

STUDY OF MORPHOLOGICAL CHARACTERS OF TRANSPLANTED TREES WITH SPECIAL REFERENCE TO THEIR MEDICINAL IMPORTANCE

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ABSTRACT

Morphological study of transplanted tree is the foundation of this investigation. This research work is focused on documentation of transplanted tree on the basis of their morphological character and economic value with special reference to its medicinal value, there are thirteen trees described on the basis of their morphological characters, *Azadirachta indica*, *Bauhinia variegata*, *Pongamia pinnata*, *Jacaranda mimosifolia*, *Dalbergia sissoo*, *Dalbergia latifolia*, *Mimusops elengi*, *Ficus virens*, *Ficus bengalensis*, *Ficus religiosa*, *Bombax malabaricum*, *Kigelia Africana*, *Tabebuia sp.* All morphological characters are based on the taxonomic features of leaf. They are used in fodder, timber, oil, beverages, and ornamental purposes. On the basis of these characteristics trees can be easily identified and utilized in various purposes, which is baseline for the forest field and useful to upliftment of forest economy by proper utilization of tree parts.

KEYWORDS: Morphological, Transplanted tree, Medicinal

Forest is an important component of our environment and economy. Forests also have aesthetic, recreational and tourist value and serve as gene reserve of important species. Leaves also play key role in plant functioning and long term adaptation to the environment.

According to Marcos Melocorea (2015), morphological studies focusing on vegetative traits are useful in identifying species when fertile materials are not available. This study assesses the application of comparative leaf morphology to identify species of the transplanted trees ([www.scielo.br>scielo](http://www.scielo.br/scielo)). Tree morphology incorporates architectural, biomechanical and physiological aspects of the tree as well as areas in science and mathematics such as fractals conducive to computer modeling to enhance understanding of tree growth.

To my knowledge, this is the first morphological study of transplanted tree of Fisher forest and Lion Safari. Leaf morphology explores the identification, economic importance of trees with special reference to their medicinal values. Plant morphology is useful in visual identification of plant. Mathur (1988) described that the formulation of the principles of taxonomy began with the period of descriptive taxonomy which had its main period of development on a scientific level in the 19th century. This was mainly concerned with the observation of the similarities and the differences in the gross morphological characters of the plants discovered at that time all over the surface of the earth. This descriptive taxonomy began with the works of Tournfort, de Jussieu and Linnaeus and

followed by Robert Brown, Hookers, John Lindley, George Bentham, de Candolles and several others. The plants were described and classified according to the morphological characters. The present day taxonomy is based primarily on the morphological characters and affinity. According to Shukla and Misra (1992) major classification available now are those which based on morphology.

The current research was conducted with this background. The objective of this work is to identify the trees on the basis of their morphological characters and their economic values. Hopefully this study will provide useful information for identification of transplanted tree, and its economic utilization, with special reference to its medicinal value.

MATERIALS AND METHODS

Taxonomical Characters of Various Tree Species and Economic Importance of Plants

Various transplanted plant twigs are collected from the Fisher forest and Lion Safari and identified in the laboratory with the help of flora of Uttar Pradesh (Singh *et al.*, 2016) and their economic importance was also studied. Mature leaves were collected from the top of the stem from trees transplanted before 4 years and studied in the laboratory with help of various reference books like Duthie flora, Chavan and mathur, Exotic tree internet and Botanical review and Gazeets of Kolkata, Interested flowering trees.

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Research Site

Fisher forest, Etawah lies in the western part of U.P. at 26°47' north latitude and 72°20' east longitude. The pioneer work for the protection of land from erosion by establishing the forest was initiated by Mr. Fisher (Collector of Etawah) in 1888. Therefore, this forest is called Fisher forest. Lion Safari is about 25 km from Research Centre Heonra, Etawah, 109 km from Gwalior and 120 km from Agra.

Study of Morphological Characters of Transplanted Tree

In Fisher forest and Lion Safari transplanted trees were 3-4 years old only. Therefore leaf morphological feature are described only. This is sufficient for identification for plant. (Table 1)

Azadirachta indica

A. Juss: Leaves pari-or imparipinnate, 10-45 cm long, leaflet 9-18, opposite or alternate, ovate-lanceolate, 4-9*1-2.3cm, acuminate at apex, prominently oblique at base, coarsely crenate-seirate, along margins, glabrous terminal leaflet after aborted; petiolutes 2-3mm long.

Bombax malabaricum D.C.

Leaves slightly broader than long 5-15cm long, divided 1/3 way down Cordate at base 9-15 nerved; lobes obtuse.

Dalbergia latifolia Roxb

Leaves impair-pinnate, alternate 10-15 cm long leaflets 5-7, equal in size, broadly elliptic. Obovate or subordicular, 3.5-6.5cm long and broad, obtuse or emarginated at apex, cuneate at base glabrous.

Dulbergia sissoo D.C

Leaves imparipinnate, 10-20 cm long, leaflets 3-5, alternate broadly ovate or subordicular, 2.5-6*2.5-4 cm, cupidate or acuminate at apex, appressed pubescent at first beneath, glabrous when old.

Ficus bengalensis L.

Leaves 4-8 inch long 2-5 inch broad, egg shaped, rounded or elliptical tip blunt, base rounded or somewhat heart shaped, 3 to 7 nerves arising from the base.

Ficus religiosa L.

Leaves leathery, 4 to 8 inch long by 3 to 5 inch wide, somewhat egg shaped or rounded tailed at the tip and heart shaped at the base, or sometimes rounded.

Ficus virens Dryander

Leaves are 8-19cm long and 3-6 cm wide, with a whitish midrib stipules are less than 1 cm long, ovate lanceolate in shape leaves thin, shining green above, duller paler green below, leaves with a short tip.

Jacranda mimosifolia

Leaves are borne at the ends of branches bipinnately compound, symmetrical like a fern, entire obovate, rhomboid, leaf blade less than 2 inches.

Kigella Africana (Lans.) Benth

Leaves opposite, leathery elliptic to ovate ablong, upto 10 cm long entire strigose beneath.

(<https://sites.google.com/bignoniaceae>)

Pongamia pinnata (L.) pierre

The imparipinnate leaves of the tree alternate and are short- stalked, rounded or cuneate at the base, ovate or oblong along the length, obtuse-acuminate at the apex and not toothed on the edges. They are a soft, shiny burgundy when young and mature to a glossy deep green as the season progress with prominent veins underneath.

Mimusopa elengi L.

Leaves are glossy, dark green, elliptic, short or long acuminate 5-14 cm (2-5.5 inch) long and 2.5-6 cm (0.98-2.36 inch) wide closely but faintly veined.

Tabebuia argentea

Compound leaf, 5 leaves present, middle leaf large, lower side leaves are small, leaf size 12 cm large and 7 cm wide.

Table 1: Leaf Based Morphological Studied of Various Tree Species

S.No	Botanical Name	Characteristic Features of leaf
1	<i>Azadirachta indica</i> A. Juss	Leaves pari-or impari-pinnate, 10-45cm long; leaflets 9-18, opposite or alternate, ovate-lanceolate, 4-9x1-2.3cm, acuminate at apex, prominently oblique at base, coarsely crenate-serrate, along margins, glabrous, terminal leaflet often aborted; petiolules 2-3 mm long.
2	<i>Bombax malabaricum</i> DC	Leaves digitate 5, 7 foliolate, leaflets lanceolate or elliptic, 8-18x5.8 cm acuminate at apex, tapering at base, entire, glabrous, petioles, 12-20 cm long; stipules triangular.
3	<i>Bauhinia variegata</i> L.	Leaves slightly broader than long, 5-15cm long, divided 1/3 way down cordate at base 9-15 nerved; lobes obtuse.
4	<i>Dalbergia latifolia</i> Roxb.	Leaves impari-pinnate, alternate 10-15 cm long leaflets 5-7, unequal in size, broadly elliptic. obovate or suborbicular, 3.5- 6.5cm long and broad, obtuse or emarginate at apex, cuneate at base, glabrous.
5	<i>Dalbergia sisoo</i> D.C.	Leaves imparipinnate, 10-20cm long, leaflets 3-5, alternate broadly ovate or Suborbicular, 2.5-6x2.5-4cm, cuspidate or acuminate at apex, appressed pubescent at first beneath, glabrous when old.
6	<i>Ficus bengalensis</i> L.	Leaves 4-8 inch long 2-5 inch broad, egg -shaped, rounded or elliptical tip blunt, base rounded or somewhat heart shaped, 3 to 7 nerves arising from the base.
7	<i>Ficus religiosa</i> L.	Leaves leathery, 4 to 8 inch long by 3 to 5 inch wide, somewhat egg shaped or rounded, tailed at the tip and heart shaped at the base, or some times rounded.
8	<i>Ficus virens</i> Dryander	Leaves are 8-19 cm long and 3-6 cm wide, with a whitish midrib stipules are less than 1 cm long ovate lanceo-late in shape leaves thin, shing green above, duller paler green below, leaves with a short tip.
9	<i>Jacrandia mimosifolia</i>	Leaves are borne at the ends of branches bipinnately, compound, symmetrical like a fern. entire obovate, rhomboid, leaf blade less than 2 inches
10	<i>Kigella africana</i> (Lans) Benth	Leaves Opposite, Pinnate compound, leaflet 5-9 leathery, elliptic to ovate-oblong, upto 10cm long, 6-8 cm broad,
11	<i>Pongamia pinnata</i> (L.) Pierre	Leaves imparipinnate, 7-25cm long, leaflets 5-7, ovate or oblong 5-10 x5-8cm, acute or acuminate at apex obtuse at base; petioles 5-6 cm long
12	<i>Mimusopa elengi</i> L	Leaves are glossy, dark green, elliptic, short or long acuminate 5-14cm (2-5.5 inch) Long and 2.5-6 cm (0.98-2.36inch) wide closely but faintly veined.
13	<i>Tabebuia argentea</i>	From 5 to 7 olong silvery grey, oblong leaflets, roughly 4 inches wide and 11 inches long. Fan outward like the extended fingers of a hand botanists call palmate.

Table 2: Key Characters of Leaf

Sl. No.	Botanical Name	Common Name	Key Character	Reference
1.	<i>Azadirachta indica</i> A.Juss	Neem	Leaflet opposite or alternate ovate, lanceolate	K.P. Singh & G.P. Sinha (2016)
2.	<i>Bombax malabaricum</i> DC	Semal	Leaves digitate	Khanna (2016) & Mishra (1988)
3.	<i>Bauhinia variegata</i> L.	Kachnar	Leaves cordate	Shukla (2016), Mishra (1988)
4.	<i>Dalbergia latifolia</i> Roxb.	Kala Shisham	Leaflet elliptic obovate	Shukla & Singh (2016)
5.	<i>Dalbergia sisoo</i> DC	Shisham	Leaflet ovate	B.K. Shukla & A.N. Singh (2016) D.N. Mishra (1988)
6.	<i>Ficus bengalensis</i> L.	Bargad	Leaf broad rounded	R.K. Chakravirty & S.K. Jain, D.N. Mishra (1988)
7	<i>Ficus religiosa</i> L.	Pipal	Leaf heart shaped, tailed at the tip	R.K. Chakravirty & S.K. Jain, D.N. Mishra (1988)

8	<i>Ficus virens</i> Dryander	Pakad	Leaf whitish midrib long lanceolate	www.flowersofindia.
9	<i>Kigella africana</i> (Lans.) Benth	Balamkhira	Leaf binately, compound	Jacmina.pdf Flora of Up BSI Singh, Khanna, Sinha
10	<i>Pongamia pinnata</i> (L.) pierre	Kanja	Elliptic, odd pinnately	Gilman & Watson (1994)
11	<i>Mimusopa elengi</i> L.	Maulsiri	Leaves are glossy dark green elliptic	Shodhganga
12	<i>Tabebuia sp.</i>	Tabebuia	Usually palmately 3 to 7 foliate	Wikipedia

Economic Importance of Plants

Transplanted trees have several economic values. Economic importance of various species is given below

Azadirachta indica

This is a large tree usually found in the upper gangetic plains of our country. The neem oil is extracted from the pulp of the fruits, which is used in the manufacture of margosa soap and several skin ointments. The oil cake obtained from the seeds is used as a fertilizer and manure. Almost all the parts of tree are of medicinal value. The leaves are placed in the suitcase to repel insects and to preserve woollens. Decoction of leaves is antiseptic and used to wash ulcers and wounds. An extract of the leaves is used in the manufacture of toothpaste and soaps. The seed oil is used as an antiseptic. This oil is also burnt in the earthen lamps. Dry flower are used as a tonic. The bark is used as an antiseptic. The young branches are used as dataum. The gum, bark, leaves and seeds are used in snake bite. The wood makes a good timber. The branches are burnt as fuel. In summers people take shelter under the shade of neem tree. (Pandey, 1985)

Bauhinia variegata

Fibres obtained from the stem. Stem, bark, flowers dried bud are used in obesity, diabetes, controls, metabolism, skindisease, ulcer, worms, Athma, piles, dysentery, diarrhea, goiter.

Bombax malabaricum DC

Stem and seeds are used in oil and fibers. Bark paste on boils and blisters, stem prickles in asthma, fruits in dysentery seed paste in small pox, boils, Root extract in diarrhoea, spermatorrhoea and powder as a tonic for impotency.

Dalbergia latifolia Roxb. (Kala shisham)

A large deciduous or nearly evergreen tree with cylindrical, fairly straight stem and full rounded crown, found in the sub Himalayan tract. Indian rosewood ranks among the finest wood for furniture and cabinet work. It is valuable decorative wood suitable for carving and ornamental plyboards and veneers. It is especially useful for pattern making, calico printing blocks, mathematical instruments and screws. It is also used for gun carriage wheels, ammunition boxes and army wagons, pulleys, handles, shelves, decorative carriage parts, temple chariots, boat knees, agricultural implements, combs, razorhandles and brush backs. Carefully selected manufactured Indian rosewoodplyboards satisfy aircraft specifications. (Pandey, 1985).

Dalbergia sissoo

It occurs throughout the sub-Himalayan tract from Ravi to Assam. It is extensively cultivated in Punjab, Uttar Pradesh, Bengal and Assam. Shisham is used as high class furniture and cabinet wood widely used throughout north India. On account of its great strength elasticity and durability, it is highly valued as constructional and general utility timber and is used for all the purposes. It is esteemed for musical instrument, charpai legs, hammer handles, shoe heels, hookah tubes and tobacco pipes. Carefully selected and manufactured plywood logs satisfy the specifications prescribed for aircraft and for this purpose, the wood from trees, growing on canal banks and in plantations is considered to be the best. (Pandey, 1985)

Ficus bengalensis L.

Leaves are used as a fodder. Plant buds, roots and latex used in diarrhea, dysentery, stops vommiting, toothache, genital diseases, cough, diabetes and polyuria. (Brahmavarchaysha, 2003)

***Ficus religiosa* L.**

Leaves are used as a fodder. Bark shoot, leaves and fruit used in ulcer, skin disease, antibacterial, antihelminthic Gonorrhoea, Antifungal, seeds if taken three days during mensuration, sterilizes women for long time.

***Ficus virens* Dryander**

Leaves are used as a fodder. Bark root fibers, leaves, seeds, latex are used in Ulcer, vomiting, vaginal complains, fever, inflammation, leprosy, useful in piles, nose-diseases, gonorrhoea, dysentery, inflammation of liver.

***Kigella Africana* (Lans.) Benth.**

Fruit and seed are used in Beverages drink and leaf is used in fodder. Fruit pulp is used in Leprosy, syphilis, skin cancer, dysentery, ringworm, malaria, diabetes, pneumonia, solar keratosis, Kaposi's sarcoma, HIV related skin ailment, antioxidant, anti-inflammatory, antibacterial.

***Pongamia pinnata* L.(pierre)**

Fruit, seed and leaf are used in fibers, oil and fodder purposes. Seed, bark and leaves are also used in Skin disease impurity of blood, leprosy, piles, leucoderma, ringworm, flatulence, diarrhoea, indigestion, antibacterial, scabies, herpes, diabetes.

***Mimusopa elengi* L.**

Flowers are used in Perfume&oil. Bark, leaves flowers fruits and seeds are used in Headache, skeletal fracture, cough, leucoderma, worms, spermicidal, pyorrhoea, diaarrhoea, dysentery, ulcerated throat.

Tabebuia

Tabebuia stems are used in Timber. Bark and leaves have the properties of Antibacterial, antifungal, antiviral, antiparasitic, anticancer,

Jacaranda mimosifolia

Jakaranda stems are used in timber. Bark, leaves and roots are used in Skin problems, venereal diseases leishmaniasis, colds, rheumatism. Antioxidant, anti depressant, antimicrobial, anticancer, antiprotozoal, hypotensive.

Economic value of plant mainly studied on two heads:

- (a) Medicinal
- (b) Commercial

In medicinal point of view, described the plant parts and its active component, used in cure of disease.

Table 3: Medicinal Values of Plants

Sl. No.	Botanical Name	Active Component	Parts used	used in disease
1-	<i>Azadirachta indica</i> A. Juss	Margoin, Nimbadin, Sulphur, Nimban, Nimbosterol, Tanin, Essential oil, Resin, Glycosides, Fattyacids, Gum, Free amino acids, Starch Sugars, Quercetin, Beta-Sito Sterol	Root bark, Stem bark, Leaves, Flowers, Fruits,	Bark used in Rhinitis affection, Hypoglycaemic, Rheumatism, Antipyretic, Analgesic, malarial fever, Sedative, Antiulcer, anti bacterial. Leaves useful in Eczema, Ringworm, Fungal affection, Antiseptic, wound healer, Antihelminthic, Liver stimulant, Anti-leprotic whole plant useful in scabies ulcer, leucoderma, Blood purification, oil used in Leprosy.
2-	<i>Bombax malabaricum</i> DC	Naphthol, Napthaquinones, Polysaccharides, Anthocyanins, Shamimin & Lupeol	Bark, Stem, Fruit, seed, root	Bark paste on boils and blisters, stem prickles in asthma, fruits in dysentery seed paste in small pox, boils, Root extract in diarrhoea, spermatorrhoea & powder as a tonic for impotency.
3-	<i>Bauhinia variegata</i> L.	Sugar and Tannins, Hentria contane, Octacosanol, Beta-sitosterol, Stigma sterol, Flavonoid, Myrcetol, Glycoside, kaempferol glycoside.	Stem, bark, flowers dried bud	Obesity, diabetes, controls metabolism, skin disease, Ulcer, intestinal worms, Asthma, Piles, dysentery, diarrhea, goiter.

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4-	<i>Dalbergia latifolia</i> Roxb.	Dalbinol, sisafolin, coumarin, β -sitosterol, dalbergichromene lupeol, latifolin and dalbergin, latinone, neo flavonoid dalcridon and Latinone, tannin.	Stem bark	Leprosy, obesity worm, antioxidant.
5-	<i>Dalbergia sissoo</i> DC	Dalbergin, Dalbergenone, Methyl dalbergin, Nordal, Bergin, Isodalbergin, dalbergiphenol, tectrigerenin, isocaviudin, glucoside, isocaviunin,	Leaf, wood and bark.	Leprosy, leucoderma, antipyretic, appetizer, urinarydisease, dyscrosia, ulcer, worms, bleeding piles, diarrhoea.
6-	<i>Ficus bengalensis</i> L.	Glucoside, Bengalenoside, Talbutamide, leucoantho cyanidins, phytosterolin, Beta-sitosterol, Freidelin, Quercetin, glalactoside, Ticlic acid, Tannin.	Whole plants buds, roots and latex.	Diarrhoea, dysentery, stops vomiting, toothache, genital diseases, cough, diabetes and polyuria.
7-	<i>Ficus religiosa</i> L.	Tannin	Bark, shoot, leaves, fruit.	Ulcer, skin disease, antibacterial, Anthelmintic, Gonorrhoea, Antifungal, seeds if taken three days during menstruation, sterilizes women for long time.
8-	<i>Ficus virens</i> Dryander	Alkaloids, phenolics, flavonoids, tannin	Bark, root, fibers, leaves, seeds, latex.	Ulcer, vomiting, vaginal complains, fever, inflammation, leprosy, useful in piles, nose-diseases, gonorrhea, dysentery, inflammation of liver.
9-	<i>Jacaranda mimosifolia</i>	Flavonoids, phenyl propanoids, phenyl ethanoids, sterols, triterpenes.	Bark, leaf and roots.	Skin problems, venereal diseases leishmaniasis, colds, rheumatism. Antioxidant, anti depressant, antimicrobial, anticancer, antiprotozoal, hypotensive
10-	<i>Kigelia africana</i> (Lans.) Benth.	Norviburtinal coumarins, iridoids, flavonoids, fattyacids, sterols, glycosides, naphtha quinines.	Fruit pulp.	Leprosy, syphilis, skin cancer, dysentery, ringworm, malaria, diabetes, pneumonia, solar keratosis, Kaposi's sarcoma, HIV related skin ailment, antioxidant, anti-inflammatory, antibacterial.
11-	<i>Pongamia pinnata</i> (L.) Pierre	Bitter fattyoil, Pongamol, Protein, Alkaloids, Tannin, Sugar, Resin, Karanjin	Seeds, bark, leaves	Skin disease impurity of blood, leprosy, piles, leucoderma, ringworm, flatulence, diarrhea, indigestion, antibacterial, scabies, herpes, diabetes.
12-	<i>Mimusops elengi</i> L.	Lupeol, xylose, myrcetin, quercetin, glucosides, quercitol, ursolic acid ,glucose, triterpene, alcohol, palmitic acid, stearic acid, behenic acid, oleic acid, linoliec acid, lauric acid, myristic acid, saponin.	Bark, leaves, flowers, fruits, seeds	Headache, skeletol fracture, cough, leucoderma, worms, spermicidal, pyorrhea, diaarrhoea, dysentery, ulcerated throat
13-	<i>Tabebuia sp.</i>	Napthoquinones, Lapachol, quinoids, flavonoids, β -lapachone	Bark and leaf.	Antibacterial, antifungal, antiviral, antiparasitic, anticancer,

In commercial point of view, described the plant parts used as timber, oil, fodder, perfume, fibres and floss, beverages and drinks etc.

Table 4: Other Economic Value of Trees

Sl. No.	Botanical Name	Parts Used	Beverages and drinks	Fibres & floss	Gum/Resin	Perfume	Oil	Fodder	Timber/wood
1	<i>Bombax malabaricum</i> DC	S,SD	-	+	-	-	+	-	-
2	<i>Azadirachta indica</i> A. Juss	S,SD	-	-	+	-	+	-	-
3	<i>Bauhinia variegata</i> L.	SF	-	+	-	-	-	-	-
4	<i>Dalbergia sissoo</i> D.C.	ST	-	-	-	-	-	-	+
5	<i>Dalbergia latifolia</i> Roxb.	ST	-	-	-	-	-	-	+
6	<i>Ficus bengalensis</i> L	LF	-	-	-	-	-	+	-
7	<i>Ficus religiosa</i> L.	LF	-	-	-	-	-	+	-
8	<i>Ficus virens</i> Dryander	LF	-	-	-	-	-	+	-
9	<i>Jacaranda mimosifolia</i>	ST	-	-	-	-	-	-	+
10	<i>Kigelia africana</i> (Lans). Benth.	FR, SD, LF	+	-	-	-	-	+	-
11	<i>Mimusopa elengi</i> L	FL	-	-	-	+	+	-	-
12	<i>Pongamia pinnata</i> (L) Pierre.	LF, SD, BA	-	+	-	-	+	+	-
13	<i>Tabebuia sp.</i>	ST	-	-	-	-	-	-	+

Abbreviations: LF = leaf, ST= Stem, SD=Seed, FR=Fruit, FL= Flower, BA = Bark

DISCUSSION

Morphological characters are used for identification because it is a basic method since nineteenth century and easily observable. For the study of morphological characters one need not to have sophisticated laboratory arrangements, a hand lens or dissecting microscope or light microscope is enough to study these characters.

Trees are important woody plants of our ecosystem. Woody trees are mostly, used for timber purposes but the present work describes the utility of trees with respect to their importance in restoring, reclaiming and rejuvenating denuded and disturbed soils, their ecological, eco-development and environmental use and their educational and recreational value in gardening, landscaping and aesthetic purposes. In addition the importance of trees is discussed with reference to their value as a source of different sustenance like beverages,

medicines, essential oils, fatty oils, fodder, fuel, fiber, tannin, gums, resins and cork.

Present study defines the total number of transplanted trees and their morphological character and their economic importance to wild life. Hence, this research provides the basic first line information about the successful afforestation which can be used in its further extension.

Morphology of the plant described with out any specific instrument, therefore this has remain a long lasting method of plant identification. Various flora were helpful in the identification of plant. Thirteen transplanted species are described on the basis of their leaves dissimilarities, because plants were only 4 years old. Morphological characters are a part of descriptive taxonomy which developed in the nineteenth century. This was mainly concerned with the observation of similarities and differences in the morphological characters of plants. This began with the works of Tournefort, de Jussieu and

Linnaeus. In 20th century, primary importance was given to morphological distinctness (Saxena & Saxena, 2012).

Economic Importance of Transplanted Trees

Forest trees occupy central position in nature. They restore ecological balance of all ecosystems and maintain biological diversity. Forests have since long been looked upon as revenue generation sector. There is a need for good planning and execution of our rich, diverse forest resource which is scarce and precious. In this aspect, the Safari plays a vital role in attaining ecological security. Floristic component is the key element of ecosystem services that actually meets the livelihood needs both for the human beings as well as other animals of Safari. (Singh *et al.*, 2016). Traditionally, trees are being used for the inter dependent benefits of 6 Fs i.e food, fruit, fodder, fuel, fertilizer and fibre. The multivarious benefits and services generated from tree-based system are recognized as a tool to improve the livelihood status of forest dependent people. (Chavan *et al.*, 2015). Trees are mostly used for timber purposes, but in terms of Fisher forest and lion Safari it is also used in restoring, reclaiming and rejuvenating denuded and disturbed soils, their ecological, ecodevelopmental and environmental use and their educational and recreational value in gardening, landscaping and bioaesthetic planning. Seth (2002) given the logical meaning of “TREES”

T= Timber, R=Restoration, reclamation and rejuvenation of denuded soils, E=Ecological, ecodevelopmental and environmental use. E=Educational and recreational value in gardening, landscaping, bioaesthetic planning. S=Source of sustenance i.e. food, fuel, fodder, fertilizer, fiber, medicine, tannin, dyes, oils etc.

Woods obtained from *Dalbergia sissoo* are used for construction and other miscellaneous purposes like agricultural implements, boat and ship building, carts and carriages, carving and turnery, cooperage (barrel making), electric poles, engraving and printing blocks, furniture and cabinet work, match and match boxes, pencil and pen holders, picture framing, railway carriage and wagon building, rifle parts, shoe heels and boot lasts, shuttle, sports goods, tea chests, toys etc. Anonymous (1970-72, 1983) and Trotter (1940, 1944).

In wild life both native and ornamental trees are present. They directly feed and provide shelter to house the majority of world's creatures and animals like insects, birds, small mammals and reptiles, which are their basic need in order to live. Thus they play a major role as one of the important components of natural and human made biodiversity. The whole forest management program is useful to provide stability to the environment by restoring the ecological balance (Maithaniet *et al.*, 1991).

Ornamental flowering trees such as *Bauhinia variegata* (Seth, 2003) *Jacaranda mimosaeifolia*, *Pongamia*, *Bombax malabaricum* (Cowen, 1950; Randhawa, 1965-1983) are suitable for Safari. Ornamental trees with beautiful foliage called “Ornamental foliage trees *Kigella* sp. was recommended by Randhawa (1961), evergreen trees provide a structure for the Safari during winter months, without them garden will look bleak and dull. When the foliage of most herbaceous perennials disappears, leaving bare stems and branches. Many evergreen trees combine beauty with fragrance. Some trees that are commonly cultivated for scent and fragrance are *Mimusops elengi* (Randhawa, 1961).

Table 5: Economic Value of Transplanted Tree

Sl. No.	Genus & species	Common name	family	Part used	Product	References
1.	<i>Azadirachta indica</i>	Neem	meliceae	Flowers	Glucose, sucrose used in honey formation	Randhawa (1965-1983)
2.	<i>Dalbergia sissoo</i>	Shisham	fabaceae	Flowers	Glucose, sucrose used in honey formation	Randhawa (1965-1983)
3.	<i>Mimusops elengi</i>	elengi	Sapotaceae	Flowers	Oil used in perfume	Seth(2002)
4.	<i>Azadirachta indica</i>	Neem	Meliaceae	Seed	Oil used as antiseptic	Seth(2002)
5.	<i>Pongamia pinnata</i>	Pongam	Fabaceae	Seed	Oil used in soap making, illuminant and skindiseases.	Seth(2002)
6.	<i>Bauhinia variegata</i>	Kachnar	Caesalpinae	Leaf	fodder	Singh (1982), Anonymous

						(1983)
7.	<i>Ficus religiosa</i>	Pipal	Moraceae	Leaf	fodder	Singh (1982), Anonymous (1983)
8.	<i>Azadirachta indica</i>	Neem	Meliaceae	Wood	Fuel	Singhal and Khanna (1991)
9.	<i>Dalbergia sissoo</i>	Shisham	Fabaceae	wood	fuel	Singhal and Khanna,(1991)
10.	<i>Ficus bengalensis</i>	Bargad	Moraceae	Bark	fibre	Seth(2003)
11.	<i>Ficus religiosa</i>	Pipal	Moraceae	Bark	fibre	Seth(2003)
12.	<i>Bombax malabaricum</i>	Semal	Bombacaceae	Fruits	fibre	Seth(2003)
13.	<i>Azadirachta indica</i>	neem	Meliaceae	Trunk	Gum	Seth(2003)
14.	<i>Ficus religiosa</i>	Pipal	Moraceae	Twig	Resin obtained from lac insect	Seth(2003)

The present investigation was conducted with the objectives of Morpho-physiological study of transplanted tree in Fisher forest and Lion Safari in U.P. It is expected that the study will provide useful information about the morphological study of transplanted trees which are suitably employed in forest management. It is easiest and authentic method of identification used from ancient times. Leaves, flowers and fruits play major role in identification of plants. Leaves are important part of the tree which mainly participated in physiological process of plants and modified into floral parts. Leaves are also main characteristic feature of tree for their identification.

Naturally forests are sufficient for greenery and vegetation but Fisher forest is a man made forest. Due to overgrazing and cutting of trees, it is required to maintain best forest ecosystem by transplantation of trees and development of Safari. Economically rich forest ecosystem is the backbone of ant nation. Therefore study of economic value of trees is the most important part in forest ecosystem.

Acclimatization of transplanted tree is also an important part of afforestation of trees which may be suitably employed to improve planting practices and to boost up the rich economic resources.

Thus the findings of the present investigation demonstrate that Morphological methods are suitable for identification of plants. Their economic value is limited to the fodder, timber and some medicinal use.

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