ISSN 0376-5156
Geophytology 54(1): 107–118
May 2024

Commercial timber yielding plants from Balrampur District, Uttar Pradesh, India

Rajiv Ranjan[1*], Dharmesh Srivastava[2] and Mahesh Prasad[3]

[1*, 2]Department of Botany, M.L.K. Postgraduate College, Balrampur–271201, India.
E-mail: [1*]ranjanrajiv1001@gmail.com, [2]sridharmesh01@gmail.com
[3]Birbal Sahni Institute of Palaeosciences, 53 University Road, Lucknow–226007, India.
E-mail: [3]mahesh_bsip@yahoo.com
[*]Corresponding author

Manuscript received: 24 September 2023
Accepted for publication: 11 February 2024

ABSTRACT

Ranjan R., Srivastava D. & Prasad M. 2024. Commercial timber yielding plants from Balrampur District, Uttar Pradesh, India. Geophytology 54(1): 107–118.

Timbers are one of the most essential resources in the life of human beings and are used by them for various purposes, i.e. house construction, furniture, agricultural and musical instruments and packing cases, etc. About 67 commercial timber yielding plant species (trees) have been enumerated from different forest areas of Balrampur District, Uttar Pradesh, India. They belong to 55 genera and 28 dicotyledonous families. Most of them are native to Indian sub-continents; only few of them are introduced from other continents like America, Australia, Africa and other parts of Asian regions. Family *Fabaceae* (represented by 14 species) dominates the flora followed by family *Annonaceae* (6 species). The tree flora of Balrampur District consists of 3 types of forest taxa, i.e. deciduous (78%), evergreen (15%) and evergreen-deciduous (7%). *Shorea robusta* Roth, a member of *Dipterocarpaceae* family, is the most common tree plant in the forest area all along the foot hills in the northern part of Balrampur District. The other common trees found here are *Tectona grandis* L.f. (*Lamiaceae*), *Adina cordifolia* (Roxb.) Hook.f & Benth. (*Rubiaceae*), *Ehretia laevis* Sieber ex DC. (*Boraginaceae*), *Gmelina arborea* Roxb. ex Sm. (*Lamiaceae*), *Mallotus philippensis* (Lam.) Müll. Arg. (*Euphorbiaceae*), *Ficus* spp. (*Moraceae*), *Schleichera oleosa* (Laur.) Oken (*Sapindaceae*), *Dalbergia sissoo* Roxb. ex DC. (*Fabaceae*) and *Aegle marmelos* (L.) Correa (*Rutaceae*), etc.

Keywords: Tree plants, timber resources, floral analysis, deciduous forest, Suhelwa Wildlife Sanctuary, Kuwana Forest, Balrampur District, Uttar Pradesh, India.

INTRODUCTION

Balrampur District is a part of Devipatan Division in Uttar Pradesh. It occupies an area of 3719 km^2 along Indo-Nepal border of Terai region. The district is situated on the bank of Rapti River and is bordered by Siddharth Nagar District in the east-west, Gonda District in the south and Nepal (containing Shiwalik Hills of the Himalaya) in the north (Figure 1). The well-known Suhelwa Wildlife Sanctuary (27°30'01" N to 27°55'42" N and 81°55'36" E to 82°48'33" E) is located in this area along the Shiwalik Hills and flourished by a dense forest of about 45000 hectares and accompanied with a number of commercial timber yielding plants. The whole forest is of deciduous type predominated by Sal (*Shorea robusta*) forest. Bankatwa, Nandmahra, Seria Naka, Jarwa, Rampur, Mansurwa, and Bhabar are well famous forest areas in this Sanctuary from where a good collection of tree plants are made (Figure 1). Kuwana (27.388589°N: 82.120146°E) is other big forest lies in south of Balrampur comprising a variety of timber

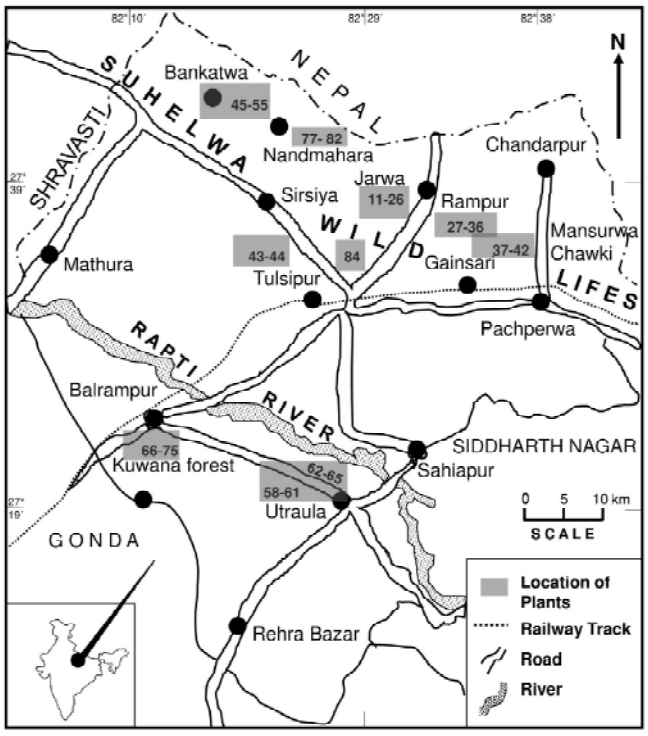

Figure 1. Location of collection sites and forest areas in Balrampur District, Uttar Pradesh, India.

plants. Swamp forests are also commonly accomplished with timber plants like *Terminalia bellirica, T. arjuna* and *Lagerstroemia parviflora*, etc.

Timber is the most important forest product and has done a lot in the development of various civilizations from time to time. It is also considered as the most essential necessity like food and clothing. The timber resources are used by the peoples for various purposes, i.e. house construction, furniture, agricultural implements, musical instruments, fuels and packing cases, etc. The present communication deals with the timber resources of Balrampur District area and about tree flora of the district along with the nature of forest and flora. So far, a little amount of research work has been carried out on the flora of Balrampur District (Khan 1984; Singh 1991). Ram Shankar et al. (2016) carried out research on exploration, conservation and cultivation of medicinal plants in Balrampur, Gonda and Shrawasti districts. Some ethnobotanical surveys are also conducted to explore medicinal plants of the area. *Indopiptadenia oudhensis*, an endangered species is reported from Suhelwa Wildlife Sanctuary of Balrampur district, Uttar Pradesh (Singh 2010). Such related work has also been carried out in other states of India (Brandis 1971, Gamble 1972, Sahni 1998, Sikarwar & Kaushik 1992, Dhaliwal & Sharma 1999, Negi et al. 1985, Chowdhury & Wadhwa 1984, Kharwal & Rawat 2009). In view of meager and scattered work on the tree flora of Indian region, it is proposed to work in this field of taxonomic research.

PHYSIOGRAPHY OF STUDY AREA

Balrampur District has an average elevation of 106 m. There are two main rivers in Balrampur District, Rapti in the north and Ghaghara in the south. They flow from north-west to south-east and are joined by numerous tributaries. The Rapti originates in the mountains near Bhalubang in Rapti Anchal of western Nepal and after taking traverses in Bahraich District enters Balrampur District. Its banks are usually high, but the river is continually changing its course. It only overflows its banks in rainy season. On either side of Rapti River, but especially on the north, it is cut up by innumerable deserted tributaries. Many of these contain water for a part of the year only. But the only one which can be considered as a water stream is that know as the Burhi Rapti which emerges near Mathura in the western part of Balrampur District and flows across the district in a direction roughly parallel to that of the Rapti. Kuwana River flows with slow speed and Bishuhi River joins Kuwana. It covers very small part of the district.

Figure 2. Occurrence of some species in the form of a group in the forests of Balrampur District, Uttar Pradesh, India. **A.** *Tectona grandis* in the outer core of Nandmahara Forest. **B.** *Shorea robusta* in Rajapur Bharia jungle. **C.** Suhelwa Wildlife Forest containing predominantly deciduous species. **D.** *Acacia nilotica,* a very dry deciduous species in between Rampur and Mansurva area. **E.** *Syzygium cumini* (Cut jamun) in Mansurva Forest Range. **F.** *Syzygium cumini* (Phrenda) on both side of the road in Bankatwa range. **G.** *Lagerstroemia parviflora* in Kuwana Forest. **H.** *Terminalia arjuna* on road side in Maharajganj area. **I.** *Holoptelia integrifolia* in Jarwa Forest Range, **J.** *Acacia catechu* in Rampur Range. **K**. *Grewia tiliifolia* in Jarwa Forest Range near Jarwa Railway Station. **L.** *Sterculia apetala* in Rampur Forest Range.

Figure 2

The forests of Suhelwa Wildlife Sanctuary are situated in the north, Terai region of Balrampur District. These forests are in the form of a strip of 5–8 km in width running along the Nepal border up to a length of 120 km. The forests are situated between 120 m and 200 m above the mean sea level. The forest area is distributed in three adjoining districts of Balrampur, Shrawasti and Gonda covering an area of 51273.80 hectares in Balrampur District and 17052.10 hectares area in the Shrawasti District. A small patch of 621.82 hectares, which is mostly having scattered vegetation, is in Gonda District known as Parvati Arga Bird Sanctuary.

Climate of Balrampur District is mainly divided into four seasons; the cold season from about the middle of November to February is followed by the summer season from March to the middle of June. The south-west monsoon season is from the middle of June to September. October and first half of November constitutes the post-monsoon or transition season. May is generally the hottest month with the mean daily maximum temperature at around 39°C and the mean daily minimum temperature is around 24° C. Balrampur District has a very hot summer season and in individual days maximum temperature may be as high as 48°C. Generally mornings are highly humid except in the summer season.

MATERIAL AND METHOD

In view of regular need of timber, an intensive exploration was undertaken in Balrampur District (Bankatwa, Nandmahra, Seria Naka, Jarwa, Rampur, Mansurva Chauki and Bhabar area) in Suhelwa Wildlife Forest, Kuwana Forest and Rajapur Bharia Forest, etc. to collect various timber yielding plants either in flowering or non-flowering stage (Figure 1). The freshly collected samples of tree plants were numbered systematically (T 1 to T 84) and arranged properly within the folded sheets of pressing papers along with two dry blotters of same size. The whole pile of blotters and pressing sheets was then locked up in a field press for 1–2 days. Since drying of plants was done without heat, it needed five changes of blotters and pressing sheets properly spread over a span of 10 days. Each specimen was mounted on a white card sheet by using white gum paste. To know the uses of timber and other details about the tree plants, different categories of people like family heads, forest workers, experienced and knowledgeable informants were repeatedly interviewed. Specific questions regarding each tree plants were asked and the given informations were recorded in the notebook along with the name of locality and local name, height and girth and their coordinates (Table 1). The photographs of some specific patch of the forests and almost all the collected tree plants were taken in order to show their natural habit and habitat (Figures 2, 3).

OBSERVATIONS

A variety of tree plants have been collected from different forest areas of Balrampur District, Uttar Pradesh. Most of them are commercial timber yielding trees. They comprise 67 species belonging to 55 genera and 28 families of dicotyledons. These are enumerated in Table 1.

RESULT AND DISCUSSION

Terai region of Balrampur District is very rich in timber yielding plant resources. The local villagers depend on timber forest products for their regular income and needs. Now a day's the use of ethno botanical information in commercial timber and non-timber plants and medicinal plant research has received more attention in scientific community. The local knowledge which may be traditional or indigenous is gone through generation by generation. This has been the basis for forestry, agriculture, food preparation,

Figure 3. Some commercially useful trees in the forest areas of Balrampur District, Uttar Pradesh, India. **A.** *Semicarpus anacardium*. **B**. *Schleichera oleosa*. **C**. *Grewia asiatica*. **D.** *Ficus benghalensis.* **E.** *Ficus infetoria.* **F.** *Ficus carica.* **G.** *Adina cordifolia.* **H.** *Phyllanthus emblica.* **I.** *Thespesia populinea.* **J.** *Alstonia scholaris.* **K.** *Terminalia bellirica.* **L.** *Terminalia arjuna*.

Figure 3

health care, education, conservation and other activities that sustain societies in many parts of the world. The present contribution helps in understanding of the socio-economic importance of the commercial timber yielding plants in the study area. In this communication 67 tree plant species comprised of 55 genera and 28 different families were recorded to be possible value-added products. Most of them are used for house construction, furniture, agricultural implements, musical instruments, fuels and packing cases etc. (Figure 4).

Family *Fabaceae* dominates the tree flora by representing 14 species while *Moraceae* come to the next with 6 species. *Malvaceae* and *Boraginaceae* each contains 4 species and *Anacardiaceae* and *Lamiaceae* both representing 3 species and occupy fourth position in the present floral assemblage. The remaining families consist of either one or two species (Figure 5). It is also worth mentioning that the *Fabaceae* was well represented and dominating family during the sedimentation of Siwalik Group (5–12 ma) in the Himalayan foot hills which is adjacent to present study area (Prasad 2008a; Prasad et al. 2019). The floral assemblage consists of three types of forest taxa, viz. 1. Evergreen taxa, 2. Evergreen and deciduous taxa and 3. Deciduous taxa. The deciduous taxa spread throughout the forest by representing about 52 species while the evergreen taxa are found locally and represented by only 10 taxa, viz. *Albizia lebbeck* (L.) Benth. and *Saraca asoca* (Roxb.) W.J. de Wilde, *Tamarindus indica* L. (*Fabaceae) Schleichera oleosa* (Laur.) Oken, and *Litchi chinensis* Sonn. *(Sapindaceae)* and *Azadirachta indica* A. Juss. (*Meliaceae*), *Anthocephalus cadamba* (Roxb.) Miq. *(Rubiaceae*), *Alstonia scholaris* (L.) R. Br. (*Apocynaceae*), *Putranjiva roxburghii* Wall. (*Euphorbiaceae*) and *Ficus benghalensis* L. (*Moraceae*). Only few taxa, such as *Pterocarpus marsupium* Roxb., *Pongamia pinnata* (L.) Pierre (*Fabaceae*), *Anthocephalus cadamba* (Roxb.) Miq. (*Rubiaceae*), *Kigelia africana* (Lam.) Benth. (*Boraginaceae*) and *Litsea glutinosa* (Laur.) C.B. Rob. (*Lauraceae*) are belong to both evergreen and deciduous taxa (Figure 6). Palaeobotanical study on fossil leaves from Lower Siwalik sediments of Seria Naka (Prasad et al. 1997) and Jarwa (Tripathi et al. 2002) and Koilabas (Prasad et al. 1999) indicates that the evergreen forest was flourishing during the sedimentation of Siwalik (about 12 Ma) in Siwalik foot hills all along the present study area, north of Suhelwa Wildlife Sanctuary. On the contrary, a deciduous forest is well flourishing there at present. Among the deciduous taxa, *Shorea robusta* Roth. of the family *Dipterocarpaceae* is one of the most common tree plant in the northern part of Suhelwa Wildlife Forest (Figure 2.B). It is also very common in Siwalik foot hills right from Jammu to Arunachal Pradesh (Kanjilal 1950). Plant megafossils study in the whole Himalayan foot hills showed that *Shorea robusta* Roth. was not recorded so far, from the Siwalik Group. Its earliest record goes to about 5600 years ago in Holocene sediments of Tanakpur, Uttarakhand (Prasad 2008b). Similarly, the palynological data obtained from Holocene sediments indicates its existence around 3000 years B.P. in Madhya Pradesh (Chauhan 2002). Thus it may be surmising that *Shorea robusta* Roth. came to existence in the foot-hills as well as its adjacent area like Suhelwa Wildlife Forest in the Terai region of Balrampur, U.P. after the Siwalik Period (1.6–18 Ma) due to onset of favorable climatic condition and after flourishing in foot hill regions it spreads towards south in Madhya Pradesh.

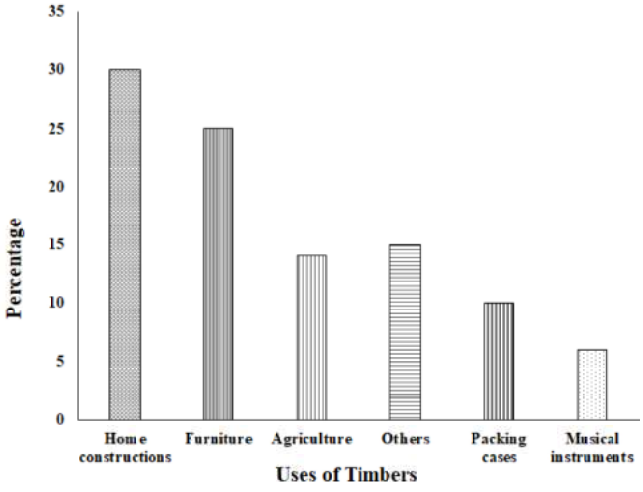

Figure 4. Different uses of timbers of tree plants in Balrampur District, Uttar Pradesh, India.

Table 1. List of tree flora of Balrampur District, Uttar Pradesh, India.

Tree plant No.	Name of the tree plants	Name of Family	Location	Coordinates	Habit of tree plant
T 72.	*Miliusa velutina* Hook.f. & Thomson Local name: Kajrauta/Domsal	*Annonaceae*	Kuwana Forest near Shivgarh	27.380752°N 82.112982°E	Deciduous tree, 15 m tall, 0.91 m in diameter
59.	*Shorea robusta* Gaertn.f. Local name: Sakhu	*Dipterocarpaceae*	Rajapur Bharia Jungle Uttaraula Road	27.390001°N 82.246865°E	Deciduous tree, 25 m tall, 2.13 m in diameter
T 84.	*Moringa pterygosperma* Gaertn. Local name: Sahjan	*Moringaceae*	Bhawaniapur, Tulsipur	27.520204°N 82.401553°E	Deciduous tree, 6 m tall, 0.61 m in diameter
T 60.	*Thespesia populnea* (L.) Sol. ex Corrêa Local name: Paras peepal	*Malvaceae*	Rajapur Bharia Jungle Uttaraula Road	27.397517°N 82.243238°E	Evergreen tree, 18 m tall, 1.52 m in diameter
T 18.	*Bombax ceiba* L. Local name: Semal	*Malvaceae*	Suhelwa Forest, Jarwa Railway Station	27.643037°N 82.523628°E	Deciduous tree, 20 m tall, 3.05 m in diameter
T 20a.	*Grewia tiliifolia* Vahl Local name: Dhamin	*Malvaceae*	Suhelwa Forest, Jarwa Railway Station	27.643037°N 82.523628°E	Deciduous tree, 10 m tall, 0.61 m in diameter
T 31.	*Grewia asiatica* L. Local name: Phalsa	*Malvaceae*	Rampur Forest	27.644045°N 82.521137°E	Deciduous tree, 10 m tall, 2.44 m in diameter
T 28.	*Sterculia apetala* (Jacq.) H. Karst. Local name: Panan	*Sterculiaceae*	Rampur Forest	27.644045°N 82.521137°E	Deciduous tree, 20 m tall, 2.74 m in diameter
T 5.	*Azadirachta indica* A. Juss. Local name: Neem	*Meliaceae*	Suhelwa Forest, Jarwa	27.649027°N 82.524271°E	Evergreen tree, 18 m tall, 2.44 m in diameter
T 54.	*Melia azedirach* L. Local name: Bakain	*Meliaceae*	Bankatwa Range Bharhsaia, Haraia Road	27.697286°N 82.243213°E	Deciduous tree, 9 m tall, 0.76 m in diameter
T 74.	*Garuga pinnata* Roxb. Local name: Kakad	*Burseraceae*	Kuwana Forest near Shivgarh	27.385618°N 82.114382°E	Deciduous tree, 16 m tall, 1.07 m in diameter
T 15.	*Aegle marmelos* (L.) Corrĕa Local name: Bael	*Rutaceae*	Suhelwa Forest, Rampur range	27.651653°N 82.524595°E	Deciduous tree, 14 m tall, 1.52 m in diameter
T 79.	*Ailanthus excelsa* Roxb. Local name: Tree of Heaven	*Simaraubaceae*	Suhelwa Forest, Seria Naka	27.670560°N 82.383715°E	Deciduous tree, 25 m tall, 2.13 m in diameter
T 47.	*Ailanthus excelsa* Roxb. Local name: Tree of Heaven	*Simaroubaceae*	Bankatwa Forest	27.736469°N 82.25o630°E	Deciduous tree, 25 m tall, 2.74 m in diameter
T 22.	*Schleichera oleosa* (Laur.) Oken Local name: Kusum	*Sapindaceae*	Suhelwa Forest, Jarwa Railway Station	27.641052°N 82.521797°E	Evergreen tree, 15 m tall, 1.83 m in diameter
T 78.	*Litchi chinensis* Sonn. Local name: Litchi	*Sapindaceae*	Jaljala Form, Nandmahra, Tulsipur	27.389755°N 82.118078°E	Evergreen tree, 5 m tall, 0.46 m in diameter
T 76.	*Ziziphus jujuba* Mill Local name: Ber	*Rhamnaceae*	Chhota Dhusahe, Balrampur	27.440016°N 82.167501°E	Deciduous tree, 6 m tall, 0.61 m in diameter
T 82.	*Ventilago calyculata* Tul. Local name: Pitti	*Rhamnaceae*	Nandmahra Forest Chauki	27.664201°N 82.337167°E	Deciduous tree, 5 m tall, 0.46 m in diameter
T 3.	*Holoptelea integrifolia* (Roxb.) Planch. Local name: Chilbil	*Ulmaceae*	Suhelwa Forest, Jarwa	27.649956°N 82.525956°E	Deciduous tree, 22 m tall, 2.59 m in diameter
T 4.	*Mangifera indica* (L.) Local name: Aam (Mango)	*Anacardiaceae*	Suhelwa Forest, Jarwa	27.649027°N 82.524271°E	Deciduous tree, 19 m tall, 2.13 m in diameter
T 70.	*Semecarpus anacardium* L.f. Local name: Bhela/Bhilwa	*Anacardiaceae*	Kuwana Forest near Shivgarh	27.389755°N 82.118078°E	Deciduous tree, 10 m tall, 0.61 m in diameter
T 77.	*Spondias dulcis* G. Forst. Local name: Ammar	*Anacardiaceae*	Jaljala Form, Nandmahra, Tulsipur	27.646667°N 82.396554°E	Deciduous tree, 12 m tall, 0.91 m in diameter
T 14	*Acacia catechu* (L.f.) Willd. Local name: Khair	*Fabaceae*	Suhelwa Forest, Rampur range	27.651653°N 82.524595°E	Deciduous thorny tree, 16 m tall, 1.22 m in diameter
T 16.	*Dalbergia sissoo* Roxb. ex DC. Local name: Shisham	*Fabaceae*	Suhelwa Forest, Jarwa Railway Station	27.643037°N 82.523628°E	Deciduous tree, 22 m tall, 2.44 m in diameter
T 19.	*Saraca asoca* (Roxb.) Willd. Local name: Ashok	*Fabaceae*	Suhelwa Forest, Jarwa Railway Station	27.643037°N 82.523628°E	Evergreen tree, 18 m tall, 2.13 m in diameter

Tree plant No.	Name of the tree plants	Name of Family	Location	Coordinates	Habit of tree plant
T 25.	*Cassia fistula* L. Local name: Varga, Amaltas	*Fabaceae*	Suhelwa Forest, Jarwa Railway Station	27.641052°N 82.521797°E	Deciduous tree, 10 m tall, 0.91 m in diameter
T 29.	*Parkia speciosa* Hassk. Local name: Petai	*Fabaceae*	Rampur Forest	27.644045°N 82.521137°E	Deciduous tree, 22 m tall, 2.44 m in diameter
T 33.	*Acacia nilotica* (L.) Willd. Ex Delile Local name: Kajrauta	*Fabaceae*	Rampur Forest	27.644045°N 82.521137°E	Deciduous tree, 12 m tall, 0.76 m in diameter
T 41.	*Butea monosperma (*Lam,) Taub. Local name: Dhak, Plash	*Fabaceae*	Mansurwa Chauki	27.616861°N 82.556556°E	Deciduous tree, 10 m tall, 0.91 m in diameter
T 44.	*Albizia lebbeck* (L.) Benth. Local name: Sirsa	*Fabaceae*	Jublikalan, Mahrajganj	27.484753°N 82.299910°E	Evergreen tree, 20 m tall, 1.52 m in diameter
T 46.	*Pterocarpus marsupium* Roxb. Local name: Vijaysar	*Fabaceae*	Bankatwa Forest	27.736479°N 82.254531°E	Deciduous to evergreen tree, 25 m tall, 2.74 m in diameter
T 51.	*Acacia nilotica* (L.) Willd. Local name: Babul	*Fabaceae*	Bankatwa Range Sangeetpur, Bardaulia	27.721326°N 82.248070°E	Deciduous tree, 14 m tall, 1.07 m in diameter
T 53.	*Delonix regia* (Hook.) Raf. Local name: Gulmohar	*Fabaceae*	Bankatwa Range near Bharhsaia, Bardaulia	27.698422°N 82.243281°E	Deciduous tree, 16 m tall, 1.71 m in diameter
T 56.	*Pithecellobium dulce* (Roxb.) Benth. Local name: Jungle jalebi	*Fabaceae*	Dipwa Bagia, Purabtola, Balrampur	27.429142°N 82.194452°E	Semi evergreen tree, 15 m tall, 1.22 m in diameter
T 62.	*Acacia catechu* (L.f.) Willd. Local name: Khair	*Fabaceae*	Dewrawna, Uttaraula Road	27.395460°N 82.259073°E	Deciduous tree, 12 m tall, 1.07 m in diameter
T 63.	*Pongamia pinnata* (L.) Pierre Local name: Karenj	*Fabaceae*	Khardauri, Uttaraula Road, Shriduttganj	27.331339°N 82.309442°E	Evergreen to Deciduous tree, 16 m tall, 1.07 m in diameter
T 65.	*Tamarindus indica* L. Local name: Imli	*Fabaceae*	Raiganwa, Uttaraula Road, Balrampur	27.339994°N 82.360578°E	Evergreen tree, 18 m tall, 1.83 m in diameter
T 83.	*Erythrina suberosa* Roxb. Local name: Nasut	*Fabaceae*	Kalyanpur-Piparahwa Road, Tulsipur	27.568081°N 82.378209°E	Deciduous tree, 6 m tall,0.61 m in diameter
T 11.	*Terminalia elliptica* Willd. Local name: Asna	*Combretaceae*	Suhelwa Forest, Jarwa	27.651620°N 82.524571°E	Deciduous tree, 12 m tall, 0.91 m in diameter
T 12.	*Terminalia bellirica* (Gaertn.) Roxb. Local name: Bahera	*Combretaceae*	Suhelwa Forest, Rampur range	27.651653°N 82.524595°E	Deciduous tree, 14 m tall, 1.07 m in diameter
T 27.	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn. Local name: Arjun	*Combretaceae*	Rampur Forest	27.644045°N 82.521131°E	Deciduous tree, 18 m tall, 2.44 m in diameter
T 43.	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn. Local name: Arjun	*Combretaceae*	Jublikalan, Mahrajganj	27.484753°N 82.299910°E	Deciduous tree, 22 m tall, 1.52 m in diameter
T 30.	Unidentified Local name: Bansopari	*Combretaceae*	Rampur Forest	27.644045°N 82.521137°E	Deciduous tree, 10 m tall, 0.91 m in diameter
T 35.	*Terminalia elliptica*. Willd. Local name: Asna	*Combretaceae*	Rampur Forest	27.644045°N 82.521137°E	Deciduous tree, 23 m tall, 2.13 m in diameter
T 61.	*Terminalia chebula* Retz. Local name: Harra	*Combretaceae*	Rajapur Bharia Jungle, Uttaraula Road	27.399423°N 82. 247592°E	Deciduous tree, 20 m tall, 1.83 m in diameter
T 80.	*Terminalia bellirica* (Gaertn.) Roxb. Local name: Bahera	*Combretaceae*	Suhelwa Forest, Seria Naka	27.670560°N 82.383715°E	Deciduous tree, 15 m tall,1.07 m in diameter
T 8.	*Syzygium cumini* (L.) Skeels Local name: Jamun	*Myrtaceae*	Suhelwa Forest, Jarwa	27.619715°N 82.524396°E	Evergreen tree, 22 m tall, 2.44 m in diameter
T 17.	*Eucalyptus globulus* Labill. Local name: Safeda	*Myrtaceae*	Suhelwa Forest, Jarwa Railway Station	27.643037°N 82.523628°E	Deciduous tree, 25 m tall, 2.74 m in diameter
T 40.	*Syzygium cumini* (L.) Skeels Local name: Katjamun	*Myrtaceae*	Mansurwa Chauki	27.616861°N 82.556556°E	Deciduous tree, 12 m tall, 2.13 m in diameter

Tree plant No.	Name of the tree plants	Name of Family	Location	Coordinates	Habit of tree plant
T 52.	*Syzygium cumini* (L.) Skeels Local name: Phrenda	*Myrtaceae*	Bankatwa Range near Kohraura, Bardaulia	27.710690°N 82.246037°E	Deciduous tree, 15 m tall, 1.83 m in diameter
T 73.	*Careya arborea* Roxb. Local name: Kumbhi	*Lecythidaceae*	Kuwana Forest near Shivgarh	27.385766°N 82.112964°E	Deciduous tree, 12 m tall, 0.76 m in diameter
T 71.	*Lagerstroemia parviflora* Roxb. Local name: Sidi/Dhaura	*Lythraceae*	Kuwana Forest near Shivgarh	27.389755°N 82.118078°E	Deciduous tree, 22 m tall, 1.83 m in diameter
T 81.	*Lagerstroemia parviflora* Roxb. Local name: Sidi/Dhaura	*Lythraceae*	Suhelwa Forest, Seria Naka	27.670560°N 82.383715°E	Deciduous tree, 22 m tall,1.22 m in diameter
T 1.	*Adina cordifolia* (Roxb.) Hook.f. & Benth. Local name: Haldu	*Rubiaceae*	Suhelwa Forest, Jarwa	27.649803°N 82.325749°E	Deciduous tree, 20 m tall, 3.05 m in diameter
T 24.	*Adina cordifolia* (Roxb.) Hook.f. & Benth. Local name: Haldu, Karma	*Rubiaceae*	Suhelwa Forest, Jarwa Railway Station	27.641052°N 82.521797°E	Deciduous tree, 13 m tall, 0.91 m in diameter
T 20b.	*Anthocephalus cadamba* Miq. Local name: Kadam	*Rubiaceae*	Suhelwa Forest, Jarwa Railway Station	27.643037°N 82.523628°E	Evergreen tree, 12 m tall, 0.76 m in diameter
T 13.	*Madhuca indica* J.F. Gmel. Local name: Mahua	*Sapotaceae*	Suhelwa Forest, Rampur range	27.651653°N 82.524595°E	Deciduous tree, 18 m tall, 1.83 m in diameter
T 55.	*Alstonia scholaris* (L.) R. Br. Local name: Chhatwan	*Apocynaceae*	Satgurwa, near Haraia, Tulsipur Road	27.633231°N 82.299626°E	Evergreen tree, 10 m tall, 0.91 m in diameter
T 32.	*Ehretia laevis* Sieber ex DC. Local name: Datranga	*Boraginaceae*	Rampur Forest	27.644045°N 82.521137°E	Deciduous tree, 7 m tall, 0.61 m in diameter
T 34.	*Cordia dichotoma* G. Forst Local name: Lahtora	*Boraginaceae*	Rampur Forest	27.644045°N 82.521137°E	Deciduous tree, 9 m tall, 0.91 m in diameter
T 45.	*Kigelia africana* (Lam.) Benth. Local name: Balamkhira	*Boraginaceae*	Bankatwa Forest	27.736479°N 82.254531°E	Deciduous to evergreen tree, 14 m tall, 2.13 m in diameter
T 48.	*Cordia dichotoma* G. Forst Local name: Lahtora	*Boraginaceae*	Bankatwa Forest	27.736469°N 82.25o630°E	Deciduous tree, 18 m tall, 2.13 m in diameter
T 75.	*Ehretia laevis* Sieber ex DC. Local name: Datranga	*Boraginaceae*	Kuwana Forest near Shivgarh	27.389755°N 82.118078°E	Deciduous tree, 14 m tall, 0.91 m in diameter
T 2.	*Tectona grandis* L.f. Local name: Sagaun (Teak)	*Lamiaceae*	Suhelwa Forest, Jarwa	27.649803°N 82.325749°E	Deciduous tree, 18 m tall, 1.07 m in diameter
T 23.	*Gmelina arborea* Roxb. ex Sm. Local name: Jigna	*Lamiaceae*	Suhelwa Forest, Jarwa Railway Station	27.658706°N 82.520725°E	Deciduous tree, 20 m tall, 2.13 m in diameter
T 50.	*Callicarpa arborea* Roxb. Local name: Ghiwala	*Lamiaceae*	Bankatwa Forest near Tenganwar village	27.753693°N 82.219097°E	Deciduous tree, 12 m tall, 0.91 m in diameter
T 67.	*Litsea glutinosa* (Laur.) C.B. Rob. Local name: Maida/Haddijorh	*Lauraceae*	Kuwana Forest Near Shivgarh	27.389389°N 82.118850°E	Deciduous to semi evergreen tree, 8 m tall, 0.76 m in diameter
T 6.	*Mallotus philippensis* (Lam.) Müll. Arg. Local name: Rohini	*Euphorbiaceae*	Suhelwa Forest, Jarwa	27.619715°N 82.524396°E	Deciduous tree, 15 m tall, 1.22 m in diameter
T 42.	*Putranjiva roxburghii* Wall. (Syn. *Drypetes roxburghii*) Local name: Patjhi	*Euphorbiaceae*	Mansurwa Chauki	27.616861°N 82.556556°E	Evergreen tree, 10 m tall, 0.76 m in diameter
T 49.	*Phyllanthus emblica* L. Local name: Awanla	*Phyllanthaceae*	Bankatwa Forest	27.736469°N 82.25o630°E	Deciduous tree, 15 m tall, 1.52 m in diameter
T 68.	*Bridelia retusa* (L.) A. Juss. Local name: Khaja	*Phyllanthaceae*	Kuwana Forest Near Shivgarh	27.387912°N 82.120146°E	Deciduous tree, 15 m tall, 1.07 m in diameter
T 37.	*Artocarpus integrifolia* L.f. Local name: Kathal	*Artocarpaceae*	Mansurwa Chauki	27.616861°N 82.556556°E	Deciduous tree, 14 m tall, 1.83 m in diameter
T 57.	*Artocarpus lacucha* Roxb. ex Buch.-Ham. Local name: Barhhal	*Artocarpaceae*	Dipwa Bagia, Purabtola, Balrampur	27.429142°N 82.194452°E	Deciduous tree, 18 m tall, 1.22 m in diameter

Tree plant No.	Name of the tree plants	Name of Family	Location	Coordinates	Habit of tree plant
T 7.	*Ficus racemosa* L. Local name: Gular	*Moraceae*	Suhelwa Forest, Jarwa	27.619715°N 82.524396°E	Deciduous tree, 22 m tall, 2.44 m in diameter
T 21.	*Ficus religiosa* L. Local name: Peepal	*Moraceae*	Suhelwa Forest, Jarwa Railway Station	27.641052°N 82.521797°E	Deciduous tree, 22 m tall, 10.61 m in diameter
T 26.	*Ficus infectoria* Willd. Local name: Pakad	*Moraceae*	Suhelwa Forest, Jarwa Railway Station	27.644027°N 82.521135°E	Deciduous tree, 15 m tall, 1.83 m in diameter
T 36.	*Ficus benjamina* L. Local name: Khurhur	*Moraceae*	Rampur Forest	27.644045°N 82.521137°E	Deciduous tree, 8 m tall, 0.61 m in diameter
T 38.	*Ficus* sp. Local name: Bhilore	*Moraceae*	Mansurwa Chauki	27.616861°N 82.556556°E	Deciduous tree, 15 m tall, 1.83 m in diameter
T 39.	*Ficus benghalensis* L. Local name: Bargad	*Moraceae*	Mansurwa Chauki	27.616861°N 82.556556°E	Evergreen tree, 20 m tall, 3.05 m in diameter
T 58.	*Ficus* sp. Local name: Bhilore	*Moraceae*	Rajapur Bharia Jungle, Uttaraula Road	27.390001°N 82.246865°E	Deciduous tree, 14 m tall, 1.37 m in diameter
T 69.	*Ficus carica* L. Local name: Anjeer	*Moraceae*	Kuwana Forest near Shivgarh	27.388589°N 82.119052°E	Deciduous tree, 10 m tall, 0.91 m in diameter

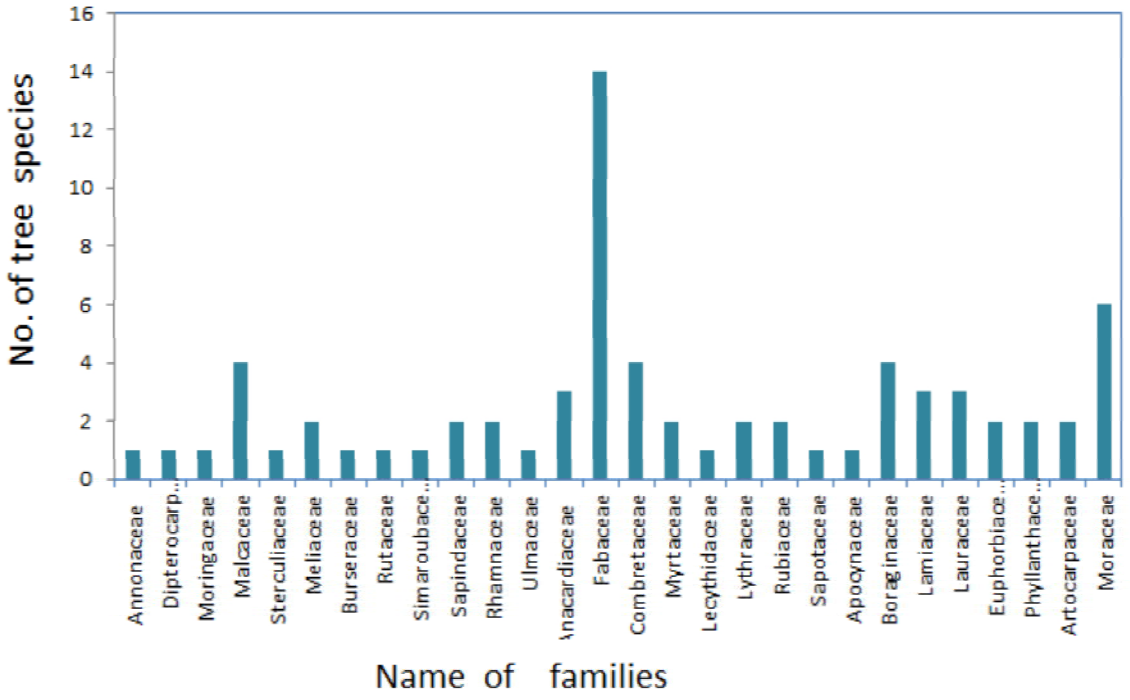

Figure 5. Diversity of tree flora in Balrampur District, Uttar Pradesh, India.

The other dominant taxa in the tree assemblage of Balrampur District are *Tectona grandis* L.f. (*Lamiaceae*), *Dalbergia sissoo* Roxb. ex DC. (*Fabaceae*), *Mangifera indica* L. (*Anacardiaceae*), *Schleichera oleosa* (Laur.) Oken (*Sapindaceae*), *Mallotus philippensis* Müll. Arg. (*Euphorbiaceae*), *Ficus* spp. (*Moraceae*), *Adina cordifolia* (Roxb.) Hook.f. & Benth. (*Rubiaceae*), *Gmelina arborea* Roxb. ex Sm. (*Lamiaceae*), *Ehretia laevis* Sieber ex DC. (*Boraginaceae*), *Acacia nilotica* (L.) Delile and *A. catechu* (L.f.) Willd. *(Fabaceae)*, *Aegle marmelos* (L.) Correa (*Rutaceae*), *Holoptelia integrifolia* (Roxb.) Planch *(Ulmaceae)*, *Lagerstroemia parviflora* Roxb. *(Lythraceae)*, *Terminalia bellirica*

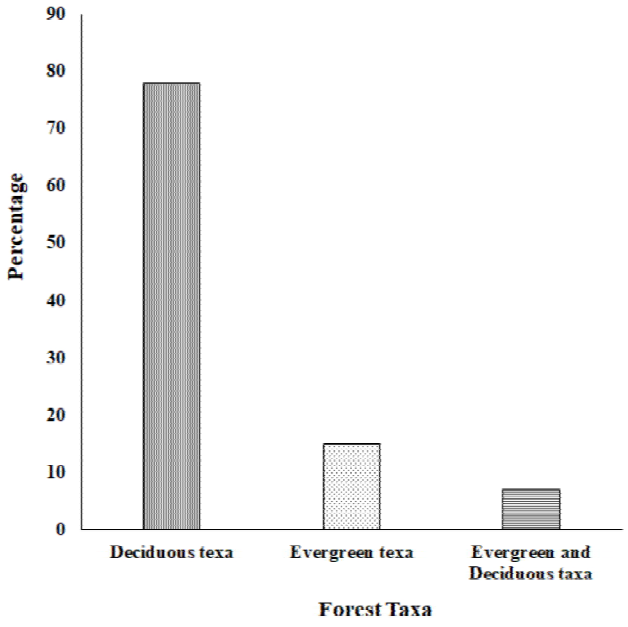

Figure 6. Different type of forest taxa in the tree flora of Balrampur District, Uttar Pradesh, India.

(Gaertn.) Roxb. and *T. arjuna* (Roxb. ex DC.) Wight & Arn. (*Combretaceae*), etc. (Figure 3.A–L, 6).

Syzygium cuminii (L.) Skeels is commonly found either in localized swamp forest or out of the forest along the small streams (Figure 2.E). In majority of dry locality, especially flood area, there is scattered occurrence of *Acacia nilotica* L. It has rarely been seen as a group looking likes a small forest (Figure 2.D). *Lagerstroemia parviflora* Roxb. is one of the second level common species also seen in a group in the Kuwana Forest as well as Rajapur Bharia jungle toward the south of Balrampur. One of the dominant and commercially most important timber yielding taxa, *Tectona grandis* L.f., is found not in the outer ring of the Suhelwa Wildlife Forest but it is also seen as large patches adjacent to the forest areas in the form of plantations (Figure 2.A). Similarly, *Eucalyptus globulus* Labill. occurs as small patches throughout the area in the form of plantation only.

CONCLUSIONS

The present study provides information about 67 timber-yielding plants belonging to 55 genera and 28 families. These plants, with their local name, name of the family, location, coordinates and habit/ habitat, are arranged in Table 1. Major part of the study area is occupied by dry deciduous forest. About 78% taxa are deciduous and dominate the tree flora of Balrampur district. The predominant families are *Fabaceae* (14 species), *Annonaceae* (6 species), *Malvaceae* and *Boraginaceae* (4 species each) and *Anacardiaceae* and *Lamiaceae* (3 species each). These timber plants are used for house construction, and in making furniture, agricultural implements, musical instruments, packing cases, etc. The present study, therefore, provides useful information to industries relying on timber resources of Suhelwa Wildlife Forest, Kuwana Forest and Rajapur Bharia Jungle areas of Balrampur District, Uttar Pradesh.

ACKNOWLEDGEMENTS

The authors are grateful to Dr. R.P. Shukla, Principal, M.L.K. Post-Graduate College, Balrampur for continuous encouragements during the progress of present research work and to the Director, Birbal Sahni Institute of Palaeosciences, Lucknow for providing library facilities. Thanks are due to the authorities of Council of Science and Technology, Uttar Pradesh for providing financial support under CST Project No. CST/AAS/D1855. Authors are also grateful to Mr. K.B. Srivastava, Forest Officer, Rampur Range, Jarwa, Tulsipur for his help during the field work. Thanks are given to Shri Rana Pratap Singh, owner of Jaljala Form, Nandmahara Chowki, Tulsipur, Balrampur for his generous helps during the collection of tree plants.

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