Contribution to the Ethnobotany of Khedbrahma region of North Gujarat. *J. Econ. Tax. Bot*, ***9*****(1),** 139-145.

Chopra, R.N., Chopra, I.C, Handa, K.L. and Kapur, L.D. (1982). Chopra's Indigenous drug of India. *B.K. Dhur of Academic Publishers Kolkata, India,*426-428.

Devi, G. (2020). Medicinal plant: giloy. *International Journal of Current Research*, **12(8)**, 12940-12941.

Kumar, K. (2023). *Plant Science and Medicine*. Publishers Annapurna Printers, Kokar, Ranchi p.44

Kumari, P.., Jain, S. C., Nirala, D. P., & Kumar, A. V. I. N. A. S. H. (2024). Effect of organic fertilisers on the yield and quality of Giloy (*Tinospora cordifolia*) in Jharkhand. *Annals of Plant and Soil Res*, **26(1),** 50-55.

Mia, M. M. U. K., Kadir, M. F., Hossan, M. S., & Rahmatullah, M. (2009). Medicinal plants of the Garo tribe inhabiting the Madhupur forest region of Bangladesh. *American Eurasian J of Sustainable Agriculture*, ***3*****(2)**, 165-171.

Nawin, N. K. (2022). *Evaluation of growth and yield performance on the spacing trial of Giloy (Tinospora cordifolia)* (Doctoral dissertation).BAU, Ranchi

Pooja, S., Murkute. *et al*. (2022). Morphological, Physicochemical and Antimicrobial Analysis of *Tinospora cordifolia* Extract. *Acta Scientific Pharmacol-ogy*, **3**, 47-58.

Reddy, C. S., Reddy, K. N., Murthy, E. N., & Raju, V. S. (2009). Traditional medicinal plants in seshachalam hills, Andhra Pradesh, India. *J of medicinal plants research*, ***3*****(5)**, 408-412.

Sharma, R., Amin, H., Shukla, V. J., Kartar, D., Galib, R., & Prajapati, P. K. (2013). Quality control evaluation of Guduchi Satva (solid aqueous extract of *Tinospora cordifolia* (Willd.) Miers): An herbal formulation. *Intern J* of *Green Pharmacy*, **7**, 258- 263.

Shetty, B.V. and Singh, V. (2010). Flora of Rajasthan. 1st edition, Merrut publishers and Distributors, *Merrut*. **1**, 756-100.

Singh, S. S., Pandey, S. C., Srivastava, S., Gupta, V. S., Patro, B., & Ghosh, A. C. (2003). Chemistry and medicinal properties of Tinospora cordifolia (Guduchi). *Indian journal of pharmacology*, ***35*****(2)**, 83-91.

Soham Saha, S. S., & Shyamasree Ghosh, S. G. (2012). *Tinospora cordifolia*: *one plant, many roles*, 151-159.

Spelman, K. (2001). Traditional and clinical use of Tinospora cordifolia, Guduchi. *Australian Journal of Medical Herbalism*, ***13*****(2).**

Tomar, H., Singhal, M., Juyal, P., Tyagi, M., Kumar, A., and Gaurav, N. 2021. Potential role of giloy (an important

traditional aurvedic medicinal dioecious creeper) as an immunomodulator. *Adalya Journal,* **9:**57-67.

Udayan, P. S., Pradeep, A. K., & Balachandran, I. (2009). A new species of Tinospora (Menispermaceae) from South India. *Edinburgh J of Botany*, **66(1)**, 77-80.

Upadhyay, A. K., Kumar, K., Kumar, A., & Mishra, H. S. (2010.) *Tinospora cordifolia* (Willd.) Hook. f. and Thoms. (Guduchi)-validation of the Ayurvedic pharmacology through experimental and clinical studies. *Inter J of Ayurveda Research*, **1(2):** 112.

Vaidya, D. B. (1994). Materia Medica of Tibetan medicine. *Sri Satguru Publications*, Delhi, India,694