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Trees, Shrubs and some Subshrubs of Afghanistan

by

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Abstract.–ALAM M., 2004. Trees, Shrubs and some Subshrubs of Afghanistan. *Bull. Soc. vaud. Sc. nat. 89.1*: 13-63.
A new list of the ligneous plants of Afghanistan has been established. This list includes more than 500 species, 135 genera and 61 families arranged alphabetically. A book is in preparation which will describe in detail 375 of the above species as well as their related genera and families.

Keywords: restoration of the natural flora, indigenous species, Afghanistan.

Résumé.–ALAM M., 2004. Les arbres, les arbustes et certains arbrisseaux d'Afghanistan. *Bull. Soc. vaud. Sc. nat. 89.1*: 13-63.
Une nouvelle liste des ligneux indigènes d'Afghanistan a été établie. Cette liste inclut plus de 500 espèces arrangées en ordre alphabétique, formant 135 genres appartenant à 61 familles. Parmi les espèces mentionnées, 375 seront traitées en détails dans un livre en cours de réalisation.

Mots clés: réhabilitation de la flore naturelle, espèces indigènes, Afghanistan.

Introduction

Trees and other ligneous plants are the main source of material for both construction and fuel in Afghanistan. As a result of overexploitation and mismanagement, the native forests and other fragile environments have suffered severe devastation. Some attempts have been made, by NGOs, to restore these natural resources (Bradford 1990, Peck 2001, FAO 2003, GPFA 2004).

In a survey of the literature, and in particular the reports mentioned above, we found that unfortunately some of these projects have ignored the indigenous

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species of Afghanistan and have introduced exotic species in order to achieve short term objectives. This is regrettable since an indigenous flora is not only the natural treasure of Afghanistan, but also enriches the flora of the region as a whole.

The reafforestation and rehabilitation of a degraded environment is a long-term process, which should be based on solid scientific information, including the ecological requirement of each species. A book describing the indigenous ligneous plants of Afghanistan is in preparation and this should prove to be a useful tool for those interested in the process of restoring and conserving the indigenous flora.

As a first step, we have prepared an up-dated inventory of the indigenous trees, shrubs and subshrubs of Afghanistan. This has been based on the list published in the report by NEDIALKOV (1973), "*Liste des essences ligneuses (arbres, arbustes, et petits arbustes) en Afghanistan*" which includes 255 species, 125 genera and 59 families, arranged alphabetically according to the scientific name of the species. However, the author of reference for the scientific name and also the vernacular name, either in Dari or in Pashto, were not always cited and synonyms were rarely mentioned. During an extensive study of the vegetation of Afghanistan which included both classical and contemporary publications (ALAM 2003), we were frequently confronted by new ligneous plants not mentioned in the NEDIALKOV list. As a result, we have added two new families, several new genera and species. On the other hand, we have omitted some plants, included by NEDIALKOV, which other authors do not consider to be indigenous. In this category we have only retained certain species introduced for short-term objectives, or for their ornamental value and these are described in detail. Our revised inventory contains more than 500 species, 135 genera and 61 families. The scientific name of each species is followed by the author of reference, and more than 200 species are accompanied by their synonyms. We have selected 375 of these species, as well as their genera and families, for more detailed study.

In this article we have restricted the detailed descriptions to the families while those concerning the genera and species will appear in the book which is in preparation.

METHOD

We propose here a more complete list essentially based on the works of the following authors: AITCHISON (1881, 1882, 1888-1894), BAUM (1978), BOISSIER (1867-1888), BOSE *et al.* (1998), BROWICZ (1983-1997), CAMUS (1914, 1936-1938), COX (1985), DAVIS (1965-2000), DELKOV (1988), DYER (1975), FREITAG (1971), GRIERSON *et al.*, (1983-2001), HALDA (2001), HARLOW *et al.* (1996),

HEYWOOD *et al.* (1993), HOOKER (1873-1897), JUDD *et al.* (1999), KHAN *et al.* (1968), KRÜSSMANN (1963, 1976-1978), LALANDE (1967, 1968), LINCHEVSKY and PROZOROVSKY (1949), LIU TANG-SHUI (1971), MILLER and COPE (1996), PRADHAN and LACHUNGPA (1990), RECHINGER (1963-2001), REHDER (1940), STEVENSON (1930), TANDON (1988), TOWNSEND *et al.* (1966-1968), VIGUI and GAUSSEN (1929), ZHENG-YI (1999-2000), and ZOHARY (1966-1986).

NOMENCLATURE

The nomenclature of the families is based on SPICHIGER *et al.* (2000), and that of genera and species on RECHINGER (1963-2001). To avoid any confusion, genera and species were checked in the Index Kewensis (1997), and FARR *et al.* (1979). Concerning the authors' names, those of European origin correspond to names used in BRUMITT and POWELL (1992), and others are mainly taken from RECHINGER (1963-2001).

ORGANIZATION

In contrast to NEDIALKOV (*op. cit.*), the plants studied here have been separated into Gymnosperms and Angiosperms. Within each of these classes, the families and their related genera and species are arranged alphabetically. The exotic genera and species have been marked by *.

GYMNOSPERMS

CUPRESSACEAE

The Taxodiaceae and Cupressaceae have long been considered as distinct. Recent studies, however, have shown that a more realistic classification combines them into one family (BRUNSFELD *et al.* 1994, ECKENWALDER 1976, PRICE and LOWENSTEIN 1989, after HARLOW *et al.* 1996).

The members of the family are trees or shrubs, evergreen or deciduous, aromatic or resinous.

Leaves alternate, opposite and decussate, or whorled, linear, subulate, or scale.

Cones (juvenile) with bracts and scales partially or completely fused, ovules erect, 2 to 12 on each scale, plant monoecious or dioecious.

Mature cones: pollen cones very small, seed cones elongated or globose, woody, leathery, or semi fleshy, composed of flat, peltate, or wedge-shaped

scale/bract complexes, maturing in 1-2 years. Seeds with 2 or 3 lateral wings, or wingless. Cotyledons 2-15.

In most members of the Cupressaceae scale leaves are the mature leaf type and subulate leaves are the juvenile type.

***Cupressus* L.**

Cupressus torulosa D Don. (*C. tortolusus* Griff.; *C. flagilliformis* Knight; *C. himalayensis* Mouill.; *C. smithiana* Carrière; *C. pendula* Griff.; *C. tournefortii* Tende.)

***Juniperus* L.**

Juniperus centrasiatica Komarov

Juniperus communis L. subsp. **nana** Syme *in* Sowerby (*J. communis* L.; *J. sibirica* Lodd. ex Burgsd.; *J. communis* L. var. *montana* Aitch.; *J. pygmaea* C. Koch; *J. alpina* Grey.)

Juniperus excelsa Bieb. (*J. sabina* L. var. *taurica* Pall., *J. polycarpos* C. Koch; *J. isophylla* C. Koch; *J. isophyllos* Anton.; *J. macropoda* Boiss.; *J. seravschanica* Komarov)

Juniperus macropoda Boiss.

Juniperus recurva Buch.-Ham. Ex D. Don

Juniperus semiglobosa Regel

Juniperus squamata Buch.-Ham. (*J. dumosa* Wall. ex Gordon; *J. recurva* Buch.-Ham. var. *squamata* Parl.; *Sabina squamata* (Buch.-Ham.) Antoine)

***Thuya* L.**

Thuya orientalis L.(*Biota orientalis* Endl.; *Thuya acuta* Moench; *Cupressus thuya* Targ. Tozz.; *Platycladus stricta* Spach)

EPHEDRACEAE

This family includes one genus and 42 species mainly in subtropical regions of the northern hemisphere. Mostly dioecious, much branched, erect or climbing shrubs. Branches usually green.

Leaves opposite or whorled, often reduced to membranous sheaths. Reproductive organs axillary, opposite or arranged in whorl of 3 or 4 cones, each cone composed of 2-8 decussate pairs of bract, the lower pair or pairs sterile, the others fertile.

Staminate flowers of 2 opposite scales (perianth) subtending the single column of stamens, anthers 2-8, at the end of column, sessile or stalked, each with 2-3 pollen sacs dehiscing by a terminal pore. Ovulate flowers in groups of 1-3, each consisting of 2-4 connate bracts (perianth) and an ovule with 2 pairs of bracts forming the outer and the inner integuments, the latter terminating in an elongated style-like microphyle (micropylar tubule). Seed enclosed in the leathery, winged or fleshy integuments, cotyledons 2. Germination epigeal.

***Ephedra* L.**

Ephedra angustifolia L.

Ephedra equistina Bunge (*E. shennungiana* Tang)

Ephedra foliata Boiss. (*E. ciliata* C.A. Mey.; *E. alte* C.A. Mey.; *E. polyleois* Boiss. & Hausskn.; *E. peduncularis* Boiss. & Hausskn.; *E. kokanica* Regel; *E. aitchisonni* (Stapf) Nikitin; *E. brevifoliata* Ghahr.)

Ephedra gerardiana Wall. ex C.A. Mey. (*E. gerardiana* var. *congesta* C. Y. Cheng)

– – var. **glauca** (Regel) Stapf

Ephedra intermedia Schrenk ex C.A. Mey.; *E. persica* (Stapf) Nikitin; *E. tibetica* (Stapf) Nikitin; *E. microsperma* Nikitin; *E. ferganensis* Nikitin.; *E. glauca* Nikitin; *E. valida* Nikitin)

Ephedra major Host (*E. nebrodensis* Tin; *E. villarsii* Godr. & Gren.; *E. macedonica* Kosanin; *E. procera* Fisch.; *E. equisetina* Bunge; *E. gerardiana* Wall. ex Stapf; *E. botschantzevii* Pachom.)

Ephedra nebrodensis Tineo

Ephedra parvifolia Wall.

Ephedra pachyclada Boiss. (*E. sinaica* Riedl)

Ephedra regeliana Florin (*E. pulvinaris* Nikitin)

Ephedra sarcocarpa Aitch. & Hemsl. (*E. holoptera* Riedl; *E. oxyphylla* Riedl)

Ephedra strobilacea Bunge (*E. intermedia* Shrenk & C.A. Mey. var. *persica* Stapf; *E. pentandra* Pachom.)

PINACEAE

This is the largest and most important timber-producing family of the Gymnosperms. It includes 9 genera and about 200 species, mostly distributed throughout the northern hemisphere from the forests of the tropics to the northern limits of the tree growth beyond the Artic circle.

Leaves deciduous or persistent, spirally arranged, in certain genera recurring in false whorls on spur shoots developed on older growth, solitary or in fascicle (*Pinus*), acicular (needle-like) or linear. Unisexual. Pollen cones solitary or clustered. Female cones erect or pendulous.

Juvenile cones, ovulate with bracts and scale distinct, flat; ovule inverted, 2 at base, in all species.

Mature cones woody, stalked or sessile, pendent or upright, maturing in one, two or rarely three seasons, in some genera, disintegrating at maturity, seed terminally winged or wingless. Cotyledons 2-18.

***Abies* L.**

Abies spectabilis var. **brevifolia** Rehder

Abies webbiana Lindl. (*A. spectabilis* D. Don; *Pinus spectabilis* D. Don; *P. webbiana* Wall.; *Picea webbiana* Loudon)

***Cedrus* Trew**

Cedrus deodara (Lamb.) G. Don *in* Loudon (*Pinus deodara* Lamb.; *Cedrus indica* Chambr.; *Cedrus libani* Barrel. var. *deodara* Hook.)

Picea Dietrich

Picea morinda Link (*P. smithiana* Boiss.; *Abies khutrow* Loudon; *A. smithiana* Forbes; *Pinus khutrow* Royle; *P. smithiana* Lamb.)

Pinus L.

Pinus excelsa Wall. (*P. wallichiana* A.B. Jackson; *P. griffithii* Mc Clell.; *P. chylla* Lodd.; *P. nepalensis* Chambr.)

Pinus gerardiana Wall. (*P. chilghoza* Elph.ex Knight; *P. neosa* Govan ex W. Baxt.; *P. auklandii* Lodd.)

Pinus halepensis Mill. (*P. brutia* Ten.; incl. *P. halepensis.* var. ***brutia*** Elwes & Henry; *P. alepensis* Poiret; *P. persica* Srangw.; *P. arabica* Sieber ex Spreng.; *P. paroliniana* Webb)

Pinus halepensis Mill. var. brutia Elwes & Henry (*P. brutia* Ten.; *P. carica* D. Don; *P. pseudo-halepensis* Denhardt; *P. pyrenaica* Carrière)

Pinus longifolia Roxb. (*P. roxburghii* Sarg.; *P. serenagensis* Madden ex Gord.)

TAXACEAE

The yew family comprises five or six genera and about 18 species. They are small to moderately sized trees or shrubs, usually not resinous or slightly resinous, fragrant or not. Wood without resin canals

Leaves simple, persistent, mostly in spirals (rarely opposite), decurrent, linear, resinous. Plant dioecious or monoecious. Ovule solitary and cone lacking. Seed entirely or partially surrounded by a fleshy brightly coloured aril. Dispersed by animals. Cotyledons 2 (occasionally 1).

Taxus L.

Taxus wallichiana Zucc. (*T. baccata* L. subsp. *wallichiana* (Zucc.) Pilger; *T. yunnanensis* W.C. Cheng & L.K. Fu)

ANGIOSPERMS

ACERACEAE

This family includes two genera with some 112 species of trees and shrubs. One genus, *Dipteronia* Oliv., includes two small trees, both native of central China, the remaining species are in the genus *Acer*.

Leaves deciduous (rarely persistent), opposite, simple or compound, mostly estipulate, the simple leaves usually palmately veined and lobed and long-petioled, the compound leaves pinnate.

Flowers regular, imperfect and perfect (most species polygamous or dioecious), borne in (1) racemes, panicles, corymbs, or fascicles, which appear before or with leaves, or (2) in lateral fascicles from separate flower buds

which appear before the leaves unfold, calyx normally 5-parted, petals 5 or 0; stamens 4 to 12 (mostly 7 or 8), pistils 2-lobed, 2-celled, compressed, each lobe winged.

Fruit a double (rarely triple) samara, united at the base, each half long-winged and 1-seeded; seeds compressed, lacking endosperm.

Twigs moderately stout to slender, pith homogenous, terete, terminal buds with either imbricated or valvate scales, lateral buds similar but smaller and sometimes collateral, leaf scar more or less U-shaped, bundle scars 3, rarely 5 to 7 or more, stipular scars rarely present.

Acer L.

Acer caesium Wall. ex Brand. (*A. molle* Pax; *A. luteolum* Borras)

Acer campestre* L.

Acer oblongum* Wall. ex DC. (*A. laurifolium* D. Don; *A. nepalense* Hort. ex Pax; *A. discolor* Rehder; *A. paxii* var. *integrifolium* Léveillé; *A. lanceolatum* Molliard; *A. hypolucum* Hayata)

Acer pentapomicum Stewart ex Brand. (*A. pubescens* Franch.; *A. monspessulanum* L. var. *turkistanica* Franch.; *A. monspessulanum* L. subsp. *pubescens* (Franch.) Wesmael; *A. regelii* Pax *in* Engl.; *A. pubescens* Franch. var. *glabrescencs* Pax; *A. monspessulanum* L. f. *turkistanicum* (Franch.) Pax)

Acer pseudoplatanus* L.

Acer semenovii Regel & Heder

Acer turkistanica Pax *in* Engl.

ANACARDIACEAE

The family includes approximately 70 genera and 600 species of trees and shrubs found mostly in the warmer regions of the world. Most members of the family have resinous tissues, although the leaves are not gland dotted. Various drugs, dyes, waxes, and tannins are obtained from the juice, which is either milky or clear and acrid, turning black upon drying. Some species have highly coloured woods and are valuable for timber, while others, such as quebracho wood of south America, one of the heaviest and hardest woods in the world, yield large amount of tannin. Pistachio nuts come from *Pistacia vera* L., and *Pistacia chinensis* Bunge is becoming very popular as an ornamental tree in streets and parks.

Leaves deciduous or persistent, usually alternate, simple or compound, exstipulate.

Flowers imperfect (plants dioecious or polygamo-dioecious), actinomrphic, mostly 5- parted (5 fused sepals, five free petals) and 5 to 10 or more stamens. Ovary superior and 3 carpellate, each containing a single pendulous ovule. Styles one to three often widely separated. Flowers entomophilous.

Fruit a drupe or nutlike.

Pistacia L.
Pistacia atlantica Desf.
– – subsp. **mutica** (Fisch. & C. A. Mey.) Rech. f.
– – subsp. **cabulica** (Stocks) Rech. f. (*Pistacia cabulica* Stocks; *P. mutica* Fisch. & C. A. Mey. subsp. *cabulica* (Stocks) Engl.
Pistacia khinjuk Stocks (*Pistacia acuminata* Boiss. & Buhse)
Pistacia vera L. (*Pistacia reticulata* Willd.)

Rhus L.
Rhus cotinus L.
Rhus coriaria L.
Rhus typhina L.

APOCYNACEAE

Perennial herbs, shrubs or small trees, usually with latex. Number of genera 180, species 1500.

Leaves usually opposite, less often whorled or alternate, simple, entire, exstipulate.

Flowers solitary and axillary or in cymes sometimes forming panicles, regular, 5-merous. Calyx 5-lobed almost to base, persistent. Corolla campanulate, infundibular or hypocrateriform, with 5 oblique lobes twisted and imbricate in bud. Stamens 5, inserted on corolla tube. Ovary superior or half inferior with 2 carpels free or connate below, united above into a single common style with a large variously shaped stigma head (clavuncle).

Fruit separating into 2 follicles, sometimes 1-follicled by abortion.

Nerium L.
Nerium indicum Mill. (*N. odorum* Sol.; *N. kotschyi* Boiss.)

Rhazya Decne.
Rhazya stricta Decne.

ARALIACEAE

Mainly a tropical family with a few genera in the temperate parts of the world. There are about 55 genera and 700 species, a few of which are cultivated as ornamental plants. They are woody climbers, sometimes herbs, with numerous adventitious roots.

Leaves alternate, rarely opposite, simple, or compound, stipules usually present, normally adnate to or connate with the petiole.

Flowers small, in globose umbels which are solitary or arranged in race mose panicles, hermaphrodite, polygamous or rarely dioecious, epigenous,

actinomorphic. Calyx small or rudimentary. Petals 5, free. Stamens 5, alternating with the petals. Disc (Turkish species) conspicuous, domed, secreting nectar. Ovary 5-locular, inferior; ovules anatropous, pendulous from apex.

Fruit a drupe or berry.

Hedera L.
Hedera nepalensis K. Koch.

ARECACEAE (PALMEAE)

This family has 210 genera and about 3000 species and is pantropical in distribution, with a few in subtropical and warm-temperate latitudes. The usually unbranched trunks are formed only by primary growth with many scattered vascular bundles, and therefore they have no true wood or bark as in dicotyledon trees. Although most are erect, some are prostrate. The palm family is one of three important families (together with legumes and grasses) for shelter, construction materials, furniture (rattan), food, fiber, wax, and oil.

The leaves, although appearing compound when mature, are actually simple before they expand. Weak zones along the folds mechanically split as the leaf enlarges. Leaves persistent, alternate, often very large, forming dense terminal rosettes, long-petiolate with a broad to tubular sheath which often splits and is open at maturity, simple but mechanically splitting into narrow segments, into either pinnate (feather), palmate (fan), a somewhat intermediate costa-palmate, or bipinnate forms.

Flowers small, fragrant, perfect or imperfect, regular, perianth 3 to 6 parted, stamens 6, in two whorls of 3, anthers have two locules; ovary 3-carpellate and superior, inflorescence a panicle enclosed at first by a large spathe; entomophilous, rarely anemophilous.

Fruit a fleshy or fibrous drupe.

Nannorrhops H.A. Wendl.
Nanorrhops ritchiana (Griff.) Aitch. (*N. stocksiana* Becc.; *N. naudiana* Becc.; *N. arabica* Burret; *Chaemaerops ritchiana* Griff.)

Phoenix L.
Phoenix dactyliflera L. (*P. cycadifolia* Hort. ex Regel; *P. excelsior* Cav.)

ASCLEPIADACEAE

This family of 130 genera and 2000 species, includes shrubs, small trees and herbs. The family is principally tropical and subtropical with many representatives in South America.

Leaves opposite, simple, commonly entire but occasionally toothed and rarely lobed, variable in size, sometimes reduced to scales or obsolete, stipules absent.

Inflorescence cymose, frequently umbelliform, occasionally branched in a racemose fashion, sometimes sessile and rarely appearing solitary. Flowers regular, pentamerous, gamopetalous. Calyx frequently deeply lobed 5 sepals, with a very short tube, sometimes appearing obsolete. Corolla, 5 petals, contorted, imbricate or valvate in bud.

Stamens with filaments frequently short and united into a tube, anthers have 2 locules. Ovary semi inferior, consist of 2 almost separate carpels, stigma large five lobed.

Fruit of two follicles, frequently fusiform in shape, but occasionally ovoid or elliptical and inflated. membranous or woody in structure, dehiscence lengthwise adaxially. Seed flat usually with a conspicuous margin and frequently with an apical tuft of silky hairs.

Calotropis R. Br.
Calotropis procera (Aiton) Ait. f.

Cynanchum L.
Cynanchum glaucum Wall. *in* Wight
Cynanchum acutum L.
– – subsp. **acutum**
– – subsp. **sibiricum** (Wild.) Rech. f.

Pergularia L.
Pergularia tomentosa L. (*Daemia tomentosa* (L.) Pomel; *Daemia cordata* (Forssk.) R. Br.; *Daemia incana* Decne.; *Asclepias cordata* Forssk.)

Periploca L.
Periploca graeca L.
Periploca aphylla Decne *in* Jaquem.
– – subsp. **aphylla** Rech.

ASTERACEAE

The family consists of about 800 genera and 20000 species. It is present in all parts of the world. The woody species are chiefly confined to tropical and subtropical regions. They are annual, biennial or perennial herbs, sometimes shrubs, rarely trees, and tissues lactiferous or not.

Leaves alternate or sometimes opposite, exstipulate (rarely stipuloid), entire, toothed, lobed or variously dissected.

Flowers bisexual or unisexual, regular or irregular, sessile on a flat or conical

axis (receptacle) and forming small or large involucrate heads, sometimes reduced to one flower. Calyx reduced to scales, awns or hairs (pappus) or sometimes lacking. Corolla gametophilous, 4-5 lobed, regular or ligulate (with an elongated limb on one side), rarely 2 lipped, stamens 4-5, anthers connate into a tube around the style, style 1, with 2 rarely 1 stigma. Ovary inferior, 1 celled and 1 ovuled.

Fruit an achene, often crowned by a persistent papus, seed exalbuminous.

Artemisia L.
Artemisia annua L.
Artemisia absinthium L.
Artemisia herba-alba Asso
Artemisia persica Pamp.

BERBERIDACEAE

Shrubs, often spiny. According to HEYWOOD (1993) the number of genera are 13-16 and species 550-600, as for DELKOV (1988) species are 250. The herbaceous species are native to northern temperate regions in both the old and new world.

Leaves alternate, simple or 1-pinnate, herbaceous or coriaceous, exstipulate.

Flowers bisexual, regular, actinomorph, solitary or several to many in fascicle or racemes. Sepals and petals similar, usually 6 of each in whorls of 3, free, yellow or greenish, sometimes tinged with red, petals with 2 oblong glands near base. Stamens 6, slightly adnate to the base of petals, anthers opening by valves. Ovary consisting of a single carpel, superior. Ovules few, basal, style short or absent, stigma rounded.

Fruit a berry.

Berberis L.
Berberis aristata DC.
Berberis asiatica Roxb. in DC.
Berberis calliobotrys Aitch. (*Berberis wazaristanica* Ahrendt; *B. gambleana* Ahrendt)
Berberis integerrima Bunge (*B. densiflora* Boiss. & Buhse; *B. turcomanica* Kar.; *B. iberica* Stev. & Fisch. ex DC.; *B. baluchistanica* Ahrendt)
Berberis heterobotys E. Wolf
Berberis lycium Royle (*B. afghanica* C. K. Schneider; *B. heteracantha* Ahrendt)
Berberis vulgaris L.

BETULACEAE

Although somewhat larger during previous geological periods, the Betulaceae family is now reduced to only six genera and about 120 species of deciduous trees and shrubs which, with a few exceptions, are restricted to the cooler regions of the northern hemisphere.

Leaves deciduous, alternate, simple, stipulate.

Flowers imperfect (plant monoecious), anemophilous, appearing before or with the leaves, or rarely autumnal; staminate aments preformed (except in *Carpinus*), pendulous, the individual flowers born in clusters of 1 to 6 in the axils of bracts, each consisting of 2 to 20 stamens, filament short, distinct to basally connate, with or without a calyx and no corolla; pistillate flowers in short, spike like or capitate aments, the individual flowers borne at the base of bracts, solitary or in clusters of two or three, comprising a 2-celled, superior ovary surmounted by a short style and a 2-lobed stigma, calyx present or absent, corolla absent.

Fruit a small to medium-size, 1-celled, 1-seeded nut (or nutlet), winged or unwinged, subtended by a papery, leafy, or somewhat coriaceous bract, or in a semiwoody and persistent cone (ament).

Alnus Mill.
Alnus nitida Endl. (*Clethropsis nitida* Spach)

Betula L.
Betula chitralica Browicz
Betula jacquemontii Spach (*B. bhojpattra* var. *jacquemontii* (Spach) Reg.; *B. utilis* var. *jacquemontii* (Spach) Winkler)
Betula kunarensis Browicz
Betula tadzhikistanica Vassiliev
Betula turkestanica Litw.
Betula utilis D. Don (*B. bhojpattra* Wall.)

Corylus L.
Corylus colurna L. (*C. cervorum* V. Petrov)
Corylus jacquemontii Decne. *in* Jacquem. (*C. lacera* Wall.; *C. tiliacea* Jacquem. ex Decne.; *C. colurna* var. *lacera* (Wall.) A. DC.; *C. colurna L.* var. *jaquemontii* (Decne.) A. DC.)

BIGNONIACEAE

The Bignoniaceae include about 112 genera and 750 species of trees, shrubs, vines and herbs, the majority of which are tropical.

Leaves mostly deciduous, opposite or whorled (rarely alternate), simple or compound, exstipulate.

Flowers perfect, usually large and showy, tubular, zygomorphic, 5-parted, 4 epipetalous stamens arched under the upper lip, holding the anthers in readiness for a suitable pollinating agent, anther 2 locules. Ovary superior, longish style and 2 lobed stigma. Flowers entomophilous and ornithophilous, and cymose.

Fruit a capsule or rarely berrylike, seeds usually winged.

Catalpa* Scop.

Jacaranda* Juss.

Jacaranda mimosifolia D. Don. (*J. ovalifolia* R. Br., *J. acutifolia* auct. non Humb & Bonpl.)

Tecomella Seem.

Tecomella undulata (G. Don) Seem. (*Bignonia undulata* Roxb.; *Tecoma undulata* (Roxb.) G. Don.)

BOMBACACEAE

A family of about 30 genera and more than 200 species confined to the tropics. Trees with tall and frequently very stout trunks.

Leaves alternate, simple or digitate, deciduous. Stipules present and caducous.

Flowers hermaphrodite, large and showy, frequently appearing before the leaves, usually bracteate, actinomorphic or slightly zygomorphic, solitary or fasciculate in the leaf axils or leaf opposed. Sepals 5, distinct or connate at base, valvate or rarely somewhat imbricate in bud, often with an epicalyx. Petals 5, or sometimes absent. Stamens free or monadelphous into a tube, 5-many. Ovary superior, 2-5 locular, ovule 2-many in each loculus, anatropous; style solitary capitate or lobed.

Fruit a loculicidal capsule or an indehiscent pod or berry, seeds frequently embedded in hairs arising from the pericarp, endosperm scanty or absent.

Bombax L.

Bombax malabaricum DC.

BRASSICACEAE

Comprises about 419 genera and 4130 species. They are trees, shrubs, subshrubs or herbs and are cosmopolitan, most diverse in the Mediterranean region, southwestern and central Asia, and western North America. Many species occur in early successional communities.

Hairs diverse, simple to branched, stellate or peltate.

Leaves usually alternate, sometimes in basal rosette, simple, often pinnately dissected or lobed, or palmately or pinnately compound, entire to serrate, with palmate or pinnate venation, stipules present or absent.

Inflorescence racemose usually ebracteate.

Flowers bisexual, actinomorphic or rarely slightly zygomorphic, 4-merous. Sepals 4, free, in two pairs, the inner part often saccate at the base. Petals 4, rarely absent, free, sometimes winged or dilated at base. Stamens 6, 2 long and four short. Nectaries arranged at base of (stamen) filament. Ovary superior, bicarpellate, divided by a thin membranaceous septum into 2 loculi. Ovules usually many, style solitary, stigma capitate or bilobed, sometimes decurrent.

Fruit dry, either a siliqua (long) or a silicula (short) dehiscing by two valves, or an indehiscent nut or lomentum (breaking transversely in two parts when ripe).

Seed with radicle incumbent (lying against the face of the cotyledons) or accumbent (lying against the edges of cotyledons), cotyledons sometimes folded (conduplicate).

Matthiola R. Br.
Matthiola afghanica Rech.f. & Koeie
Matthiola ghorana Rech.
Matthiola graminea Rech.
Matthiola perpusilla Rech.
Matthiola tenera Rech.

CAPPARIDACEAE

The Capparidaceae contents 40-50 genera and about 700 species of herbs, trees, shrubs and some lianas. Few of its members are of horticultural or economic importance. The best known is the capers.

Members of the family are found in the warmer parts of the world, mainly in the tropics and subtropics of both hemispheres and in the Mediterranean.

Leaves are alternate, rarely opposite and simple or palmate or digitate. They have 2 to 7 leaflets and minute or spiny stipules which are persistent or caduceus.

Inflorescence terminal or axillary, and may be racemose or corymbose, or the flowers may be solitary or fascicled and often showy.

Flowers bisexual rarely unisexual (the sexes then on separate plants). They are usually irregular with four to eight sepals, which are free or variously joined. In some cases forming a hood, which dehisces and falls off at flowering time. There are four to sixteen petals (sometimes absent), which may be equal or the two posterior ones larger. The stamens range from four to many. Ovary is superior, of two fused carpels. The ovules are few to numerous. Style is single and stigma is bilobed or capitate.

Fruit is a capsule, dehiscing by valves, sometimes with the appearance of a siliqua, or round to cylindrical berry, rarely a single seeded indehiscent fleshy or dry nut. Pollination is by insects and possibly by bats in some South American species.

Capparis L.

Capparis spinosa L. (*C. ovata* Desf., *C. sicula* Dush., *C. rupestris* Sibth. et Sm., C. *herbacea* Willd., *C. canescens* Coss., *C. leucophylla* DC., *C. aegyptiana* Lam., *C. mucronifolia* Boiss., *C. parviflora* (Boiss.) Boiss., *C. himalayensis* Jafri., *C. orientalis* Duhamel).

CAPRIFOLIACEAE

Herbs, shrubs or small trees, sometimes climbing, usually with pith. Generally distributed throughout the world.

Leaves simple or compound, opposite. Stipules present or absent.

Flowers hermaphrodite, usually in corymbs or short spikes, rarely paniculate. Calyx adnate to ovary, usually 5-lobed. Corolla gamepetalous, actinomorphic or zygomorphic, lobes usually 5, imbricate in bud. Stamens 5, rarely 6, inserted on corolla tube, alternating with corolla lobes. Ovary inferior, (1-) 2-8 locular, style long or short, stigmas capitate or lobed, ovule few or many.

Fruit a drupe or berry.

Lonicera L.

Lonicera asperifolia (Decne.) Hook. f. & Thompson (*Xylosteum asperifolium* Decne. *in* Jaquem.; *L. semenovii* Regel var. *nuristanica* Kitam.)
Lonicera griffithii Hook. f. & Thomson
Lonicera korolkovii Stapf
Lonicera nummulariifolia Jaub. & Spach (*L. persica* Jaub. & Spach; *L. arborea* Boiss. var. *persica* (Jaub. & Spach) Rehder; *L. turcomanica* Fisch. & C.A Mey.; *L. nummularia* Jaub & Spach *in* Krüssmann).
Lonicera obovata Royle ex Hook.
Lonicera sericea Royle (*L. purpurascence* Hook. f. & Thompson)
Lonicera semenovii Regel (*L. glauca* (non Hill.) Hook. f. & Thompson)
Lonicera spinosa (Decne.) Walp. (*Xylosterom spinosum* Decne. *in* Jaquem.)
Lonicera webbiana Wall. ex DC.

Sambucus L.

Sambucus ebulus L.
Sambucus wightiana Wall. (*S. ebulus* (non L.) Clarke *in* Hooker.; *S. javanica* Blume)

Viburnum L.

Viburnum cotinifolium Don.

CELASTRACEAE

Trees, shrubs, or climbers. According to DELKOV (1988), it includes 40 genera and 400 species whereas HEYWOOD (1993) quotes 55 and 850 respectively. The family is widespread, but concentrated in sub- and tropical regions.

Leaves simple, alternate, opposite or in whorls, stipule very small or absent.

Flowers often in cymes, hermaphrodite or unisexual, actinomorphic, arranged in cymose inflorescence. Sepals 3-5, free or united at the base, and 3-5 free petals rarely none. Stamens alternate with and equal to the number of petals and are inserted on the disk. Anthers have 2 locules. Ovary superior, 1-5 locular. Single very short style, terminated by a capitate or two to five lobed stigma. Ovules usually 2 in each loculus.

Fruit a fleshy capsule, opening by 4-5 valves, samara, berry or drupe. Seed with endosperm, conspicuously arillate, which aids dispersal by birds.

Euonymus L.
Euonymus hamiltonianus Wall. (*E. europaeus* L. var. *hamiltonianus* (Wall.) Maxim.)
Euonymus fimbriata Wall. *in* Roxb.
Euonymus nanus Bieb.

Gymnosporia (Wight & Arnott) Hook. in Benth. & Hook f.
Gymnosporia royleana (Wall.) Lawson. (*Maytenus royleanus* (Wall. ex Lawson) Cufod.; *Celatrus royleanus* Wall.)

CHENOPODIACEAE

Annual herbs of temperate and subtropical, principally saline habitat. Number of genera 100, species 1500.

Leaves alternate, simple, exstipulate, sometimes gland-dotted, mealy with white scales or stellate-pubescent.

Flowers in axillary clusters, sometimes forming cymes or terminal panicles, unisexual or bisexual, actinomorphic, wind pollinated. Perianth segments 3-5, free or connate, herbaceous or membranous, persistent. Stamens 2-5, opposite perianth segments, filaments free or connate at base. Ovary superior, 1-celled; ovule1, terminal style with usually 2 to 3 (less than 5) stigmas.

Fruit an achene, often enclosed by persistent perianth.

Aellenia Ulbrich. in Engler et Prantl
Aellenia glauca (Bieb.) Aellen
Aellenia subaphylla *sensu* Collenette (1985) non C.A.Mey.

Haloxylon L.

Haloxylon ammodendron (C.A. Mey.) Bunge ex Fenzel; (*H. aphyllum* (Minkw.) Iljin; *Anabasis ammodendron* C.A. Mey.)

Haloxylon persicum Bunge ex Boiss.

Haloxylon salicornicum (Moq.) Bunge ex Boiss. (*H. schweinfurthii* Asch., *Hammada salicornica* Iljin; *Hammada elegans* (Bunge) Botsch.)

Salsola L.

Salsola arbuscula Pall.

Salsola incanescens C.A. Mey. (*S. spissa* Boiss.)

Salsola subaphylla C.A. Mey. (*Aellenia subaphylla* (C.A. Mey.) Botsch. ex Aellen; *Halothamnus iraqensis* Botsch.

CORNACEAE

The Cornaceae including the Nyssaceae, has about 15 genera and 120 species of trees, shrubs and a few herbs distributed throughout the forests of the northern hemisphere.

Leaves deciduous, alternate or opposite, simple, usually entire, exstipulate. The inflorescence usually corymbs or umbels.

Flowers perfect or imperfect, regular, 4-5 -parted calyx and petals, petals rarely absent and equal numbers of stamens alternate with petals. Anthers short, bilocular, open lengthwise. Ovary inferior of 2 fused carpels, with one to four locules. Style simple, stigma lobed, entomophilous.

Fruit a drupe or berry with one to four locules and one or two stones.

Cornus L.

Cornus capitata Wall. *in* Roxb.

Cornus macrophylla Wall. *in* Roxb. (*Thelycriana macrophylla* (Wall.) Pojark.; *Cornus brachypoda* C.A. Meyer; *Thelycrania brachypoda* (C.A. Meyer) Pojark.)

EBENACEAE

The Ebenaceae include five genera and about 485 species of trees and shrubs widely scattered through the tropical and warmer forested regions of both hemispheres. The present flora of tropical Africa and the Indo-Malayan region includes many members of this family. While true ebony wood is produced by *Diospyros ebenum* J. König ex Retz., a number of other species also produce black or brownish-black timber which is described as ebony.

Leaves mostly deciduous, alternate, simple, entire, exstipulate.

Inflorescences are short and determinate, in the leaf axil, sometimes reduced to a single flower, especially in female.

Flowers perfect and imperfect (plant usually dioecious or polygamous),

small, actinomorphic, perianth 3-to 7-parted, each connate, stamens 3-many, ovary superior with as many locules as there are sepals and petals; entomophilous.

Fruit a berry with large seeds, edible, often enlarged calyx attached.

Diospyros L.
Diospyros lotus L.

ELAEAGNACEAE

This is a small family of three genera and 50 species in warm temperate to subtropical regions. They are deciduous or evergreen trees and shrubs with silvery or brown stellate hairs or scales (lepidoe) on the twigs and leaves. The roots have nodules with nitrogen fixing bacteria.

Leaves deciduous or persistent, alternate (rarely opposite or whorled), simple, entire, estipulate.

Inflorescence umbel, raceme or flowers solitary.

Flowers in late spring and early summer, perfect or imperfect (plant dioecious), regular, with 2 to 4 connate sepals, no petals, stamens 2,4 or 8 filaments free and bilocular anthers, carpel superior to appearing inferior, entomophilous. Ovary is superior. Stigma simple.

Fruit an achene or drupe -like structure enclosed by a thicken lower part of the persistent calyx.

Elaeagnus L.
Elaeagnus angustifolia L. (*E. hortensis* Bieb.; *E. angustifolia* L. var. *capsica* (Sosn.) Grossh.; *E. turcomanica* Kozlovskaja; *E. spinosa* L.; *E. inermis* Mill.; *E. tomentosus* Moench)
Elaeagnus edulis Sieb. ex E. May. (*E. multifolia* Thunb., *E. longipes* Gray)
Elaeagnus orientalis L. (*E. angustifolia L.* var. *orientalis* (L.) Kuntze; *E. pravifolia* Wall.; *E. umbellata* Thunb.)

Hippophae L.
Hippophae rhamnoides L.
Hippophae salicifolia D. Don.

ERICACEAE

This family includes 125 genera and some 3500 species of trees, shrubs, rarely vines, and herbs widely scattered through the cooler regions of the world, but particularly abundant in southeastern Asia and South Africa. The family is of little importance as a timber-producing group, but several genera, *Rhododendron* etc., are highly prized for ornamental purposes.

Leaves deciduous or persistent, alternate (rarely opposite or whorled), simple, exstipulate.

Inflorescence extremely variable, ranging from umbel-like racemes to cluster or single flower. Flowers perfect, mostly sympetalous and mainly 5-parted, calyx 4-5 sepals fused at base, in many species the calyx is reduced to an undulate rim. Corolla 4-5 petals (rarely more in some species) which are usually fused to form a tube at base. Stamens 8-10, reduced in some genera to 4-5, attached directly to the floral receptacle. Anthers inverted during growth. Flowers actinomorphic or zygomorphic, entomophilous, ovary superior or inferior. Stigma capitate.

Fruit a capsule, berry or drupe.

Rhododendron L.
Rhododendron afghanicum Aitch. & Hemsl.
Rhododendron campanulatum D. Don
Rhododendron collettianum Aitch. & Hemsl.

FABACEAE

The legumes consist of about 630 genera and nearly 15500 species of trees, shrubs, lianas, and herbs widely distributed throughout the world. They are second only to the grasses in their economic importance.

Legumes have long been classified in one family, Fabaceae or Leguminosae on the basis of the entomophilous flower, single superior carpel, generally compound (rarely simple) leaves, and the unique fruit type (the legume) which normally splits along two sutures, or may remain indehiscent. As a single family it was then divided into three subfamilies based mainly on floral morphology. It is felt now that these three groups are more consistent with the customary concepts of families of flowering plants and they are treated in this way. However, the phylogenetic relationships are still not well resolved, and with additional investigation, it may be appropriate to again combine the three groups into one family (JUDD *et al.* in HARLOW *et al.* (1996).

Table 1.–Comparison of the three Legume Families. (From HARLOW *et al.* 1996).

Family	Symmetry	Stamens	Petals	Leaves
Mimosaceae	actinomorphic	much larger than petals; 4-10 to many	usually valvate, fused	mostly bipinnate
Caesalpiniaceae	slightly to strongly zygomorphic	usually 10 and same length or shorter than petals; 10 usually separate	imbricate, upper petal inside lateral petals; 2 lower petals separate	bipinnate, pinnate or 1-foliate
Fabaceae	strongly zygomorphic	usually 10 and same lenght or shorter than petals, 10 either separate or fused into a filament tube or 9 fused and 1 separate	imbricate, upper petal outside lateral petals (wings); 2 lower petals usually fused (keel)	pinnate, or 1-foliate pinnate, or palmately compound

Acacia Willd.
Acacia modesta Wall.

***Albizzia* (*Albizia*)** Durazz.
Albizzia lebek Benth. *in* Hook (*Mimosa lebbek* L.; *Acacia lebbek* (L.) Benth.)
Albizzia mollis Boiv. (*A. jullibrissin* Durazz.)

Amorpha L.
Amorpha fruticosa L.

Astragalus L.
Astragalus ajfreidii Aitch.
Astragalus aloisii Deml
Astragalus altimurensis Deml

Astragalus antheliophorus Deml
Astragalus antoninae Grig
Astragalus baghlanensis Deml
Astragalus caroli-henrici Deml
Astragalus confertissimus Kitam.
Astragalus dicernendus Sirj. & Rech.
Astragalus endytanthus Podlech
Astragalus franziskae Deml
Astragalus freitagi Deml
Astragalus gregarius Deml
Astragalus hadroacanthus Rech.
Astragalus hololeios Bornm.
Astragalus infectus Boiss.
Astragalus interiectus Deml
Astragalus lasiosemius Boiss.
Astragalus leptus Boiss.
– – subsp. **ghazniensis** Deml
Astragalus melanochiton Deml
Astragalus molestus Rech.
Astragalus mokurensis Sirj. & Rech.
Astragalus nigrivestitus Podlech
Astragalus orionotus Boiss.
Astragalus parwanicus Podlech
Astragalus pecten-erinis Deml
Astragalus pecten-hystricis Deml
Astragalus phalacrophyton Deml
Astragalus podlechii Deml
Astragalus psilancanthus Boiss. (*A. paghmanensis* Sirj. & Rech.)
Astragalus psilocentros Fisch.
Astragalus raphiodontus Boiss.
Astragalus sharestanica Podlech
Astragalus speciosus L.
Astragalus stenopterus Sirj .& Rech.
Astragalus terrestris Kitam.

Caragana Fabr.
Caragana aurantiaca Koehne (*C. grandiflora* auct. non DC.)
Caragana brevispina Royle (*C. triflora* Lindl.)
Caragana decorticans Hemsl. (*C. aitchisonii* Prain; *C. prainii* C.K. Schneider)
Caragana gerardiana Royle (*C. spinosissima* Benth. *in* Royle; *Aspalathus gerardiana* (Royle ex Benth.) O. Kuntz.; *Caragana nuristanica* Rech. f. & Edelberg)
Caragana maimanensis Rech.f.
Caragana ulicina Stocks (*Aspalathus ulicinus* (Stocks) O. Kuntz.)
Caragana versicolor Benth. (*C. pygmaea* auct. non (L.) DC.)

Cercis L.
Cercis griffithii Boiss.

Colutea L.
Colutea afghanica Browicz
Colutea orientalis Mill.
Colutea persica Boiss.

Dalbergia L.
Dalbergia sissoo Roxb.

Ebenus L.
Ebenus stellata Boiss. (*E. tragacanthoides* Jaub. et Spach.)

Gleditsia* L.
Gleditsia triacanthos L.

Indigofera L.
Indigofera gerardiana Wall.

Onobrychis Mill.
Onobrychis cornuta (L.) Desv.

***Ononis* L.**
Ononis afghanica Sirj. & Rech. (*O. spinosa* L. subsp. *afghanica* (Sirj. & Rech. f.) Kitamura)
Ononis nuristanica Podlech
Ononis spinosa L.

Prosopis L.
Prosopis spicigera L. (*P. cineraria* (L.) Druce; *Mimosa cineraria* L.)
Prosopis stephaniana (M. Bieb.) Kunth ex Spreng. (*Prosopis farcta* (Banks & Sol) J.F. Macbr.; *Mimosa farcta* Banks & Sol.; *Lagonychium farctum* (Banks & Sol.) Bobrov)

Robinia* L.
Robinia pseudoacacia L.

Sophora L.
Sophora alopecuroides L. (*Goebelia alopecuroides* (L.) Bunge ex Boiss.)
Sophora alopecuroides x **pachycarpa**
Sophora japonica L.
Sophora mollis (Royle) Baker *in* Hook (*Edwardsia mollis* Royle; *Edwardsia persica* Boiss.; *Sophora hortensis* (Boiss. & Buhse) Rech.; *Keyserlingia mollis* (Royle) Boiss.)
– – subsp. **griffithii** (Stocks) Ali (*Sophora griffithii* Stocks *in* Hook; *Keyserlingia griffithii* (Stocks) Boiss.; *Sophora korolkowii* Koehne *in* Dippel)
Sophora martensis Boiss.
Sophora pachyclada Boiss.
Sophora pachycarpa C.A. Mey. (*Goebelia pachycarpa* (C. A. Mey.) Bunge & Boiss.; *Ammothamus intermedius* O. Kuntz.)

FAGACEAE

This family includes nine genera and about 800 species of trees and shrubs occurring throughout both hemispheres, but is most characteristic of the forests in the north temperate zone.

Leaves persistent, or deciduous and often marcescent, alternate, simple, stipulate, usually pinnately veined, and short-petioled.

Flowers anemophilous, imperfect (plant monoecious) and borne in one of several ways. Staminate flowers usually in aments, but in *Fagus* they form a globose head, the aments pendent or erect, the flowers variously grouped on the axis; staminate flowers have a 4- to 7-lobed calyx and 4 to 8 (rarely more) stamens. Pistillate flowers borne in short few-flowered spikes on new growth (*Fagus* and *Quercus*) or in clusters near the base of a smaller staminate ament (*Castanea*, etc.). When such bisexual aments occur, there are also others of the purely staminate type present; pistillate flowers consists of a 4- to 8-lobed calyx adnate to a 3-(rarely 6-) celled ovary with a style for each cell, containing 1 to 2 ovules, only one of each matures. Ovary inferior.

Fruit a nut with an outer cartilaginous coat, and partially or wholly encased in an involucre; nut 1-seeded by abortion, seed lacking endosperm, cotyledons large seeds, always remaining (with the exception of *Fagus*) within the seed coat upon germination.

Quercus L.
Quercus baloot Griff. (*Q. ilicifolius* Griff.; *Q. ilex* sensu Hook)
Quercus dilatata Lindl. (*Q. floribunda* Lindl. ex Wall.)
Quercus semecarpifolia Smith *in* Rees (*Q. obtusifolia* D. Don; *Q. aquifolioides* Rehder & Wilson)

GROSSULARIACEAE

The family has only one genus and they are all shrubs.

Leaves alternate, simple, usually palmately lobed, exstipulate or with small stipules adnate to petiole.

Inflorescence racemose. Flowers hermaphrodite or dioecious, actinomorphic, epigenous. Hypanthium conspicuous, often coloured. Sepals 4-5, free. Stamens 4-5, alternating with the petals. Ovary inferior, with 2 carpels; placentation parietal; ovules numerous; styles 2, joined below.

Fruit a berry with persistent calyx at apex; seed with copious endosperm.
Ribes L.
Ribes alpestre Decne. (*R. grossularia* Wall. *in* Roxb.; *R. himalensis* Royle)
Ribes grossularia L.
Ribes orientale Desf. (*R. orientale* var. *genuinum* and var. *resinosum* Jancz)
Ribes rubrum L.
Ribes villosum Wall.

HIPPOCASTANACEAE

The Hippocastanaceae include two genera and about 15 species of trees and shrubs in the forests of northern South America, Central America, Mexico, eastern and western United States, southern Europe, eastern Asia, and India. As a group they are of little value for timber, but many of them are highly prized for ornamental purposes, because of their showy flowers or handsome foliage.

Leaves deciduous, opposite, palmately compound, with 5 to 9 (or rarely 11) leaflets, each short-stalked, serrate, petiole long, estipulate.

Flowers perfect or often imperfect in the same panicle (raceme with lateral cymes) the upper flower which is male, opens first; calyx connate and 5-lobed; corolla 4 or 5 parted, stamens 5-8, flower zygomorphic; ovary superior, entomophilous.

Fruit a leathery capsule with 1 to 6 large brown seeds each with a large, light coloured hilum.

Aesculus L.
Aesculus indica (Wall. ex Camb.) Hook. (*Pavia indica* Royle)
A. indica var. **indica** Rech.
A. indica var. **concolor** Browicz

JUGLANDACEAE

The Juglandaceae include seven genera and about 60 species of trees and large shrubs which are widely distributed in the forests of the north temperate zone and to a lesser extent in the tropical forests of both the northern and southern hemisphere. Aromatic trees, tannins present.

Leaves deciduous, mostly alternate, pinnately compound, exstipulate, more or less aromatic.

Plants mostly monoecious, anemophilous, appearing with or after the leaves; staminate in drooping axillary ament, the individual flowers consisting of 3 to many often nearly sessile stamens surrounded by a 3- to 6-lobed calyx and subtended by a bract; pistillate solitary or in a few flowered spikes terminating the new growth, the individual flowers with a 1- to 4-celled pistil, short style and 2 plumose stigmas, the ovary inferior, covered by a 3-to 5 lobed or parted calyx and subtended by an adnate involucre consisting of a bract and 2 bracteoles.

Fruit a bony nut encased in semi-fleshy or woody, dehiscent «husk», seed lacking endosperm but with a large, convoluted cotyledons.

Juglans L.
Juglans regia L.

LOGANIACEAE

The Loganiaceae is a family of trees, shrubs and climbers. They are an important source of timber, and also produce some well-known poisons, notably strychnine. There are about 29 genera and 470 species in this family. They occur in the tropics, subtropics and temperate regions.

The leaves are opposite, entire, pinnately nerved, often with reduced stipules.

The flowers are regular, bisexual and borne in terminal cymes or rarely solitary, the four or five lobes of the calyx are always imbricate, the corolla is tubular, four or five lobed (occasionally up to 16-lobed) and usually imbricate to some degree, but sometimes valvate. The characteristics of the corolla lobe are useful in the classification of the family. There are four to five stamens (rarely 16) joined in a ring to the petals. The ovary is superior, formed of two fused carpels, and in some genera sunk in a disk. There are 2-5 locules, each with one to numerous axillary ovules. Style is 2 lobed. Fruit is a capsule or berry.

Buddleja L.
Buddleja crispa Benth. (*B. paniculata* Clarke not Wall.; *B. tibetica* W. Smith)

LORANTHACEAE

Shrubby, rarely herbaceous; stem-parasite of trees, shrubs or on other Loranthaceae. Number of genera at least 35, and including 1300 species. Mainly tropical, extending to temperate zones.

Leaves opposite, sometimes alternate, simple, entire, often coriaceous, pinnately or rarely palmately veined, exstipulate, sometimes stellate hairy, leaves sometimes absent.

Flowers in spikes, racemes, umbels or clusters, unisexual or hermaphrodite, actinomorphic, often subtended by 1 or more bracts. Calyx absent or forming a reduced epigynous rim, rarely lobed. Petals 3-6, free or united into a tube. Stamens 3-6 borne on or at base of petals. Ovary inferior, 1-celled. Style simple or absent, ovule solitary, axilllary.

Fruit a 1-seeded drupe, seed often sticky.

Loranthus L.
Loranthus europaeus L.
Loranthus grewinkii Boiss. & Buhse

Viscum L.
Viscum album L.
Viscum cruciatum Sieber ex Spreng.
Viscum dryophilum Rech.

MAGNOLIACEAE

This family not only includes some of the most interesting of our modern trees but also some of the most primitive (HARLOW *et al.,* 1993).

Leaves deciduous or persistent, alternate, simple, stipulate, the stipules enclose the bud and their conspicuous scars encircle the twig.

Flowers large, actinomorphc, perfect (rarely unisexual), terminal or axillary, solitary, sepals 3, petals 6 or more, stamens and pistils many, arranged spirally on elongated receptacle, filaments short and thick, poorly differentiated from anthers, ovary superior, entomophilous.

Fruit a conelike aggregate of follicles or samaras. Seed with red to orange fleshy coat (except *Liriodendron*).

Magnolia* L.

MALVACEAE

The Malvaceae is a cosmopolitan family of herbs, shrubs and trees. It includes about 80 genera and over 100 species.

The leaves are alternate, with stipules, often stellate hairs are present. Inflorescence determinate to occasionally indeterminate, sometimes reduced to a single flower, axillary, often with supernumerary bracts.

The flowers are bisexual and regular, with parts usually in fives. The calyx is composed of five sometimes joined sepals, and is often subtended by an epicalyx. This has been interpreted both as fused bracteoles and as stipules. The corolla consist of five free petals, usually convolute. The numerous stamens monadelphous, that is united below into a tube basally joined to the corolla. Division of the filaments has resulted in the anthers being unilocular. The ovary is superior and composed of five or more fused carpels with axillary placentation. The style is branched.

The fruit is dry, capsular or shizocarpic, except in *Malvaviscus* where it is a berry. The seeds are often covered with fine hairs.

Hibiscus L.
Hibiscus syriacus L.

MELIACEAE

This family, which includes some of the finest known cabinet woods, consists of about 50 genera and 550 species of trees and shrubs, mostly tropical.

Leaves deciduous or persistent, alternate, simple, unifoliolate, pinnately or bipinnately compound, the leaflets often oblique, exstipulate.

Flowers often in cymose panicles, axillary or terminal, they are perfect or

imperfect, regular, 3 to 5 free or united sepals, 3 to 5 (rarely up to 14) usually free petals and five (rarely 3) to 10 (rarely 23) stamens. Ovary superior with 2-6 locules. Style may be absent and stigma is often disciform or capitate. Flower entomophilous.

Fruit a capsule or drupe.

Cedrela L.

Cedrela serrata Royle (*C. toona* Roxb. ex Rottle; *C. kingii* C. DC.; *Toona ciliata* Roemer; *Toona serrata* Roemer)

Melia L.

Melia azedarach L.

MORACEAE

This is a family of 48 genera and 1000 species (65 genera, and 1500 species, DELKOV 1988) of trees, shrubs, vines and herbs, distributed for the most part in the warmer regions of the world, but with a few species in the temperate zone. The sap is milky, and in certain genera notably *Ficus* and *Castilla* it is source of rubber. Other genera are a source of valuable timbers, edible fruit, paper fibers and dyes.

Leaves deciduous or persistent, alternate, simple stipulate. Inflorescence determinate, but sometimes appearing indeterminate, axillary, individual flowers usually congested and inflorescence axis often thickened and variously modified.

Flowers imperfect, the plants monoecious or dioecious, sepals 4, petals 0, stamens 4, opposite the sepals, filaments distinct, 1-2 locular. Ovary superior or inferior, 2-carpellate, anemophilous, except for the entomophilous *Ficus*.

Fruit a small drupe or achene usually in multiples.

Ficus L.

Ficus benghalensis L.

Ficus carica L. (*F. kopetdagensis* Pakhom. *in* Ved.)

Ficus elastica Roxb.

Ficus johannis subsp. **afghanistanica** (Warb.) Browicz (*F. afghanistanica* Warb.; *F. afghanica* (Popov) Dorov.; *F. carica* L. var. *afghanica* Popov.)

Ficus johannis subsp. **johannis** Browicz (*F. persica* Boiss.; *F. geranifolia* Miq.; *F. malvastifolia* Warb.; *F. vitifolia* Warb.)

Ficus palmata Forssk.

Ficus religiosa L.

Morus L.

Morus alba L. (*M. indica* L.)

Morus indica Roxb. non L. (M. *australis* Poir.; *M. acidosa* Griff.; *M. stylosa* Ser.; *M. lba* L.; *M. alba* var. *stylosa* (Ser.) Bur.)
Morus nigra L.

MYRSINACEAE

It is a family of trees and shrubs, of little economic importance except for a few species grown as ornamentals. It includes 32 genera and 1000 species, widely distributed from warm temperate to tropical regions.

The leaves are alternate, simple, leathery, and without stipules and are usually dotted with glands or conspicuous resin ducts.

The flowers are small, regular, bisexual or unisexual (with the sexes on separate plants) and are normally borne in fascicles, either on scaly short shoots or on spurs in the leaf axil, but they may also be in terminal panicles, corymbs to cymes. There are four to six free or basally connate, small sepals and the same number of petals which are connate to a six lobed corolla. The stamens are equal in number to,and usually opposite, the corolla lobes. Anthers have two locules. Ovary is superior or semi-inferior with one locule and few to numerous ovules.

The fruit is a fleshy drupe.

Myrsine L.
Myrsine africana L.

Reptonia A. DC.
Reptonia buxifolia (Faic.) A. DC. (*R. mascatensis* (A. DC.) Radlk. Ex O. Schwartz.; *Monotheca mascatensis* A. DC.; *Edgeworthia buxifolia* Falc.)

MYRTACEAE

A tropical and sub-tropical family with 140 genera and over 3000 species, it is found mainly in the southern hemisphere, particularly South America and Australia. They are evergreen trees or shrubs.

They have alternate (*Eucalyptus*), opposite or whorled, simple leaves, which are entire, punctate-leathery, and aromatic when crushed.

Flowers are showy regular and bisexual more frequently cymose, less often racemose with a thick hypanthium, 4-5 sepals usually free, and 4 or 5 petals, free, and many stamens sometimes in tuft opposite the petals. The ovary is commonly inferior with one to many locules. Stigma simple capitate.

Fruit is a berry or capsule, pollination is by insects, birds, or bats.

Callistemon R. Brown
Callistemon speciosus (Sims) DC.

Eugenia* L.
Eugenia jambolana Lam.

Eucalyptus* L.
Eucalyptus globulus Labill.

Myrtus L.
Myrtus communis L.

NYCTAGINACEAE

These are herbs, shrubs, or trees which are widespread in tropical and subtropical regions. The family includes 31 genera and 350 species.

Leaves usually opposite, simple, usually entire, with pinnate venation, stipule lacking.

Inflorescence determinate, terminal or axillary. Flowers usually bisexual and radial, sepal or petal-like tepals 5, connate forming a distinct tube. Stamens usually 5, filaments distinct or slightly connate. Ovary superior. Stigma capitate.

Fruit an achene or nut, usually enclosed in persistent, leathery or fleshy portion of perianth tube.

Perovskia Karel.
Perovskia atriplicifolia Benth. *in* DC.
Perovskia abrotanoides Karel.

OLEACEAE

The olive family includes about 30 genera and some 600 species of trees and shrubs distributed mostly through the temperate and tropical forests of the northern hemisphere.

Leaves deciduous or persistent, opposite or rarely alternate, simple or pinnately compound, estipulate. Inflorescence determinate, sometimes reduced to a single flower.

Flowers perfect and/or imperfect, actinomorphic; calyx 4-lobed or lacking; corolla 4-or rarely 5- to 16-lobed, or lacking; stamens 2 (rarely 3 to 5), adnate to the corolla and alternating with its lobes, rudimentary or lacking in the pistillate flowers, anthers opening often by pores; pistils 1, superior, the ovary 2- (rarely 3-) celled, with 2 ovules in each cell, with a single style and a 2-lobed stigma, rudimentary or lacking in the staminate flowers, entomophilous or anemophilous.

Fruit a samara, capsule, berry, or drupe

Fraxinus L.
Fraxinus xanthoxyloides (G. Don) DC. (*F. oxyacanthifolia* Hort. ex Dippel; *F. xanthoxyloides* var. *dimorpha* sensu Lingelsheim *in* Engl.; *Ornus xanthoxyloides* G. Don)
Fraxinus floribunda Wall. *in* Roxb.
Fraxinus syriaca Boiss. (*F. sogdiana* Dipp. not Bl.; *F. turkistanica* Carr.; *F. oxyphylla* Boiss.; *F. oxycarpa* var. *obligophylla* (Boiss.) Wenzig)
Fraxinus oxycarpa Willd.
Fraxinus rotundifolia Mill.
Fraxinus raibocarpa Regel (*F. rehderi* Haeckel)

Jasminum L.
Jasminum humile L. (*J. revolutum* Sims; *J. wallichiana* Lindl.)
Jasminum officinale L.

Olea L.
Olea ferruginea Royal. (*O. cuspidata* Wall. ex G. Don)

Syringa L.
Syringa afghanica C.K. Schneider
Syringa persica L.
Syringa x **persica** L.
Syringa vulgaris L.

PLATANACEAE

This family has only one genus with 6-7 species distributed from Canada to Mexico and from the Eastern Mediterranean to India.

Tree often with deciduous bark.

Leaves simple, palmately 3-9 lobed, deciduous, alternate. The dilated base of petiole encloses the axillary bud. Stipules large, sheathing, caduceous. Inflorescence indeterminate, a raceme of globose heads, but sometimes reduced to a single head, pendulous, axillary.

Flowers unisexual and born on the same tree, anemophilous. There are 3-7 small, free hairy sepals, petals 3-7. The male flower has three to seven subsessile stamens, filaments very short, anthers with the connection prolonged into a petalate appendage. Carpels 5-9, distinct, ovary superior. Style one tapering. Stigma unilateral. Ovule 1-2, pendulous.

Fruit more or less linear achenes, subtended by long bristles, in dense, globose cluster.

Platanus L.
Platanus orientalis L.

PLUMBAGINACEAE

Cosmopolitan perennial (rarely annual) herbs, subshrubs or shrubs, particularly in dry and saline habitats. Genera 10, species 560

Leaves alternate or in basal rosette, simple, entire or rarely pinnatifid, without stipules.

Inflorescence cymose or racemose or in dense capitulate cluster.

Flowers bisexual, and regular, actinomorphic, 5-merous, 5 persistent sepals fused, forming 5-tooth tube, 5 petals are free. Stamens 5, antipetalous, epipetalous, or rarely connate at base. Ovary superior, 1-locular, with 1 basally attached ovule pendulous on a long funicle; style 5, or 1 with a 5-lobed stigma.

Fruit 1-seeded, dispersed within calyx, indehiscent.

Acantholimon Boiss.
Acantholimon acalocephalum Aitch.
Acantholimon acanthobryum Rech.
Acantholimon ahangarense Rech.
Acantholimon amoenum Rech.
Acantholimon anisophyllum Rech.
Acantholimon argyrostachyum Rech.
Acantholimon atrofuscum Rech.
Acantholimon brecklei Rech.
Acantholimon cabulicum Boiss.
Acantholimon calocephalum Aitch.
Acantholimon candaharensis Rech.
Acantholimon catenatum Rech.
Acantholimon cephalotes Boiss.
Acantholimon chrysostegium Rech.
Acantholimon diapensioides Boiss.
Acantholimon ekbergianum Rech.
Acantholimon ghoranum Rech.
Acantholimon gracillium Rech.
Acantholimon grammophyllum Rech.
Acantholimon griffithianum Boiss.
Acantholimon hindukushum Mobayen
Acantholimon homophyllum Rech.
Acantholimon hyalinum Rech.
Acantholimon inerme Rech.
Acantholimon koeiei Rech.
Acantholimon koelzii Rech.
Acantholimon lycopodioides Rech.
Acantholimon macropetalum Rech.
Acantholimon nawaricum Rech.
Acantholimon peculiare Rech.

Acantholimon poliochlorum Rech.
Acantholimon polystachyum Boiss.
Acantholimon rechingeri Freitag
Acantholimon revolutum Rech.
Acantholimon salangensis Bokhari
Acantholimon saxifragifolium Rech.
Acantholimon schizostegium Rech.
Acantholimon speciosisimum Aitch. (*Gladiolimon speciosissimum* Aitch.)
Acantholimon subflavescens Rech.
Acantholimon subulatum Rech.
Acantholimon vacillans Rech.
Acantholimon xanthacanthum Rech.
Acantholimon zaprjagaevii Lincz.

POLYGONACEAE

Herbs, subshrubs or climbers, sometimes spinous. Cosmopolitan, but chiefly in northern temperate regions. About 30 genera and 750 species.

Leaves simple, entire, margins rarely sinuate or serrulate, alternate or rarely subopposite, venation pinnate, stipules usually united around stem to form sheath (ocrea).

Flowers in racemes, panicles or clusters, actinomorphic, bisexual, sometimes unisexual, joined to pedicel; inflorescence rarely bulbiferous; perianth segments 3-6, usually connate below, sometimes enlarging in fruit, membranous, fleshy or coriaceous. Stamens 1-9, adnate to perianth. Ovary superior, unilocular; styles 2-3, simple, minutely capitate, rarely hooked or fimbricate; ovule solitary, basal.

Fruit a trigonous, flattened or biconvex achene.

Atraphaxis L.
Atraphaxis pyrifolia Bunge
Atraphaxis spinosa L.

Calligonum L.
Calligonum amoenum Rech. f. & Schiman-Czeika
Calligonum bungei Boiss.
Calligonum comosum L'Hér.
Calligonum crinitum Boiss.
Calligonum intertextum Rech. f. & Schiman-Czeika
Calligonum molle Litwinow
Calligonum polygonoides L.
Calligonum setosum Litwinow (*C. acanthopterum* Borszcz. var. *setosum* Litwinow)
Calligonum turkestanicum (Korovin) Pavlov (*C. comosum* L. var. *turkistanicum* Eug Kur.; *C. comosom* auct. Fl. Turkest. non L'Hérit.)

Pteropyrum Jaub. & Spach
Pteropyrum olivieri Jaub. & Spach

PROTEACEAE

The Proteaceae is one of the most prominent families of the southern hemisphere. It is found in southern Africa, Asia, Australasia, and Central and South America, especially in areas with a long dry season. It includes 62 genera and over 1000 species. Almost all of the species are trees or shrubs.

Leaves alternate, entire or divided, without stipules, leathery and often hairy to some extent.

The flowers are borne in sometimes showy racemes, spike or head with a ring of bracts. Flowers are normally bisexual but sometimes unisexual, with male and female flower on separate plants. They are irregular and have four perianth lobes. Stamens 4, inserted on the perianth lobes with only the anther free and conspicuous, the fused filament not at all evident. The ovary may be stalked and superior, with one carpel, and one to many ovules in a single locule. The style is long and terminal, often bent inwards and sometimes fleshy or wiry.

Fruit is follicle, drupe or nut, the seeds are often winged and have no endosperm.

Grevillea R. Br.
Grevillea robusta A. Cunn. ex R. Br.

PUNICACEAE

Shrubs or small trees, often spiny. Number of genera one and species 2. It is distributed from southeastern Europe to Himalayas, and Socotra.

Leaves deciduous, opposite, sometimes crowded on short lateral shoots, simple, entire, pinnately veined, exstipulate.

Flowers terminal and axillary, solitary or few in clusters, actinomorphic, bisexual. Floral parts epigenous. Calyx lobes 6-7, tube adnate to ovary. Petals 6-7, showy, free, crumpled. Stamens numerous, borne on calyx tube; anthers versatile. Ovary inferior, 8-13 celled, cells often in 2 or 3 layers; style slender; stigma capitate; ovules numerous, axillary and parietal.

Fruit berry-like with leathery rind, pulpy within, containing many seeds, calyx persistent.

Punica L.
Punica granatum L.

RANUNCULACEAE

Annual or perennial herbs, erect or stoloniferous, rarely shrubs or woody climbers. About 50 genera and 1800 species (HEYWOOD 1993), or 1400 species (DELKOV 1988). Centered in temperate and cold regions of the Northern hemisphere.

Leaves basal and on stems, alternate, rarely opposite, entire palmately, ternately, or pinnately dissected, exstipulate or petioles sometimes broadened into stipule-like auricles at base. Hairs when present simple.

The inflorescence is determinate, sometimes appearing indeterminate or reduced to a single flower, terminal.

Flowers actinomorphic or zygomorphic, bisexual or rarely unisexual (plant dioecious). Sepals 3-8, mostly 5, often showy and petioled. Petals sometimes absent, 1-many, free, often nectariferous, sometimes inconspicuous. Stamens many, rarely 8-20, filament distinct, anthers opening by longitudinal slits. Ovary superior, carpel 1-many, free or shortly connate at base, ovule 1, basal or few- to many, marginal. Stigma punctate or extending along one side of the style.

Fruit a cluster of 1-seeded indehiscent achenes or few-to many seeded follicles dehiscing along dorsal suture, rarely a berry.

Clematis L.
Clematis grata Wall. (*C. vitalba* L. subsp. *grata* (Wall.) Kuntz)
Clematis hilariae Kovalesk. (*C. sarezica* Ikonnikov)
Clematis orientalis L. *s. l.*

RHAMNACEAE

The Rhamnaceae include 53 genera and about 900 species of trees and shrubs (sometimes lianas, rarely herbs) widely distributed in the tropics and warmer regions of the world. The root, bark, stem and leaves of many rhamnaceous plants contain compounds used for pharmaceutical purposes. The fruits of *Ziziphus jujuba* Mill., are edible, and this species is now widely cultivated on a commercial scale. The family is not important for timber.

Leaves deciduous or persistent, alternate or sub-opposite, simple, stipulate.

Inflorescence cymes. Flowers perfect or polygamous, small, actinomorphic, mostly 4-5-parted, stamens 4-5, enclosed by petals. Ovary 2- or 3- carpellate, superior. The style is simple or divided.

Fruit drupe or capsule, sometimes winged. The latter are wind dispersed, while fleshy drupes and nuts are dispersed by mammals and birds.

Paliurus Mill.
Paliurus spina-christi Miller (*Rhamnus paliurus* L.; *Paliurus aculeatus* Lam.)
– – var. **spina-christi** Mill.

Rhamnus L.
Rhamnus pallasii Fisch.
Rhamnus baldschuanicus Grubov
Rhamnus persica Boiss. (*Rh. kurdica* Boiss. & Hohen. var. *persica* (Boiss.) Bornm.; *Rh. kurdica* Boiss. & Hohen. var. *kermanensis* Bornm.)
Rhamnus prostrata Jaquem. (*Rh. persica* Lawson *in* Hook)
Rhamnus pentapomica Parker (*Rh. persica* Lawson *in* Hook)
Rhamnus virgata Roxb. (*Rh. dahuca* Lawson *in* Hook)

Sageretia Brongn.
Sageretia thea (Osbeck) M.C. Johnston
– – subsp. **brandrethiana** (Aitch.) J. Zielinski

Ziziphus Mill.
Ziziphus jujuba Mill. (*Z. vulgaris* Lam.; *Z. sativa* Gaertn. ; *Rhamnus ziziphus* L.)
Ziziphus nummularia (Burm. f.) Wight & Arn. (*Rhamnus nummularia* Burm. f.; *Z. rotundifolia* Lam.)
Ziziphus mauritiana Lam. (*Ziziphus jujuba* Lam. not Mill.)
Ziziphus oxyphylla Edgew. (*Ziziphus acuminata* Royle)
Ziziphus spina-christi (L.) Desf. (*Rhamnus spina-christi* L.; *Ziziphus aucheri* Boiss.)

ROSACEAE

The Rosaceae include about 100 genera and some 3100 species of trees, shrubs, vines, and subshrubs with a worldwide distribution although more numerous in temperate climates.

Leaves deciduous or persistent, alternate (rarely opposite); simple, unifoliate, or compound; mostly stipulate.

Flowers perfect, actinomorphic, 5-(rarely 4-) parted; stamens many and whorled, not spirally arranged. The anthers have 2 locules. Hypanthium present; ovaries inferior or superior, stigmas terminal. Flowers entomophilous.

Fruit a pome, drupe, follicle, or achene, rarely a capsule.

Amygdalus L.
Amygdalus brahuica Boiss. (*Prunus brahuica* (Boiss.) Aitch. & Hemsl.)
Amygdalus browiczii Freitag
Amygdalus bucharica Korsh. (*Prunus amygdalus* Batsch var. *ovalifolia* Franch.; *Prunus bucharica* (Kursh.) Hand-Mazz.)
Amygdalus communis L. (*Prunus amygdalus* Batsch; *Amygdalus stocksiana* Boiss.; *Prunus communis* Arcang.; *A. dulcis* Mill.; *P. dulcis* (Mill.) D.A. Webb)
Amygdalus eburnea Spach (*A. scarpius* Spach; *A. eburnae* Spach var. *leiocalyx* Boiss.)
Amygdalus erioclada Bornm. (*Prunus erioclada* Bornm.)
Amygdalus humilis Edgew.
Amygdalus jugata Browicz

Amygdalus koelzii Browicz
Amygdalus kuramica Korsh. (*Prunus kuramica* (Korsh.) Kitam.)
Amygdalus spinosissima Bunge (*Prunus spinosissima* (Bunge) Franch.)

Cerasus L.
Cerasus rechingeri Browicz

Cotoneaster L.
Cotoneaster afghanica Klotz (*C. nummularia* Fisch. & C.A. Mey. var. *tomentosa* Aitch.; *C. racemiflora* (Desfontaines) C. Koch. var. *kotschyi* C.K. Schneider)
Cotoneaster aitchisonii C.K. Schneider
Cotoneaster bacillaris Wall.
Cotoneaster falconeri Klotz
Cotoneaster hissarica Pojark. (*C. racemiflora* (Desf.) Booth ex Boose var. *hissarica* (Pojark.) Kitam.)
Cotoneaster integerrimus Med. (*C. vulgaris* L.; *Mespilus cotoneaster* L.)
Cotoneaster lindleyi Steud. (*Cotoneaster nummularius* Lindl. not Fisch. & C.A. Mey.)
Cotoneaster minuta Klotz
Cotoneaster multiflora Bunge *in* Ledeb. (*Cotoneaster reflexa* Carrière)
Cotoneaster suavis Pojark. (*C. racemiflora* (Desf.) C. Koch var. *suavis* (Pojark.) Kitam.)
Cotoneaster subuniflora (Kitam.) Klotz. (*C. racemiflora* (Desf.) C. Koch var. *subuniflora* Kitam.)
Cotoneaster rosea Edgew.

Crateagus L.
Crataegus monogyna Jacq.
Crataegus oxyacantha L. (C. lavigata (Poir.) DC.
Crataegus pseudoheterophylla Pojark.
Crataegus songarica C. Koch (*C. fischeri* C. K. Schneider; *C. pinnatifida* Bunge var. *ghoranica* **O. Paulsen)**
Crataegus turcomanica Pojark.
Crataegus turkestanica Pojark.
Crataegus wattiana Hemsl. & Lace (*C. altaica* Lange.; *C. purpurea* Bosc ex DC. var. *altaica* Loudon; *C. korolkovii* L. Henry.)

Cydonia Mill.
Cydonia oblonga Mill. (*Pyrus cydonia* L., *Cydonia vulgaris* Pers.)

Eriobotrya Lindl.
Eriobotrya japonica (Thunb.) Lindl. (*Photinia japonica* (Thunb.) Franch. & Sav.)

Malus Mill.
Malus baccata (L.) Borkh. (*Pyrus baccata* L.)
Malus turkmenorum Juz. & Pop.

Potentilla L.
Potentilla anserina L.
Potentilla bifrons L.
Potentilla coelestis Gilli
Potentilla collettiana Aitch. & Hemsl
Potentilla gerardiana Lindl.
Potentilla komaroviana Th. Wolf
Potentilla multifida L.
Potentilla pedata Nestl.
Potentilla pannosa Boiss. & Hausk.
Potentilla persica Boiss.
Potentilla sericophylla Parker
Potentilla songarica Bunge
Potentilla sericea L.

Prunus L.
Prunus armeniaca L. (*Armeniaca vulgaris* Lam.)
Prunus avium L. (*Cerasus avium* (L.) Moench; *C. sylvestris* Lund.; *C. nigra* Mill.)
Prunus bifrons Fritsch (*P. jaquemontii* var. *bifrons* (Fritsch) Ingram; *P. prostrata* var. *bifrons* (Fritsch) Schneid; *P. afghana* Cardot; *P. erythrocarpa* (Nevski) Gilli; *Cerasus erythrocarpa* Nevski; *Cerasus bifrons* (Fritsch) Pojark.)
– – var. **bifrons**
– – var. **pedicellata** Browicz
Prunus cerasus L. (*Cerasus vulgaris* Mill.; *C. communis* Poit. & Turpin)
Prunus communis Fritsch (*Amygdalus communis* L.).
Prunus divaricata Ledeb. (*P. cerasifera* subsp. *divaricata* (Ledeb.) C. K. Schneider; *P. phoeniocarpa* Hausskn. ex Bornm.; *P. monticola* K. Koch.)
– – subsp. **divaricata** Rech.
Prunus domestica L. (*P. communis* Huds.)
Prunus x domestica L.
Prunus dulcis (Mill.) D.A. Webb (*P. communis* (L.) Arcang. not Huds.; *AMYGDALUS DUCLIS* MILL.; *A. COMMUNIS* L.; *A. SATIVUS* MILL.)
Prunus griffithii (Boiss.) C. K. Schneid. (*Cerasus grifithii* Boiss.)
Prunus jaquemontii Hook. f. (*Amygdalus humilis* Edgew.; *Cerasus jaquemontii* (Hook. f.) Buser)
Prunus microcarpa C.A. Mey. (*Cerasus microcarpa* (C.A. Mey.) Boiss.)
Prunus padus L. (*Padus cornuta* (Wall. ex Royle) Carrère; *Cerasus cornuta* Wall.; *Prunus cornuta* (Wall. ex Royle) Steud.; *Prunus padus* L. var. *cornuta* (Wall. ex Royle) Henry *in* Elwes & Henry
Prunus persica (L.) Batsch (*Persica vulgaris* Mill.; *Amygdalus persica* L.)
Prunus pseudoprostrata Pojark. (*Cerasus pseudoprostrata* Pojark)
Prunus verrucosa Franch. (*Cerasus verrucosa* (Franch.) Nevski; *C. amygdaliflora* Nevski)

Pyrus L.
Pyrus communis L.
Pyrus korshinskyi Litv.
Pyrus lanata D. Don (*Sorbus lanata* (D. Don) Schaur)

Pyrus malus Ledeb.
Pyrus pashia Buch.-Ham. Ex D. Don (*P. variolosa* Wall.)
Pyrus persica Pers. (*P. persica* (L.) Batsch; *Persica vulgaris* Mill; *Amygdalus persica* L.)
Pyrus salicifolia Pall. (*P. argyrophylla* Diap., *P. elaeagnifolia* auct. Fl. Cauc. non Pall.)

Rosa L.
Rosa beggeriana Schrenk (*R. anserinaefolia* Boiss.; *R. laceranc* Boiss. & Buhse; *R. silverhjelmii* Schrenk)
Rosa brunonii Lindl. (*R. bubescenc* Roxb.; *R. moschata* auct. non Herrm.)
Rosa canina L. (*R. corymbifera* Borkh.; *R. dumentorum* Thuill.; *R. tomentella* Lehm. var. *acuta* (Crepin) Christ *in* Boiss.; *R. canina* L. var. *keredjensis* Klast.)
Rosa ecae Aitch.
Rosa foetida Herrm. (*R. lutea* Mill.)
Rosa freitagii Zielinski
Rosa kokanica (Regel) Regel ex Juzepczuk (*R. divina* Sumnev; *R. ovezinnikovii* Koczk)
Rosa macrophylla Lindl (*R. alpina* L. var. *macrophylla* (Lindl.) Bouleng.)
Rosa moschata Herrm. (*R. moschata* Herrm. var. *nastrana* Christ *in* Boiss.)
Rosa persica Michx. ex Juss. (*R. berberifolia* Pall.; *Hulthemia persica* (Michx. ex Juss.) Bornm.; *Hulthmeia berberifolia* (Pall.) Dumort.)
Rosa sericea Lindl.
Rosa webbiana Wall. (*R. maracandica* Bunge; *R. fedtschenkoana* Regel; *R webbiana* Wall. ex Royle var. *microphalla* Crépin; *R. hissarica* Slobod.)

Rubus L.
Rubus anatolicus (Focke) Focke ex Hausskn. (*R. sanctus* Willd., Ledeb. et auct. mult. non Schreb.; *R. ulmifolius* Schott; *R. sanguineus* Friv.)
Rubus caesius L.
Rubus irritans Focke (*R. purpureus* Hook. f.)
Rubus niveus Thunb. (*R. lasiocarpus* Sm. *in* Rees; *R. mysorensis* Heyne *in* Roth.; *R. pauciflorus* Wall.; *R. distans* D. Don; *R. pinnatus* D. Don)

Sorbaria A. Br.
Sorbaria aitchisoni Hemsl. (*Sorbaria angustifolia* Zabel *in* Hemsl.; *Spiraea angustifolia* Hemsl.; *Spiraea sorbifolia* Aitch.)
Sorbaria tomentosa (Lindl.) Rehder (*Spiraea lindleyana* Wall.; *Schizonotus tomentosus* Lindl.; *Spiraea sorbifolia* Hook.; *Sorbaria lindleyana* Maxim.; *Basilima lindleyana* Wall. ex Kuntze)

Sorbus L.
Sorbus lanata (D. Don) Schau. (*Pyrus lanata* D. Don)
Sorbus turkestanica (Franch.) Hedl. (*Pyrus turkestanica* Franch.)

Spiraea L.
Spiraea brahuica Boiss.

Spiraea pilosa Franch.
– – subsp. **pilosa** (*S. trilobata* L. var. *pubescens* Regel; *S. brahuica* var. *hindukushiensis* Kitam.)
– – subsp. **glaucophylla** (Kitam.) Schönbek-Temsey (*S. brahuica* Boiss. var. *glaucophylla* Kitam.)

RUBIACEAE

A very large family of about 450 genera and 6000 species, predominantly represented by woody plants in the tropics, or are herbaceous plants.

Leaves opposite, or whorled, entire, with stipules.

Inflorescence panicles or cymes or aggregated into congested heads. Flowers mostly bisexual, more rarely unisexual and monoecious or dioecious, regular, actinomorphic and usually penta- or tetra-merous. Sepals mostly free or reduced. Corolla sympetalous, hypocrateriform, infundibuliform, campanulate or rotate, with tube of different length and shape, and contorted, imbricate or valvate petal lobes. Stamens 4-5 alternate with corolla lobes. Ovary inferior, often only 2-celled, each compartement with 1-numerous ovules. Stigma capitate or variously lobed.

Fruit capsule, berry, drupe, or schizocarp. Seeds are sometimes winged.

Gaillonia A. Rich.
Gaillonia hymenostephana Jaub. & Spach

RUTACEAE

This is a large family of about 150 genera and 1500 (2000 according to DELKOV 1988) species of trees and shrubs distributed over the warmer and temperate regions of the world. All are characterized by a bitter-tasting, aromatic, volatile oil. Stem with or without thorns. The family is of importance in horticulture.

Leaves deciduous or persistent, alternate or some opposite, mostly compound or unifoliate, with glandular-punctate dots, exstipulate, aromatic.

Inflorescence corymbs or panicles. Flowers usually regular, white or greenish, bisexual or unisexual, 4 to 5 parted, stamens 8 to 10. Ovary superior. Stigma various. Flowers entomophilous.

Fruit a drupe, follicle, samara, or hesperidium (the pulp in the citrus fruit is derived from enlarged hairs).

Citrus L.
Citrus acida* Roxb.
Citrus decumana* L.
Citrus medica* L.
– – var. **acida** Hook.

SALICACEAE

The Salicaceae include two genera and about 350 species of trees and shrubs widely distributed throughout the world, but most abundant in the cooler regions of the northern hemisphere. The tropical species are restricted to the mountainous regions, where they usually occur at or near timberline. The willow family, except for the genus *Populus*, is not currently a timber-producing group of major importance, but many of its species are important in the natural regeneration of forests, in the conservation of soils and water, and for ornament and fuel.

The seeds of poplars and willows are short-lived and require abundant and continuous moisture for germination. Because of this they are, in nature, restricted to sites that are quite moist during the period of seed dispersal. In many species propagation by cuttings or root sprouts is exceptionally good, and this feature is of value in obtaining a network of fast growing roots for erosion control, or rapid propagation of clones.

Leaves deciduous, alternate, simple, stipulate, the petioles often glandular.

Flowers imperfect (plant dioecious) or in some cases also androgynous; both sexes in aments, usually appearing before the leaves; individual flowers solitary, each subtended by a bract, staminate flowers with 1 to many stamens free or united; pistillate flowers consisting of a 1-celled pistil with 2 to 4 parietal placentae bearing many ovules, the styles with 2 to 4 often 2-lobed stigmas, ovary superior. Flowers anemophilous and entomophilous.

Fruit a 1-celled, 2-4 valved capsule containing numerous small, comose seeds which are shed in late spring or early summer. These are extremely light in weight and are often carried considerable distances by wind. They rapidly lose their viability, however, and unless a moist location is available soon after their release, they dry out and die. Given proper conditions, germination take place rapidly, often within 24 to 48 hours.

Table 2.–Comparison of genera in the Salicaceae. (Taken from HARLOW et al. 1996).

Genus	Leaves	Flowers	Fruit	Buds
Salix	usuallly several times longer than broad, short petioled	with nectar glands bract margins entire	not inserted upon a disk scale	covered by a single caplike
Populus	usually about as long as broad, long petioled	without nectar glands bracts margins laciniate	inserted upon a disk	covered by several imbricate scales

Populus L.

Populus afghanica Aitch. & Hemsl. (*P. nigra* L. var. *afghanica* Aitch. & Hemsl.)
Populus afghanica var. **afghanica** Aitch. & Hemsl. (*P. uzbekistanica* Komarov)
Populus afghanica var. **tajikistanica** (Komarov) C. Wang & Chang Y. Yong
Populus alba L.
Populus x **berolinensis** Dipple
Populus canescens (Ait.) Smith. (*P. capsica* Bornm.; *P. bachofenii* Wierzb. ex Reichenb.; *P. bolleana* Lauche *in* Huttig; *P. paletskyana* Dode; *P. morisetiana* Dode; *P. triloba* Dode; *P. berkarensis* Poljakov; *P. alba* L. var. *canescens* Ait.)
Populus ciliata Wall. ex Royle
Populus euphratica Olivier (*Balsamiflua euphratica* (Olivier) Kimura; *Populus ariana* Dode; *P. deversifolia* Schrenk; *P. litwnowiana* Dode; *Turanga euphratica* (Olivier) Kimura.; *P. transcaucasica* Jarmelenko ex Grossh.)
Populus laurifolia Ledeb.
Populus nigra L.
Populus nigra var. **italica** (Moench) Koehne (*P. nigra* var. *pyramidalis* (Bork.) Spach; *P. italica* Moench; *P. fastigiata* Poir.; *P. pyramidalis* Rozier)
Populus pamirica Komarov
Populus pruinosa Schrenk (*Balsamiflua pruinosa* (Schrenk) Kimura; *Turanga pruinosa* (Schrenk) Kimura)
Populus talassica Komarov (*Populus densa* Komarov)

Salix L.

Salix acmophylla Boiss. (*S. persica* Boiss.; *S. pseudo-safsaf* A. Camus & Gombault; *S. basraensis* Toepffer; *S. louissi* A. Camus & Gombault; *S. deviesii* Boiss.)
Salix babylonica L. (*S. lasiogyne* Seem.; *S. matsudana* Koidz.; *S. jeholensis* Nakai)
Salix caesia Vill. (*S. minutiflora* Turcz. ex E. L.Wolf; *S. myricifolia* Anderss.)
Salix denticulata Anderss. (*S. elegans* Wall. ex Anderss.)
Salix excelsa J.F. Gmel. (*S. australior* Anderss.; *S. fragilis* auct fl. orient. non L.; *S. variifolia* Freyn & Sint.; *S. oxica* Dode; *S. dischgensis* Görz; *S. litwinowii* Görz ex Nasarov; *S. euapiculata* Nasarov)
Salix flabellaris Anderss.
Salix grisea Hook.
Salix karelinii Turcz. (*S. hastata* auct. non L.; *S. prunifolia* Kar. & Kir.; *S. hastata* L. var. *himalayensis* Anderss.; *S. himalayensis* Flod.; *S. adenophylloides* Floderus)
Salix linearifolia Wolf (*S. blakii* Görz; *S. olgae* Regel; *S. blakolgae* Drobov)
Salix pycnostachya Anderss.
Salix sericocarpa Anderss. (*S. rehderiana* C.K. Schneider var. *lasiogyna* C. Wang & P.Y. Fu.; *S. daphnoides* Vill. var. *indica* Anderss.; *S. insignis* Anderss.; *S. dolichostachya* Floderus)
Salix schugnanica Görz
Salix songarica Anderss. (*S. hypericifolia* Golosk.)
Salix tetrasperma Roxb. (*Pleiarina tetrasperma* (Roxb.) N. Chao & G. T. Gong; *Salix disperma* Roxb. ex D. Don)
Salix triandra L.
Salix turanica Nasarov (*Salix viminalis* L. var. *songarica* Anderss.)

Salix wallichiana Anderss. (*S. disperma* Roxb. ex D. Don; *S. grisea* Wall.; *S. julacea* Anderss.)
Salix wilhelmsiana Bieb. (*S. angustifolia* Willd.; *S. dracunculifolia* Boiss.; *S. trautvetteriana* Regel)

SAPINDACEAE

The family of 140 genera and 1500 species is found mostly in tropical and subtropical climates with only a few representatives in the north temperate zone. About 300 species are lianas. They are trees or shrubs, including the economically important food plant in such genera as Litchi.

Leaves persistent or deciduous, alternate (rarely opposite), pinnate or bipinnate, or simple, mostly exstipulate, often with toxic saponins.

Flowers small, imperfect (monoecious or dioecious) borne in cymose inflorescence. 4 or 5 free or fused sepals, and 4-5 free petals. The stamens are in two whorls of five, often with two stamens missing and so appearing as 8. The filaments are free, ovary 3-carpellate, superior, the style is terminal, simple or divided. Flowers are actinomorphic or zygomorphic, entomophilous.

Fruit a berry, drupe, capsule, nut, samara, or schizocarp.

The Sapindaceae, Hippocastanaceae, and Aceraceae are very closely related and there is recent evidence, indicating that all three should be included in the Sapindaceae (JUDD *et al.* 1994, *in* HARLOW *et al.* 1996).

Dodonaea Mill.
Dodonaea viscosa (L.) Jacq. (*Dodonaea angustifolia* L.; *Ptelea viscosa* L.)

Stocksia Benth.
Stocksia brahuica Benth.

SIMARUBACEAE

This family is composed of about 25 genera and 150 species and is chiefly tropical or subtropical. The members are trees and shrubs often with very bitter bark and other parts.

Leaves alternate, pinnately compound, unifoliolate, or simple, stipulate or exstipulate.

Flowers small, regular, bisexual or unisexual, borne in cymose spikes or dense panicles, entomophilous or ornithophilous. Sepals and petals 3- to 8-parted or united, stamens many or double the number of petals, free, filaments distinct. Ovary superior, of to five carpels which are free or fused below and united above the style or stigma. Stigma capitate to strongly lobed.

Fruit a capsule, drupe, berry or samara.

Ailanthus* Desf.
Ailanthus glandulosa Desf. (*Ailanthus altissima* (Mill.) Swingle)

SOLANACEAE

A cosmopolitan family of herbs, shrubs, trees or lianas. Number of genera about 90, species 2000-3000.

Leaves usually simple and alternate, exstipulate, but often with smaller leaves (minor leaves) in their axils or intercalary.

Flowers often showy, solitary and axillary, or in racemes, spike, panicles, corymbs or cymes, usually hermaphrodite, regular, actinomorphic or somewhat zygomorphic. Sepals (3-)5(-10), cupular, campanulate or tubular, usually persistent, often enlarged in fruit. Petals 5 (rarely 10) arotate, campanulate, infundibular or valvate in bud. Stamens (4-)5(-6) epipetalous and alternating with corolla lobes, sometimes didynamous, anthers sometimes connivent, dehiscing by terminal (and sometimes also basal) pores or by introrse longitudinal slits; fifth anther sometimes replaced by a staminode. Ovary superior, 2-4(-5) locular. Style single, stigma 2 lobed.

Fruit a berry or capsule; seed many, small, compressed, reniform or discoid; testa smooth or ornamented.

Lycium L.
Lycium dasystemum Pojark. (*L. turcomanicum sensu* Boiss.)
Lycium depressum Stocks
Lycium kopetdaghi Pojark.
Lycium ruthenicum Murray
Withania Pauq.
Withania coagulans (Stock) Dun. *in* DC.
Withania somnifera (L.) Dun. *in* DC. (*Physalis somnifera* et *Ph. flexuosa* L.)

STAPHYLEACEAE

This is a family of five genera and about 60 species of temperate or tropical trees and shrubs. Some staphylea species are cultivated as ornamental garden plants

The leaves are opposite or alternate, trifoliate or pinnate, with paired stipules.

The flowers are regular, bisexual or sometimes unisexual with male and female on the same plant, rarely on separate plants, and are borne in paniculate clusters. There are five imbricate sepals, five imbricate petals, and five stamens alternating with the petals, the filament sometimes being flattened. The ovary is superior and consists of 2 to 4 fused carpels. Each locule contains one or a

few ovules on axillary placentas. The 2 to 4 styles are free or completely fused together.

Fruit berry like or inflated capsule with an open top. Seeds few.

Staphylea L.
Staphylea emodi Wall.

TAMARICACEAE

This family of trees and shrubs includes four or five genera and 100 species and is native to Eurasia and Africa.

Plants halophyte and xerophytes with slender, upright, or spreading branches resembling those of a juniper.

Leaves small, simple, alternate, scalelike and appressed to the slender twig, exstipulate, persistent or deciduous, with salt-excerting glands.

Flowers minute but showy, perfect with 4 to 5 sepals, petals, and stamens. Stamens inserted on a fleshy, nectar secreting disk, stamens are free or slightly fused at base, with bilocular anthers. Ovary superior of two, four or fused carpels and has a single locule. Stigma sessile; flowers crowded in slender racemes, spikes, or panicles, appearing in the spring and summer, entomophilous.

Fruit a small capsule with hairy, windblown seeds

Tamarix L.
Tamarix androssowii Litw.
Tamarix aphylla (L.) Karsten (*T. articulata* Vahl)
Tamarix arceuthoides Bunge
Tamarix aucheriana (Decne.) Baum
Tamarix bachtiarica Bunge ex Boiss. (*Tamarix smyrnensis* Bunge)
Tamarix dioica Roxb. ex Roth
Tamarix dubia Bunge
Tamarix gallica L.
Tamarix hispida Willd.
Tamarix kotschyi Bunge
Tamarix laxa Willd.
Tamarix salina Dyer *in* Hook. f.
Tamarix stricta Boiss.
Tamarix tetragyna Ehrenb. (*Tamarix brachystachys* Bunge; *Tamarix meyeri* Boiss.)
Tamarix tetrandra Pall. (*Tamarix parviflora* DC.)
Tamarix troupii Hall. (*Tamarix indica* Willd. *in* Baum)

Myricaria Desv.
Myricaria elegans Royle (*Myrtama elegans* (Royle) Ovcz. Kinzikaeva; *Tamarix ladachensis* Baum)

THYMELAEACEAE

Shrubs or trees, rarely herbs, with tough fibrous inner bark. Cosmopolitan, especially well represented in Africa. The family includes about 45 genera and about 500 species.

Leaves alternate, simple, pinnately veined, entire, exstipulate.

Flowers in axillary or terminal, umbellate or globose heads, bisexual, actinomorphic. Perianth tubular, lobes 4-5; flowers are basically cup shaped, the hollowed out receptacle forming a deep tube with the floral parts mostly arranged at the rim. Stamens 8-10, adnate to perianth tube, often arranged in 2 whorls. Ovary superior, 1-2 celled; ovule 1-2 per cell, apical, style slender, stigma capitate to oblong.

Fruit a capsule, drupe or nut, 1-2 seeded.

The bark is used locally to make paper.

Daphne L.

Daphne mucronata Royle (*D. angustifolia* C. Koch; *D. acuminata* Boiss. & Hohen.; *D mucronata* Royle var. *affghanica* [sic] Meisner *in* DC.; *D. salicifolia* Auch. ex Meisn.; *D. angustifolia* C. Koch var. *affghanica* [sic] (Meisn.) Keissler)

Daphne oleoides Schreb.

Wikstroemia Endl.

Wikstroemia canescens Meissn. (*W. chamaedaphne* (Bunge) Meissn. *in* DC.; *Daphne sericea* D. Don; *D. canescens* Wall.)

TILIACEAE

The Tiliaceae comprise about 50 genera and 450 species of trees, shrubs, and herbs, widely distributed throughout the world, but most abundant in the southern hemisphere. They are used for timber and for ornament.

Leaves are deciduous, alternate in two rows, distichous, simple stipulate at base.

Flowers perfect, small and green, yellow or white, actinomorphic, entomophilous, borne in cymes or corymbs; sepals 5 which are either free and valvate or united; petals 5 usually free with glandular hairs at the base. Stamens numerous, in multiples of 5 inserted at the base of the petals; the ovary is superior, with 2 to 10 locules, each containing one to many ovules.The style is simple with a capitate or lobed stigma.

Fruit a capsule, dupe, berry, or nutlike; seed without endosperm.

Grewia L.

Grewia tenax (Forssk.) Fiori (*G. populifolia* Vahl; *G. betulaefolia* Juss.)

ULMACEAE

This family includes 18 genera and about 150 species of trees and shrubs widely distributed throughout the temperate regions of both hemispheres, with a few species in the tropics.

Leaves deciduous (rarely persistent), alternate, simple, stipulate, pinnately veined, usually serrate, often inequilateral at base. Inflorescence determinate, forming fascicle, axillary.

Flowers perfect (plants polygamy-monoecious), anemophilous. Calyx 4 to 9 lobed or parted. Stamens 4 to 6(4-9 after JUDD 1999), opposite the carpels, filaments distinct, erect in bud. Ovary superior, usually 1-celled with a single ovule, style 2.

Fruit a samara, drupe or nutlet; seeds flat.

Celtis L.
Celtis australis L.
Celtis caucasica Willd.

Ulmus L.
Ulmus minor Mill. (*Ulmus carpinifolia* Gleditsch; *U. campestris* L. nom. ambig.; *U. glabra* Mill. not Huds.; *U. foliacea* Gilib. nom. pre-Linn.; *U. nitens* Moench)
Ulmus glabra Huds. (*U. scabra* Mill.; *U. montana* With.; *U. elliptica* C. Koch.)
Ulmus umbraculifera Zielinski *in* Rech. (*U. campestris* L. var *umbraculifera* Trautv.; *U. densa* Litw.; *U. densa* Litw. var. *bubyriana* Litw.; *U. pumila* L. f. *androssovi* (Litw.) Rehder)
Ulmus wallichiana Planchon (*U. wallichiana* Planchon subsp. *xanthoderma* Melville & Heybroek)

VERBENACEAE

These are tropical or subtropical with a few temperate herbs, shrubs or trees. Stems often quadrangular, indumentum of simple or stellate, rarely medifixed hairs, often with gland-dots or scales. It includes about 75 genera and 3000 species.

Leaves opposite, sometimes whorled, simple or palmately compound, sometimes lobed, exstipulate.

Flowers in head, racemes, cymes, corymbs or panicles, zygomorphic or rarely actinomorghic, bisexual. Calyx tubular at base, 2-6 lobed (4-5 lobed after HEYWOOD 1993), sometimes entire. Corolla tubular below, salverform, funnel shaped or 2-lipped, 4-6 lobed. Stamens (2-)4(-6), often in unequal pairs, or with 2 fertile stamens and 2 staminodes; filaments inserted within corolla tube, anthers included or exserted. Ovary superior, 2-8 celled, ovule 1-2 per cell, placentation axillary. The style is terminal, occasionally arising from between the ovary lobes.

Fruit a drupe, less commonly capsule or schizocarp.

Tectona L.
Tectona grandis L.

Vitex L.
Vitex agnus-castus L.
Vitex pseudo-negundo (Hausskn. ex Bornm.) Hand.-Mazz.

VITACEAE

The family include about 10 genera and 600 species. They are woody climbers or trailers, often with tendrils, rarely shrubs or small trees. Nodes often swollen or jointed. The tendrils are either modified shoots or inflorescence and may end in disk-like suckers.

Leaves alternate (the lower ones sometimes opposite), petiolate, with deciduous stipules, simple or palmately or pinnately compound.

Flowers hermaphrodite or unisexual, actinomorphic, small, borne in leaf opposed cymes or panicles. Sepals 4-5 fused to a cup like structure. Petals 4-5, free, but are often united at the tip. Stamens 4-5, antipetalous inserted on a ring like lobed disk. Ovary superior, usually 2-celled; ovule 2 per cell, axillary. Style short, stigma four lobed.

Fruit a berry.

Ampelopsis Michx.
Ampelopsis vitifolia (Boiss.) Planchon (*Vitis persica* Boiss.; *V. aegirophylla* BOISS.; *Ampelopsis aegirophylla* Planchon *in* DC.; *Cissus vitifolia* Boiss.)

Vitis L.
Vitis vinifera L.
Vitis nuristanica Vassilcz.
Vitis hissarica Vassilcz. subsp. **hissarica**

ZYGOPHYLLACEAE

A family of about 25 genera and 250 species of xerophytes or halophytes widely distributed in the tropics and subtropics. Shrubs or herbs, mostly woody at the base, rarely annual or trees.

Leaves opposite or alternate, usually pinnate or divided, stipulate.

Flowers regular or rarely zygomorphic, axillary or corymbose or in cymes, hermaphrodite. Flower parts usually pentamerous, rarely tetramerous or trimerous. Sepals and petals free. Stamens usually twice the number of petals, more rarely the same or three times the number. Ovary with 4-5 locules, each with 2 or more axillary ovules, or very rarely one ovule per loculous, or, by abortion, one per fruit. Style short or stigma sessile.

Fruit a capsule, schizocarpous or rarely a berry. Endosperm present or not.

Malacocarpus Fisch. & C.A. Mey.
Malacocarpus crithmifolius (Retz.) Fisch. & C.A. Mey. (*Peganum crithmifolium* Retz.; *Peganum harmala* L. var. *crithmifolium* DC.)

Nitraria L.
Nitaria schoberi L.
– – var. **caspica** Pall.
– – var. **roborowskii** (Komar.) Hadidi

Zygophyllum L.
Zygophyllum atriplicoides Fisch. & C. A. Mey.
Zygophyllum bucharicum B. Fedtsch.
Zygophyllum eurypterum Boiss. & Buhse.
– – subsp. **eurypterum**
– – subsp. **gontscharowii** (Boriss.) Hadidi
Zygophyllum heterocladum Rech. f. & Patzak

Conclusion

This inventory of trees, shrubs and subshrrubs contains over 500 species which have all been verified by more than one author. We consider that it is therefore more complete and more accurate than previously published lists. The aim of this study has been to provide a reliable source of information for those concerned with the regeneration of the native forests and thus the restoration of the fragile natural environment of Afghanistan.

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