

Climbers of Rourkela Forest Division: ecological, medicinal, food and economical aspects

ABSTRACT

For plants growing on the forest floor, sunlight is a limited factor, but climbers could scramble up trees and shrubs towards the light. Climbers are important because they help to reduce temperature, i.e., keep the garden cooler on a hot day. Some climbers are also edible, which makes it more important to grow them in the backyard garden and on the terrace. It is also planted because of the decoration on the walls. It is beneficial in forest areas because the climber creates a perfect shade where any wild animal can take shelter on summer days and can help them avoid hunters. It is also one of the economic purposes for tribal people. Several studies have documented plants used for medicinal, ecological, economic, and food purposes, but categories as different as climbers are less documented. The survey in Rourkela Forest Division took place, and we documented climbers in different aspects. In this paper, it comprises about 52 plant species and is specifically divided into food, medicinal, economic, and ecological. Therefore, authors summarized the climber and documented it in a scientific manner in Rourkela Forest Division, Odisha.

Keywords: Wild animal, edible, tribal communities, medicinal, economic, decoration, shading

INTRODUCTION

Rourkela Forest Division is one of the three forest divisions in Sundargarh District. Other divisions are the Sundargarh Forest Division and the Bonai Forest Division. Rourkela Forest Division is bounded by longitudes 84° 04' E to 85° 04' E and latitudes 21° 03' N to 22° 08' N. The division has Reserved Forests, Proposed Reserved Forests, Demarcated Protected Forests, Village Forests, Protected Forests, and DLC Forests. The total forest area was computed to be 1100.43 sq. km, which is about 36.73% of the geographical area of the division. It is also known as the "Steel City of Odisha," and it is situated in the northern district of Sundargarh, Odisha, India. The area is rich with forests and tribal communities with abundant traditional knowledge. Climbers are pretty vigorous. However, despite its importance in the world's flora, it has subsequently been generally neglected. The climbers exist among ancestral angiosperm groups and monocotyledonous families and are commonly

represented in major groups of Rosids and Asterids. Climbers generally identify them as having elongated internodes (the length of stem between each leaf joint) to help cover the distance, but they employ other structures to get a grip, including tendrils, aerial roots, and twining stems. Some climbers are characterised by spring-like tendrils as members of the cucumber family (Plate 1). It is derived from modified leaves. They hook on to a branch, then coil up, pulling the vine towards its support structure. The tendrils coil when the cells on each side grow at different rates. Surface hairs detect foreign objects and stimulate twining. Tendrils recognise their own stems and avoid twining around them. Another climbing technique is characterised by twining stems (Plate 2). Tendrils, aerial roots, and hooked prickles all attach themselves to supports, but in some climbers, the stem itself can cling by twining. Some twining plants twist clockwise, while others twist anti-clockwise. Long leaf stalks allow the leaves to reach away from the support and face the sun. Emerging flowers have the potential to release many seeds, further expanding the plant's territory. It can easily reach bee, moth, and butterfly pollinators. The ability of one stem to twine around another is due to thigmotropism. When climbing stems and tendrils detect the presence of a support, one side of the growing point begins faster than the other, making the stem bend (Gianoli 2015). It is quietly available all over the world, and some are used for an edible purpose and others for a medicinal purpose, economical, ecological, etc. The survey takes place in tribal communities in Rourkela Forest Division, Odisha. Rourkela Forest Division (RFD) Among the floral diversity, climbers are less documented. Therefore, we attempt to document the climbers available in Rourkela Forest Division, Odisha, in a scientific manner.

METHODOLOGY

The survey was carried out in Rourkela Forest Division, Odisha. Through an extensive survey through a semi- questionnaire conducted with tribal communities. The plant was identified by the authors with the help of literature (Haines 1925; Saxena and Brahman 1995).



Plate 1: Climbing techniques: Spring like tendrils



Plate 2: Climbing technique: Twining stem

RESULTS AND DISCUSSION

Data enumerated through ethnobotanical survey plant species with their vernacular names: medicinal, economic, ecological, and food. The results revealed that about 52 plant species were enumerated in Rourkela Forest Division, Odisha. According to the results, it is revealed

that some climbers are used for medicinal purposes other than food, ecological, and economic purposes. Climbers are used for medicinal, food, economic, and ecological purposes listed according to family (Figure 1, Figure 2, Figure 3, Figure 4). Climbers are important because, due to their characteristic features, climbers on the wall will reduce the temperature and keep the garden, backyard, or balcony cooler on summer days. In forest areas, climbers are one of the reasons for shade in the forest. On summer days, the wild animal has a convenient place to rest beneath the climbers, like *Bauhinia vahlii*, *Butea superba*, and *Combretum roxburghii*. Climbers on the walls of the houses, like *Antigonon leptopus*, *Capparis zeylanica*, *Clitoria ternatea*, *Coccinia grandis*, *Luffa acutangular*, *Luffa aegyptiaca*, *Momordica charantia*, *Passiflora foetida*, *Quisqualis indica*, and *Trichosanthes tricuspidate*. Many researchers document climbers in Odisha. In 2014, Suthari et al. reported the ethnomedicinal and economic uses of climbers in northern Telangana, India. In 2012, Abhilash et al. reported the medicinal value and distribution of Nattika climbers. In 2020, Rahman et al. reported about the climbers in relation to their hosts in the Himalayas. In 2020, Mayurj and Kaushik reported on the climber and creeper plant species in Gujarat. In 2022, Khillar et al. reported climbers being used as food plants by the Santhal community in Odisha. In 2020, Das et al. reported the diversity of climbers in Odisha. In 2015, Kalam and Ahmad reported the medicinal importance of climbers used in the Unani system of medicine. Therefore, we need further documentation on climbers in Odisha.

Table 1: Climbers of Rourkela Forest Division, Odisha, India

Botanical name	Family	Common name	Medicinal	Economical	Ecological	Food
<i>Abrus precatorius</i>	Fabaceae	Kaincha	✓	✓	-	-
<i>Ampelocissus latifolia</i>	Vitaceae	Paninocho	✓	-	-	-
<i>Ampelocissus tomentosa</i>	Vitaceae	Kanjinoi	✓	-	-	-
<i>Antigonon leptopus</i>	Polygonaceae	Nil	✓	-	-	-
<i>Argyreia nervosa</i>	Convolvulaceae	Brudhha taraka	✓	-	-	-
<i>Aristolochia</i>	Aristolochiaceae	Iswar mula	✓	-	-	-

<i>indica</i>						
<i>Asparagus racemosus</i>	Asparagaceae	Satavari	✓	✓	✓	-
<i>Bauhinia vahlii</i>	Fabaceae	Siali	✓	✓	✓	✓
<i>Butea superba</i>	Fabaceae	Lota palasha	✓	-	✓	✓
<i>Cajanus scarabaeoides</i>	Fabaceae	Ban koltha		-	-	-
<i>Capparis zeylanica</i>	Capparaceae	Asadua	✓	-	-	-
<i>Celastrus paniculatus</i>	Celastraceae	Kujuri	✓	✓	-	-
<i>Cissampelos pariera</i>	Menispermaceae	Musakani	✓	✓	✓	-
<i>Cissus quadrangularis</i>	Vitaceae	Hada jodi	✓	-	-	-
<i>Clematis roylei</i>	Ranunculaceae	Ganamari	✓	-	✓	-
<i>Clitoria ternatea</i>	Fabaceae	Aparajita	✓	✓	✓	✓
<i>Coccinia grandis</i>	Cucurbitaceae	Bana kunduri	✓	✓	✓	✓
<i>Combretum roxburghii</i>	Combretaceae	Atundi	✓	-	✓	-
<i>Cryptolepis buchanani</i>	Apocynaceae	Dudhi nai	✓	-	-	-
<i>Cuscuta reflexa</i>	Convolvulaceae	Nirmuli	✓	-	-	-
<i>Derris scandens</i>	Fabaceae	Kentia	✓	-	-	-
<i>Dioscorea bulbifera</i>	Dioscoreaceae	Pita alu	✓	✓	-	✓
<i>Dioscorea oppositifolia</i>	Dioscoreaceae	Pani alu	✓	✓	-	✓
<i>Diplocyclos palmatus</i>	Cucurbitaceae	Shivlingi	✓	-	-	-
<i>Erycibe paniculata</i>	Convolvulaceae	Joda koli	✓	-	-	-

<i>Getonia floribunda</i>	Combretaceae	Dhonati	✓	-	-	-
<i>Gloriosa superba</i>	Colchicaceae	Agnisikha	✓	-	✓	-
<i>Gouania leptostachya</i>	Rhamnaceae	Rakta-pichali	✓	-	✓	-
<i>Gymnema sylvestre</i>	Apocynaceae	Gudmari	✓	✓	-	✓
<i>Hemidesmus indicus</i>	Apocynaceae	Anantamula	✓	-	✓	-
<i>Hiptage benghalensis</i>	Malpighiaceae	Boromali	✓	-	✓	-
<i>Ichnocarpus frutescens</i>	Apocynaceae	Shyama lata	✓	-	-	-
<i>Ipomoea aquatica</i>	Convolvulaceae	Kalama sago	✓	✓	✓	✓
<i>Luffa acutangula</i>	Cucurbitaceae	Jhonny	✓	✓	✓	✓
<i>Luffa aegyptiaca</i>	Cucurbitaceae	Luffa	✓	-	✓	-
<i>Merremia umbellata</i>	Convolvulaceae	Nil	✓	-	✓	-
<i>Merremia vitifolia</i>	Convolvulaceae	Nil	✓	-	✓	-
<i>Momordica charantia</i>	Cucurbitaceae	Kalara	✓	✓	✓	✓
<i>Passiflora foetida</i>	Passifloraceae	Bisripi	✓	-	-	-
<i>Quisqualis indica</i>	Combretaceae	Madhumalati	✓	-	✓	-
<i>Scindapsus officinalis</i>	Araceae	Gaja pipalli	✓	-	✓	-
<i>Smilax perfoliata</i>	Smilacaceae	Nil	✓	-	✓	-
<i>Smilax zeylanica</i>	Smilacaceae	Ramdatun	✓	-	✓	-

<i>Solena amplexicaulis</i>	Cucurbitaceae	Mitha kunduri	✓	-	✓	✓
<i>Spatholobus parviflorus</i>	Fabaceae	Lata polasa	✓	-	✓	-
<i>Stephania japonica</i>	Menispermaceae	Sondhimali	✓	-	-	-
<i>Symphorema involucratum</i>	Verbenaceae	Nil	✓	-	✓	-
<i>Tiliacora acuminata</i>	Menispermaceae	Nil	✓	-	-	-
<i>Tinospora cordifolia</i>	Menispermaceae	Guluchi	✓	✓	✓	-
<i>Trichosanthes tricuspidata</i>	Cucurbitaceae	Mahakal	✓	-	-	-
<i>Vallisneria spiralis</i>	Apocynaceae	Nil	✓	-	✓	-
<i>Ventillago denticulata</i>	Rhamnaceae	Kantamali	✓	-	✓	-
<i>Wattakaka volubilis</i>	Apocynaceae	Nil	✓	-	✓	-



Plate 3: Climbers of Rourkela Forest Division, Odisha a) *Aristolochia indica*, b) *Spatholobus parviflorus*, c) *Cajanus scarabaeoides*, d) *Capparis zeylanica*, e) *Celastrus paniculatus*, f) *Merremia umbellata*



Plate 4: Climbers of Rourkela Forest Division, Odisha g) *Bauhinia vahlii*, h) *Momordica charantia*, i) *Luffa aegyptiaca*, j) *Vallaris solanacea*, k) *Ventillago denticulata*, l) *Merremia vitifolia*



Plate 5: Climbers of Rourkela Forest Division, Odisha m) *Diplocyclos palmatus*, n) *Symphorema involucreatum*, o) *Hemidesmus indicus*, p) *Getonia floribunda*, q) *Tinospora cordifolia*, r) *Clitoria ternatea*



Plate 6: Climbers of Rourkela Forest Division, Odisha s) *Asparagus racemosus*, t) *Combretum roxburghii*, u) *Trichosanthes tricuspidate*, v) *Cissus quadrangularis*, w) *Smilax zeylanica*, x) *Gloriosa superba*

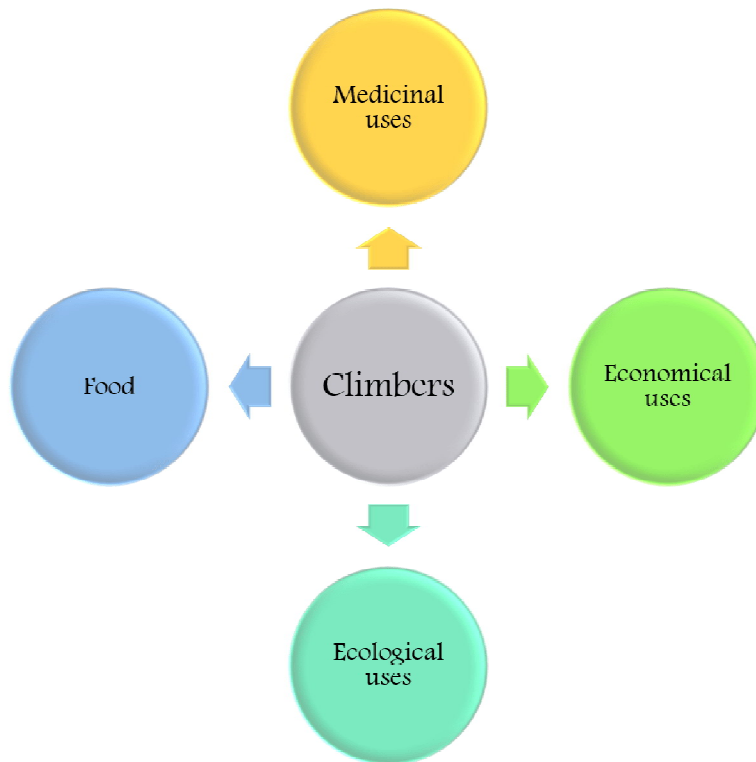


Figure 1: Uses of climbers in different aspects in Rourkela Forest Division, Odisha, India

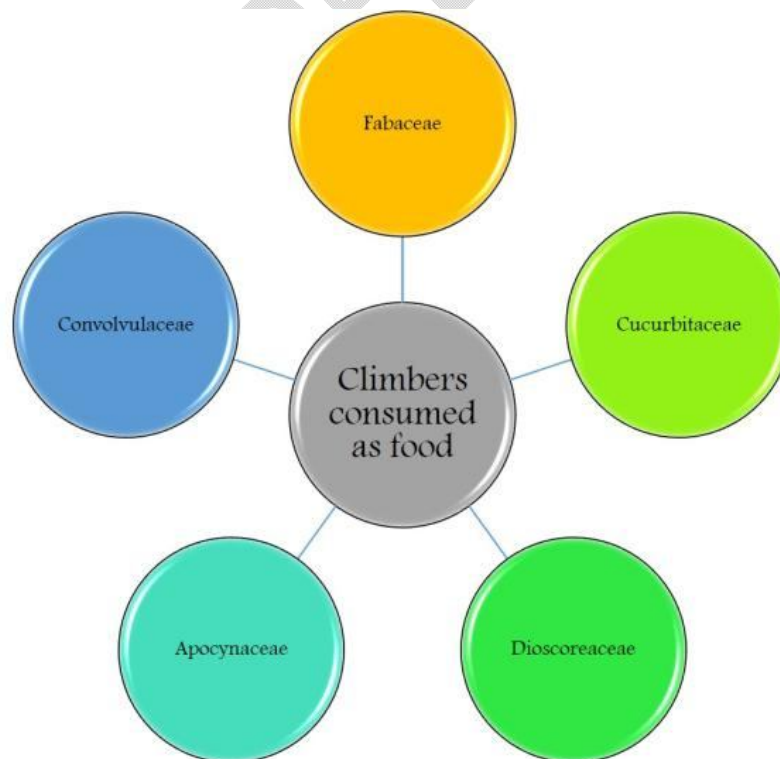


Figure 2: Family wise climber used as food purpose in Rourkela Forest Division, Odisha



Figure 3: Family wise climbers used as economic purposes in Rourkela Forest Division, Odisha

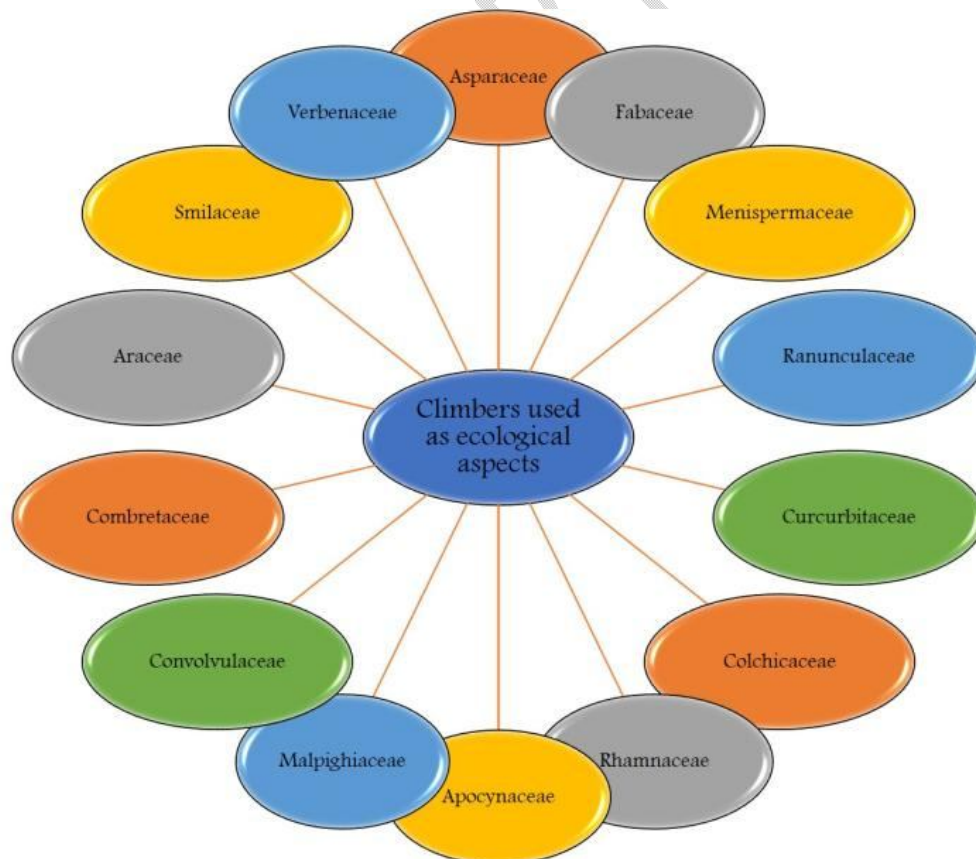


Figure 4: Family wise climbers used as ecological aspects in Rourkela Forest Division, Odisha

CONCLUSION

Climbers are one of the important groups of plants whose morphological support comes entirely from their own tissue and their original rooting position in the soil, and whose climbing efforts can take their foliage and reproductive organs into tree canopies. The current studies show 53 climber species were documented in Rourkela Forest Division, Odisha. The present paper highlights the food, medicinal, economic, and ecological values. Therefore, we need further documentation in a scientific manner.

REFERENCES

- Abhilash ES, Parayil SP, Raju AR, Sathian B, and Udayan V. (2012). A study on the medicinal value and distribution of climbers of Nattika, India. *APJEESD*. 1: 36-39.
- Das PK, Das MK, Sahu C, Rath SK, and Kumar S. (2020). Diversity of climbers of Odisha. *Medico bio- wealth of Odisha*. 1-11. ISBN: 978-81-938861-4-4
- Gianoli E. (2015). The behavioural ecology of climbing plants. *AoB PLANTS* 7: 13. doi:10.1093/aobpla/plv013
- Haines HH. (1994). *The Botany of Bihar and Orissa*. Adlard & Sons, London. 1994
- Kalam MA and Ahmad G. (2015). Medicinal importance of climbers used in Unani system of medicine. *Biotechnological strategies for the conservation of medicinal and ornamental climbers*. 65- 100. DOI 10.1007/978-3-319-19288-8_3
- Khillar AK, Dagawal MJ, Saradar B, Jadhao AB, Marndi S, and Kumar S. (2022). Climbers used as a food plant by the santhal community. *Indigenous Traditional Knowledge and Advancement in Medicinal Plant Research*. 1-6. ISBN: 978-81-955847-2-7
- Mayurj P and Kaushik PC. (2020). Study of climber and creeper plant species growing in Talod Taluka of Sabarkantha district, Gujarat. *International Journal of creative Research Thoughts*. 8(6): 3433- 3450.
- Patel DK. (2014). Diversity of climber and creeper medicinal and aromatic plants with special reference to their regeneration in herbal garden for Ex – situ conservation. *International Journal of Current Research in Biosciences and Plant Biology*. 1(4): 67-73.
- Rahman AU, Khan SM, Saqib Z, Ullah Z, Ahmad Z, Ekercin S, Mumtaz AS, and Ahmad H. (2018). Diversity and abundance of climbers in relation to their hosts and elevation in the monsoon forests of Murree in the Himalayas. *Pak. J. Bot.* 52(2): 1-12.

Saxena HO and Brahmam M. (1995). The flora of Orissa. Orissa Forest Development Corporation & RRL, Bhubaneswar, India

Suthari S, Sreeramulu N, Omkar K and Raju VS. (2014). The climbing plants of Northern Telangana in India and their ethnomedicinal and economic uses. Indian Journal of Plant Sciences. 3(1): 86-100.

UNDER PEER REVIEW