

Achene: a simple dry fruit containing a single seed. [see Fig. 3a overleaf].

Acuminate: gradually tapering to a point [see Fig. 4f overleaf].

Adventitious: a structure arising from an unusual place; e.g. roots growing from the shoot system.

Aeolian soil: soil generated with sediments eroded, transported and deposited by the action of the wind.

Agroforestry: a land-use system with two or more interacting plant species, where one of them is a tree or shrub.

Alkaloid: a group of natural chemical compounds containing basic nitrogen atoms produced by a large variety of organisms (bacteria, fungi, plants, animals). They can be extracted and used in traditional and modern medicine, interacting with the metabolic systems of humans and animals.

Allelopathy (adj. allelopathic): negative effects created by a plant on the growth or development of other nearby plants by releasing toxic substances.

Anamorph (adj. anamorphic): in mycology, an asexual reproductive stage in a fungus life-cycle, which also includes a teleomorph, the sexual reproductive stage. In the past some fungi had a double nomenclature related to their different stages, recently declared scientifically invalid.

Androdioecious: species having separate plants with staminate flowers and plants with perfect fully-functional flowers [see Fig. 2b overleaf].

Androecious: the plant having the male flowers in a **dioecious** population.

Androgynomonocious: species having in the same plant perfect fully-functional flowers, pistillate and staminate flowers. [see Fig. 2b overleaf]

Andromonoecious: species having in the same plant perfect fully-functional flowers and staminate flowers. [see Fig. 2b overleaf]

Androsterility (adj. androsterile): see pistil.

Anthropogenic: caused or produced by humans.

Apomixis (adj. apomictic): reproduction of plants where the embryo develops without fertilisation occurring.

Apophysis: A natural outgrowth, swelling or enlargement.

Arborescent: having the shape of a tree, tree-like.

Arcto-Tertiary geoflora: floral assemblage that once covered the Northern Hemisphere, from roughly the late Mesozoic to mid Cenozoic Eras.

Aril (syn. arillus): a fleshy fruit that covers or is attached to the seed, often edible to encourage dispersion by animals.

Array: of data (including spatial data), information or numerical models. In **computational science**, collection of homogeneous or heterogeneous layers (for example, **field observations** of forest tree species; land cover maps on the distribution of broadleaved/coniferous taxa; maps on **bioclimatic** and geographic information) which may be processed in a compact way (array programming) as a sequence within numerical models.

Arthropod: an invertebrate animal with an external skeleton (exoskeleton), a segmented body, and jointed appendages. Arthropods include the insects, arachnids, myriapods, and crustaceans.

Autoecology: the term generally refers to diagrams also known as **climate-space diagrams**. For a given **taxon**, an empirical autoecology diagram is based on the available **field observations** to illustrate the pattern of selected **bioclimatic** quantities (for example, the average annual temperature versus the total annual precipitation) associated with the locations where the taxon has been observed. When available (as is the case in this Atlas), autoecology diagrams also illustrate the empirical climate space occupied by all the taxa (presence/absence autoecology).

Axil: the upper angle between one part of a plant and another part.

Auriculate: having an auricle, i.e. an ear-shaped lobe at the base of a leaf.

Big data: in **computational science**, collection of data whose appropriate analysis and **computational modelling** requires specific techniques in order for the challenging amount of information to be managed. Usual standard approaches of numerical processing are generally inadequate with big data due to their dimension or complexity/heterogeneity. The qualification of data as "big data" highly depends on the typical computational resources, software and knowledge available in given historic time.

Bioclimatic: referring to climatic aspects relevant for the biology of the organism (for example, referring to temperature, precipitation, evapotranspiration, solar irradiation, etc.).

Biogenic volatile organic compounds: volatile organic compounds produced by plants. Involved in plant growth, development, reproduction and defence. While contributing to tropospheric ozone and secondary particle formation, they also have indirect effects on cloud formation and climate change.

Bisexual: see **monoecious**

BP: acronym standing for "Before Present" with "Present" being the 1st January 1950, reflecting the time when radiocarbon dating became practicable.

Brachyblast: branches with shortened internodes (brachyblasts) as opposed to branches with long internodes.

Bronze Age: the term Bronze Age refers to a period in human cultural development when the metalworking included techniques for smelting copper and tin from naturally occurring outcrops of ores, and then combining them to cast bronze to produce sophisticated tools such as sickles or knives. This is the earliest period in which some civilisations introduced writing.

BVOC: See **biogenic volatile organic compounds**.

Calyx: the outer floral envelope that protects the developing flower bud, consisting of the **sepals**.

Cambium: the tissue in the stems and roots of plants, consisting of cells that divide rapidly to form new layers of tissue. In woody plants it lies between the bark and wood of the stem; on its outer surface the vascular cambium forms new layers of **phloem**, and on its inner surface, new layers of **xylem**.

Chasmophyte (adj. chasmophytic): plant growing in rock crevices.

Chorology: study of the spatial distribution of organisms.

Climate-space diagrams: see **autoecology**.

Computational model: mathematical model in **computational science** requiring computational resources to analyse or estimate specific statistics and information on the behaviour of a natural or artificial system (for example, the **relative probability of presence** or the **habitat suitability** of forest tree species).

Computational science: scientific and technical methods to analyse existing information and to estimate unavailable information with the help of mathematics and **computational models**.

Constrained spatial multi-frequency analysis: (acronym: C-SMFA) in **computational science**, a **spatial frequency analysis** of a given quantity

(for example, the frequency of **field observations** concerning a given tree species) which considers multiple spatial scales to account for the different local density of data. Furthermore, C-SMFA is constrained to be consistent with an additional available information to improve the overall quality of the frequency analysis. In this Atlas, C-SMFA is exploited to estimate the **relative probability of presence** of forest tree species.

Constraint: for the meaning in **computational modelling**, see **semantic constraint**.

Cordate: having a heart-shaped outline. [see Fig. 4b overleaf].

Coriaceous: leathery.

Corolla: the inner circle of petals of a flower, usually of a colour other than green.

Corvid: a bird belonging to the crow family Corvidae, e.g. jays, magpies, choughs.

Corymb: a flat-topped flower cluster in which the individual flower stalks grow upward from various points on the main stem to approximately the same overall height. [see Fig. 1b overleaf].

Cotyledon: an embryo tissue within the seed which upon germination forms the embryonic leaf/leaves of the plant.

Coumarin: an organic compound naturally present in many plants. It has a sweet odour, recognised as the scent of new-mown hay. It is used in perfumes, for giving aroma to drinks and tobaccos, and more recently for clinical medical purposes.

Cryptic: see refugia

Cuneate: having the shape of a wedge, triangular at the base and tapering to a point. [see Fig. 4g overleaf].

Cyme: A usually flat-topped or convex flower cluster in which the main stem and each branch end in a flower.

Decumbent: spreading horizontally with the ends growing upwards

Dehesa: a Spanish word which refers to the savannah-like open woodland traditionally managed as a multi-purpose agricultural system in the Iberian Peninsula. In Portugal it is named **montado**. This agro-sylvo-pastoral land use provides firewood, shading and secondary products (i.e. acorn, olive, nuts, cork, manna, etc.) from trees and pasture for livestock from grass land. Main tree species managed as dehesa/montado are principally Mediterranean evergreen oaks, holm oak (*Quercus ilex*), cork oak (*Quercus suber*), Lusitanian oak (*Quercus faginea*) and Pyrenean oak (*Quercus pirenaica*), but also ash (*Fraxinus angustifolia*) and stone pine (*Pinus pinea*) with other accompanying tree such as olive (*Olea europaea*) and junipers (*Juniperus oxycedrus* and *J. thurifera*).

Dendrochronology: the science of dating based on the analysis of tree ring patterns.

Dioecious: species that has male and female flowers (or reproductive structures) in separate plants.

Diploid: organism which contains two sets of chromosomes, one set inherited from each parent.

Disking: Agricultural term to describe the process of using a disk, or harrow, to disturb the soil, setting back natural succession by cutting up grassy vegetation, thus preventing an area from maturing into briars, shrubs, and trees.

Dormant (adj. dormancy): an induced and hormone-regulated stage of inactive state in which growth stops and metabolism is slowed.

Drupe: a fruit with the seed inside a woody shell (**endocarp**) surrounded by a fleshy part (**mesocarp**) and skin (**exocarp**). [see Fig. 3b overleaf].

Ecotone: the transition zone between two different plant communities, e.g. between forest and prairie.

Ectomycorrhiza: a fungus that forms a symbiotic relationship with the roots of various plant species. Unlike other mycorrhizae, they do not penetrate their host's cell walls, developing in the intercellular spaces. They form a dense hyphal sheath surrounding the root surface, helping the host plant to take up water and nutrients and to access carbohydrate supplies.

Edaphic: related to the soil.

Emarginate: having a broad shallow notch at the apex. [see Fig. 4f overleaf]

Empyreuma: the smell and taste associated with burning vegetable and animal matter. Empyreumatic oils are obtained by distilling various organic substances at high temperatures.

Endemic (adj. endemism): a species that lives in a defined and restricted geographical zone or habitat type.

Endocarp: see **drupe**

Entomophilous: form of pollination whereby pollen or spores are distributed by insects.

Epicormic: growing from the bark of the trunk, stem or branch.

Epiphyte: a plant that grows harmlessly upon another plant, deriving its moisture and nutrients from air and rain. In the temperate zone they are principally mosses, lichens, algae and liverworts.

Eutrophic: characterised by an abundant accumulation of nutrients that support a dense plant life.

Fascicle: A bundle or cluster of stems, flowers or leaves.

Fastigate: having erect branches, often appearing to form a single column with the stem.

Fennoscandia: a region comprising the Scandinavian Peninsula, Finland, Karelia and the Kola Peninsula.

Field observations: data referring to measurements performed in the environment where a certain organism or association of organisms lives (for example, measurements of whether a certain tree species is found in a certain local environment). Complementary to laboratory measurements and **computational modelling** estimations.

Flexuose: bent from side to side in one plane in zigzag form.

Forest plot: local-scale **field observation** concerning forest resources. Forest plots are often the basis of national forest inventories and of other thematic datasets on forests.

Frugivore: (adj. frugivorous) an organism that feeds on fruit.

Galbulus (pl. galbuli): a fleshy berry-like seed cone of junipers and cypresses.

Gall (syn. cecidium): an abnormal outgrowth of plant tissue, similar to tumours, caused by parasites, principally insects, and used as a habitat for development and as a food source.

Garrigue: a discontinuous Mediterranean vegetation composed of low bushy

scrub species associated principally with calcareous rocky soils and hot arid climates. This formation often develops as consequence of a degraded **maquis** vegetation after fires or intense exploitations.

Genotype: the genetic makeup of an organism or group of organisms with reference to a single trait or set of traits, as distinguished from the physical appearance.

Geospatial: in **computational science**, it refers to data or information which is geographically distributed and covers significantly broad spatial extents. Under these circumstances, for example the simple approximation of the portion of Earth's surface covered by the spatial extent as a geometrical plane is no more valid.

Glabrous: smooth; without hair or scales.

Glacial-interglacial cycles: Continental ice-sheets in the Northern Hemisphere have grown and retreated many times in the past. Times with large ice-sheets are known as glacial (cold) periods that were separated by (warm) interglacial periods. We are currently in an interglacial period called the Holocene that initiated 11 700 years BP.

Glaucous: having a pale greyish or bluish green colour, often with a whitish bloom which may be rubbed off.

Globose: ball-shaped.

Gynodioecious: species having separate plants with pistillate flowers and plants with perfect fully-functional flowers [see Fig. 2b overleaf].

Gynoecious: the plant having the female flowers in a **dioecious** population.

Gynomonoecious: species having in the same plant perfect fully-functional flowers and pistillate flowers [see Fig. 2b overleaf]

Gynosterility (adj. gynosterile): see stamen

Habitat suitability: (acronym: HS) potential suitability for a certain organism (e.g. a tree species) to live in a given local habitat. It is generally a quantity varying from 0 (0%, unsuitable habitat) to 1 (100%, potentially very suitable habitat). **Computational science** may be required for HS to be quantitatively estimated. Depending on the objective to be investigated, HS may consider interspecific competition and other ecological aspects, or may instead just consider **bioclimatic** limitations. In the latter case, the estimated HS constitutes a potential limit which may be altered by the local ecology (typically, the bioclimatic-related HS of a certain **taxon** may be higher than the actual one due to competing taxa which are more fit in a given habitat).

Heartwood: the older, non-living central wood of a tree, consisting of non-functioning **xylem** tissue that has become blocked with resins, tannins and oils and providing mechanical support. Heartwood is usually darker and harder than the younger **sapwood**.

Hectare: one hectare is 100 × 100 metres.

Heliophilous: organism that needs, or tolerates, a high level of direct sunlight.

Hermaphrodite: organism or reproductive organs that have both male and female structures. Relating to flowers, hermaphrodite flowers can be called also **bisexual** or perfect. [see Fig. 2b overleaf].

Hilium: a scar or a mark remaining on a seed or spore at its point the site of its former attachment.

Holocene: The Holocene is the geological epoch that began approximately 11 700 years BP and continues to the present.

Hygrophylous: adapted for growth in a wet or damp environment.

Hypoglycin A: a natural amino acid which occurs in several plants; this compound is toxic if ingested, causing profound hypoglycaemia.

Imbricate: Having regular overlapping edges

Inflorescence: a grouping of flowers on a stem or in a leaf axil.

Interstadial: Time period corresponding to a temporary period of thaw in the middle of an ice age.

Involucre: a ring of small leaves, or bracts, at the base of a flower, flower cluster, or fruit.

Iron Age: in archaeology, the Iron Age (in Europe between about 1200 BC – 1 BC) refers to the advent of ferrous metallurgy to produce hard metal tools. The adoption of iron coincided with other changes in past cultures, often including more sophisticated agricultural practices and artistic techniques.

Karst (adj. karstic): terrain or landscape characterised by largely bare, rocky surface and irregular limestone in which erosion has produced fissures, sinkholes, underground streams and caverns and underneath which rivers flow.

Lanceolate: having a narrow shape and tapering to a point at each end, with the base slightly wider. [see Fig. 4b overleaf].

Lenticel: small raised corky spot or line through which gaseous exchange occurs. They typically appear on bark but also on fruits.

Lignicolous: organism which grows or lives on or in wood.

Maquis (syn. matorral): this is the main vegetation along the Mediterranean coasts, where summers are hot and dry, and rain falls abundantly in winter. It contains densely packed bushes, shrubs and evergreen trees with generally coriaceous leaves, occasionally deciduous during the summer.

Marcescence (adj. marcescent): deciduous tree that retains its leaves through the winter, shedding them only when new leaves emerge in spring.

Marl: a crumbly mixture of clays, calcium and magnesium carbonates, and remnants of shells that is sometimes found under desert sands and used as fertiliser for lime deficient soils.

Matorral: see **maquis**

Maximum habitat suitability: (acronym: MHS) referring to **bioclimatic-based habitat suitability**, it represents the *maximum* spatial extent where a given **taxon** is suitable to live. It may also be referred to as survivability. Complementary to the average habitat suitability (AHS), which only focuses on the optimal ecological niche of a given taxon. MHS is greater or equal to AHS. Low values of MHS may be exploited to identify the less suitable areas for a given taxon to survive, irrespective of other ecological aspects such as interspecific competition. Conversely, correspondingly low values of AHS may only identify non-optimal areas. In these areas, the taxon is in a sub-optimal condition where it may or may not be able to survive, depending on other factors.

Melliferous: producing or promoting the production of honey.

Mesic: characterised by or adapted to a moderately moist habitat.

Mesocarp: see **drupe**.

Mesoclimate: the climate of a small area not representative of the general climate of the district

Mesolithic: This period began at the end of the Pleistocene epoch, around 9200 BC, and ended with the introduction of agriculture, the date of which

varied by geographic region.

Mesophile (adj. mesophilous, mesophilic): an organism which grows best in a moderate temperature.

Mesophyte (adj. mesophytic): plant that grows in an environment having a moderate amount of moisture.

Metadata: in **computational science**, information concerning a certain set of data expressing, at least partially, their **semantics** and how the data have been generated.

Monoecious: species that has both male and female flowers on the same plant; flowers can be **unisexual** when they have only male or female structures, or can be **hermaphrodite** (or **bisexual**, or perfect) when flowers have both male and female structures. [see Fig. 2b overleaf].

Monopodial: tree with a trunk that develops by continuing growth of a single shoot apex.

Montado: see **dehesa**

Morphogenesis: the biological process that causes an organism to develop its shape.

Mucilaginous: slimy and sticky.

Mutualism (adj. mutualistic): a relationship between two organisms of different species in which both benefit from the activity of the other.

Nectariferous: producing nectar.

Neolithic: This was a period of early rural technology and societal development; specifically it included the use of domestic crops and animals, usually accompanied by ceramic production. It began about 10,200 BC in areas of the Middle East, and started later in other parts of the world.

Ob lanceolate: having a lance-shaped outline, with the thin end at the base [see Fig. 4b overleaf].

Obligate: required or necessary.

Obovate: having an egg-shaped outline, with the narrow end at the base [see Fig. 4b overleaf].

Oomycete (syn. oomycota): microscopic filamentous organisms with pathogenic or **saprophytic** lifestyles. They were classified among fungi and later placed in the Heterokonts, a group composed principally of algae and diatoms.

Ovoid: egg-shaped.

Palmate: having more than three lobes or segments that spread out from a common point [see Fig. 4b and 4c overleaf].

Palynology (adj. palynological): the study of live and fossil spores, pollen grains, and other microscopic plant structures.

Panicle: an indeterminate **inflorescence** in which the flowers are borne on branches of the main axis or on further branches of these. [see Fig. 1b overleaf].

Pannonia (adj. Pannonian): a geographical term indicating the plain of East-Central Europe, surrounded by the Carpathian Mountains (north and east), the Alps (west), and the Dinaric Alps and the Balkan mountains (south), through which flow the Rivers Danube and Tisza.

Pectinate: set like the teeth of a comb

Pedicel: the stalk bearing a single flower of an inflorescence.

Petiole: the stalk of a leaf.

Petrophytic: (of a plant) adapted to growing on rocks or scree.

Phloem: the tissue in vascular plants that conducts synthesized food substances from the leaves to the other parts of the plant, consisting primarily of tube-like cells that have porous openings.

Phreatophyte: a plant with a very long root system that mainly uses groundwater as its source of moisture, typical of desert and semi-desert habitats.

Phytophagous: feeding on plants, including shrubs and trees.

Phytoplasmas: a group of bacterial plant parasites responsible for important diseases. They infect and replicate inside the host tissues and are principally transmitted by insects. They are characterised by the absence of a cell wall, behaving as a virus.

Phytoremediation: the use of plants or trees to decontaminate polluted soil or water.

Phytosociology: The branch of ecology that deals with the characteristics, classification, relationships, and distribution of plant communities the branch of ecology dealing with the origin, composition, structure, and classification of plant communities (see section on page 32).

Pinnate: an arrangement in a divided leaf where leaflets arise from both sides of a common leaf-stalk. They can be described according to the depth of the division (lobed, cleft, parted and divided), and according to the number of divisions (odd pinnate, with a single leaflet at the tip, or even pinnate, with a pair of leaflets at the tip). [see Fig. 4c overleaf].

Pistil (adj. pistillate): reproductive female organ of the flower, consisting of ovary, style and stigma. Pistillate flowers have only pistils or sterile stamens (androsterility).

Pith: the soft, spongy tissue in the centre of the stem.

Plant functional traits: functional traits are morphological, biochemical, physiological, structural, phenological, or behavioural characteristics that are expressed in phenotypes of individual organisms and are considered relevant to their growth and to their response to environmental conditions.

Plasticity (adj. plastic): the property of an organism to adapt to different ecological conditions.

Podsolization: reflects the downward migration of Al and Fe, together with organic matter, from the surface areas, and their accumulation in the soil profile's deep areas.

Pole: Tree of a size larger than a sapling but smaller than a mature specimen (actual dimensions vary by region).

Polymorphic: organisms of a single species displaying a number of varieties of form.

Polyphagous: organism that feeds on different types of food. Related to plants, they are parasites of several plant species.

Polyloid: organism which contains more than two set of chromosomes (**diploid**), e.g. **triploid** (3 sets), **tetraploid** (4 sets), etc. Polyploidy is common among plants, which may display novel morphological variations from parental **diploid** forms. This mechanism may contribute to the speciation process.

Pome: a fleshy fruit not formed from the ovary, but consisting of an enlargement of the receptacle which encloses the ovary and the seeds. It is typical of some members of the Rosaceae family; e.g. apple, pear, quince, medlar. [see Fig. 3b overleaf].

Pontic: denoting or relating to the Black Sea.

Pubescent: covered with a layer of fine short hairs or down.

Pyrophyte: plant that is resistant to fire and/or that needs fire to propagate.

Quaternary: the geological epoch that spans from about 2.6 million years BP to the present. The Quaternary Period is divided into two epochs: the Pleistocene (2.588 million years BP to 11.7 thousand years BP) and the Holocene (11.7 thousand years BP to today). The Quaternary period is typically defined by the cyclic growth and decay of continental ice sheets driven by Milankovitch cycles and the associated climate and environmental changes.

Quiescence (adj. quiescent): an inactive state in which growth stops and metabolism is slowed imposed by unfavourable environmental conditions.

Raceme: an inflorescence with stalked flowers arranged singly along an elongated axis, with the flowers at the bottom opening first.

Rachis: the main stem or axis of an **inflorescence** or compound leaf.

Refugia: spatially limited areas where plants and animals can grow and survive during adverse or unfavourable environmental conditions (e.g. cold glacial period). Particularly small refugia are sometimes called micro refugia. Cryptic refugia are refugia which are difficult to identify because of their very small size and/or because of the extremely reduced number of individuals of a species. Refugia comprise areas with sheltered topography and buffered, stable local microclimatic and edaphic conditions, which are e.g. important for moisture supply.

Relative distance similarity: (acronym: RDS) in **computational science**, the **similarity** between two patterns of data based on their relative distance (i.e. the aggregated dimensionless ratio between the numeric values associated with each pattern). For example, in this Atlas RDS is applied to estimate the **maximum habitat suitability** of a given tree species in a certain area, based on how similar are the **bioclimatic** conditions of the area with the ones found where the available **field observations** indicate the presence of the species.

Relative probability of presence: (acronym: RPP) probability of finding a certain organism or entity (for example, a certain tree species) in a given area, irrespective of the probability of finding other entities (e.g. without taking into account other tree species). Concerning tree species, the sum of the RPP associated with different taxa in the same area is not constrained to be 100%. For example, in a forest with two co-dominant tree species which are homogeneously mixed, the RPP of both may be 100%.

Relevé: a French word translated into "list", "statement" or "summary" among the English meanings in its use in vegetation studies. Typically the vegetation relevé is a list of the plants recorded in a sampling plot.

Rendzina: a young, rocky and shallow soil, lacking in moisture, associated with carbonate bedrock (chalk, limestone).

Rhytidome: outer layer of bark.

Samara: a dry fruit with its wall expanded into a wing [see Fig. 3a overleaf].

Saprophyte: organism that lives and feeds on dead organic matter.

Sapwood: the newly formed outer wood located just inside the **cambium** of a tree trunk and consisting of active **xylem** tissue for water conduction. Sapwood is usually lighter in colour than **heartwood**.

Sawfly: a common name for insects belonging to suborder Symphyta (order Hymenoptera). It is a large group of insects, whose larvae look like caterpillars and are **phytophagous**. The common name derives from the saw-like female ovipositor used to cut into plants where the eggs are laid.

Scabrous: rough to the touch.

Sclerophyll (adj. sclerophyllous): a type of vegetation or plant characterised by thickened, hardened foliage, adapted to resist loss of moisture in dry habitats.

Self-sterility (adj. self-sterile): the name for several mechanisms used by hermaphrodite plants to prevent pollen grains from fertilising the same individual (self-fertilisation or autogamy), thus encouraging the exchange of genetic materials among different plants (outcrossing or allogamy).

Semantic array programming: (acronym: SemAP) in **computational science**, a computational modelling approach to compactly process **arrays** of data preserving the consistency of their underpinning **semantics**. For example, SemAP is applied in this Atlas to compute the **relative probability of presence** (by means of the **constrained spatial multi-frequency analysis**) and the **maximum habitat suitability** (by exploiting the **relative distance similarity** approach).

Semantic constraint: in **computational modelling**, it formally expresses a logical or mathematical property which characterises the quantitative meaning (**semantics**) of a certain quantity. For example, the average total annual precipitation in a given area logically must be greater than or equal to the average precipitation of the wettest month in the same area, and both

must be nonnegative; while the relative probability of presence of *Fagus sylvatica* in the area cannot exceed the **relative probability of presence** of all the broadleaved taxa in the same area (see also **constrained spatial multi-scale frequency analysis**).

Semantics: in **computational science**, the logical and quantitative meaning of a certain quantity, data, information or model. **Metadata** and **semantic constraints** are typical tools to express the semantics of numerical data, either spatially distributed (e.g. maps) or not (e.g. average statistics).

Sensu lato: Latin term meaning "in the broad sense". In taxonomy it may indicate that the name is used more inclusively than sanctioned by current practice (e.g. including sub-species).

Sensu stricto: Latin term meaning "in the strict sense". In taxonomy it indicates that the name is used in a more narrow sense (e.g. excluding sub-species).

Sepal: one of the green leaf-like or petal-like structures composing the **calyx** of the flower, the outer floral envelope that protects the developing flower bud.

Sere (adj. seral): the sequence of ecological communities successively occupying an area from the initial stage to the climax.

Serotinous: plants which need an external environmental trigger to release seeds. In certain conifer cones, this can be the high temperatures from wildfire or heat shock (pyriscence).

Serrated: saw-toothed.

Sessile: stalkless and attached directly at the base.

Silviculture: a branch of forestry dealing with the development and care of forest trees.

Silvoarable agroforestry: (acronym: SAF) agricultural systems where both crops and trees are cultivated in the same land area. For example, SAF may consist of widely-spaced trees intercropped with arable crops.

Similarity: in **computational science**, and particularly in pattern analysis, similarity refers to a quantitative way of estimating the distance between two patterns of data (for example, to estimate how closely related are the **bioclimatic** conditions of two different spatial areas).

Sociability: in vegetation analysis it is a 5-point scale to indicate the qualitative degree of clumping or the gregariousness of a plant species in a sampling plot. The classes start from 1, a plant growing singly, to 5, a plant growing in pure populations.

Spatial frequency analysis: in **computational science**, analysis of the local spatial pattern of frequency of given quantity. For example, the analysis may focus on the frequency of **field observations** concerning a given tree species. In this Atlas, both the **species frequency** and the **relative probability of presence** have been estimated with different implementations of a spatial frequency analysis, based on different **computational modelling** approaches.

Stamen (pl. stamens or stamina; adj. staminate): reproductive male organ of the flower, consisting of a stalk (filament) bearing an anther where pollen is produced. Staminate flowers have only stamens or sterile pistils (**gynosterility**).

Stellate: star-shaped.

Stenoendemism (adj. stenoendemic): species existing only in 1 singular place, e.g., one island. (c.f. **endemism**)

Stipule: small, usually paired leaf-like outgrowths, occurring at the base of a leaf or its stalk.

Stolon: a long stem that usually grows horizontally along the ground and produces roots and shoots at widely spaced nodes.

Stoloniferous: producing **stolons**.

Stoma: (pl. stomata) a pore in the epidermis of a plant organ, used to control gas exchange with the environment.

Strobilus (pl. strobili): the seed cone of coniferous trees.

Succulent: plant having thick, fleshy, water-storing leaves or stems.

Survivability: see **maximum habitat suitability**.

Taxon: term used to describe a taxonomic category or group (e.g. phylum, order, family, genus or species). A taxonomic category or group, such as a phylum, order, family, genus, or species.

Tegument: an outer covering.

Terpenoid: a large class of organic compounds derived from the hydrocarbon isoprene. They are widely found in plants and frequently used for their aromatic qualities.

Tetraploid: see **polyploid**.

Thermophile (adj. thermophilous, thermophilic): organism living and thriving at relatively high temperatures.

Tomentose: covered with dense intertwined hairs.

Trichome: hairs, bristles, scales.

Triploid: see **polyploid**.

Umbel: a flat-topped **inflorescence** in which the flowers arise from the same point in the main stem and have stalks of the same length, with the youngest flowers at the centre. [see Fig. 1b overleaf].

Ungulate: a large terrestrial mammal characterised by hoofed toes; e.g. horses, deer, cattle, pigs, giraffes, camels, deer.

Unisexual: see **monoecious**

Xeric: characterised by dry conditions.

Xerophilous: organism that is able to thrive in a dry climate.

Xylem: plant tissue that conducts water and mineral salts from the roots to all other parts and provides mechanical support. It is composed of **sapwood** and **heartwood**, forming the wood of trees and shrubs.

Xylophagous: organism whose diet consists primarily of wood.

Fig. 1: Flowers

Fig 1a: Structure

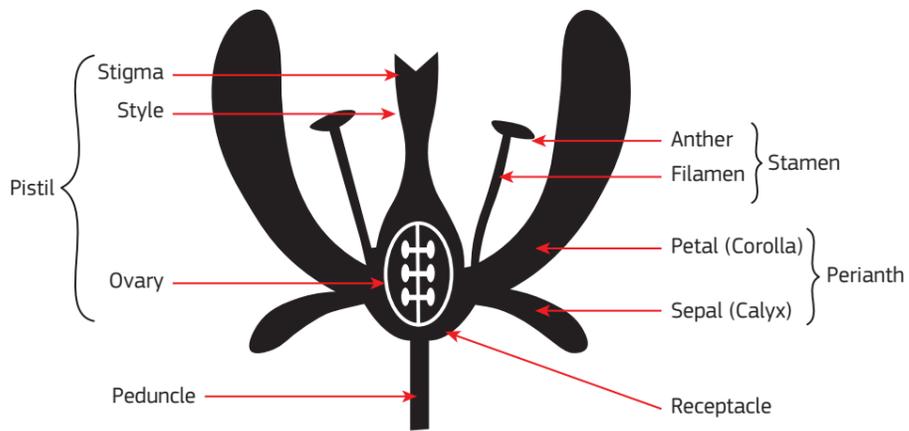


Fig 1b: Inflorescences

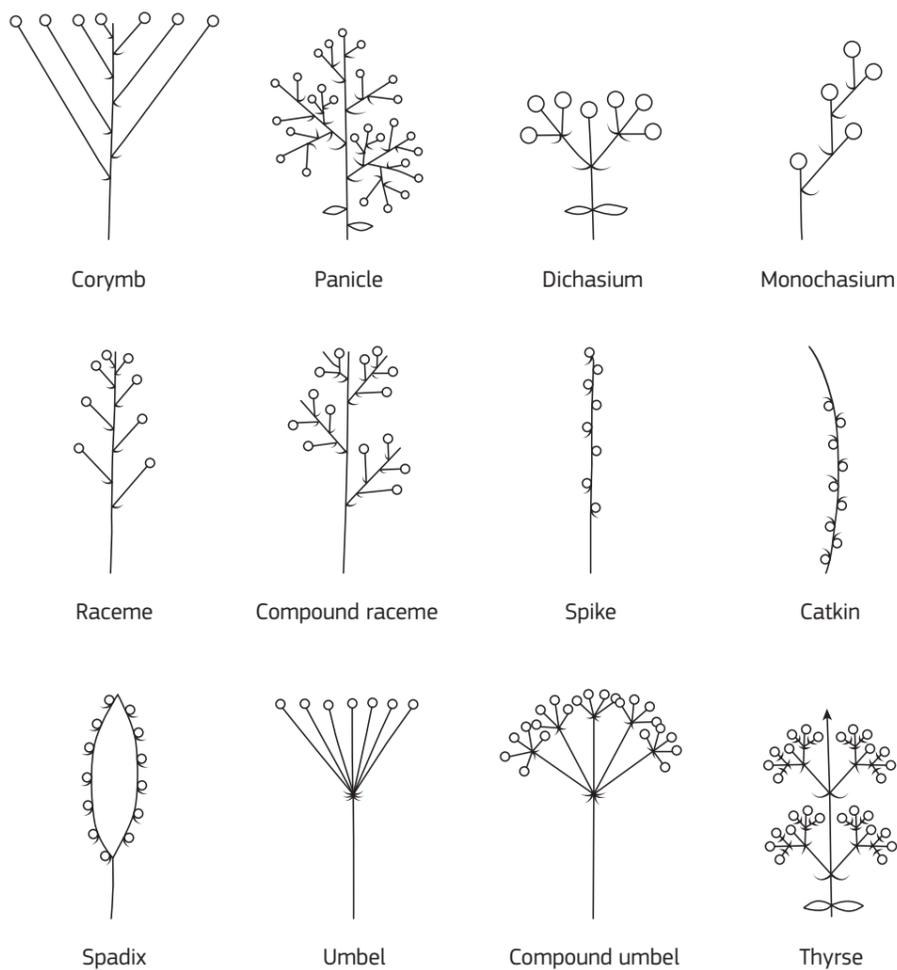


Fig. 2: Plant Sexuality

Fig 2a: Flower types according to presence or absence of the different reproductive organs.

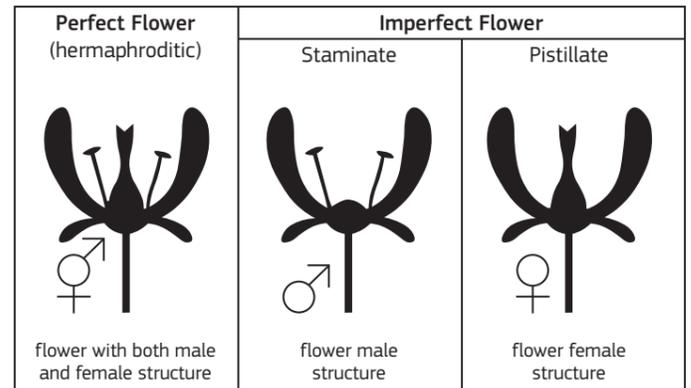


Fig 2b: Plant species classified according to presence of one or more flower types.

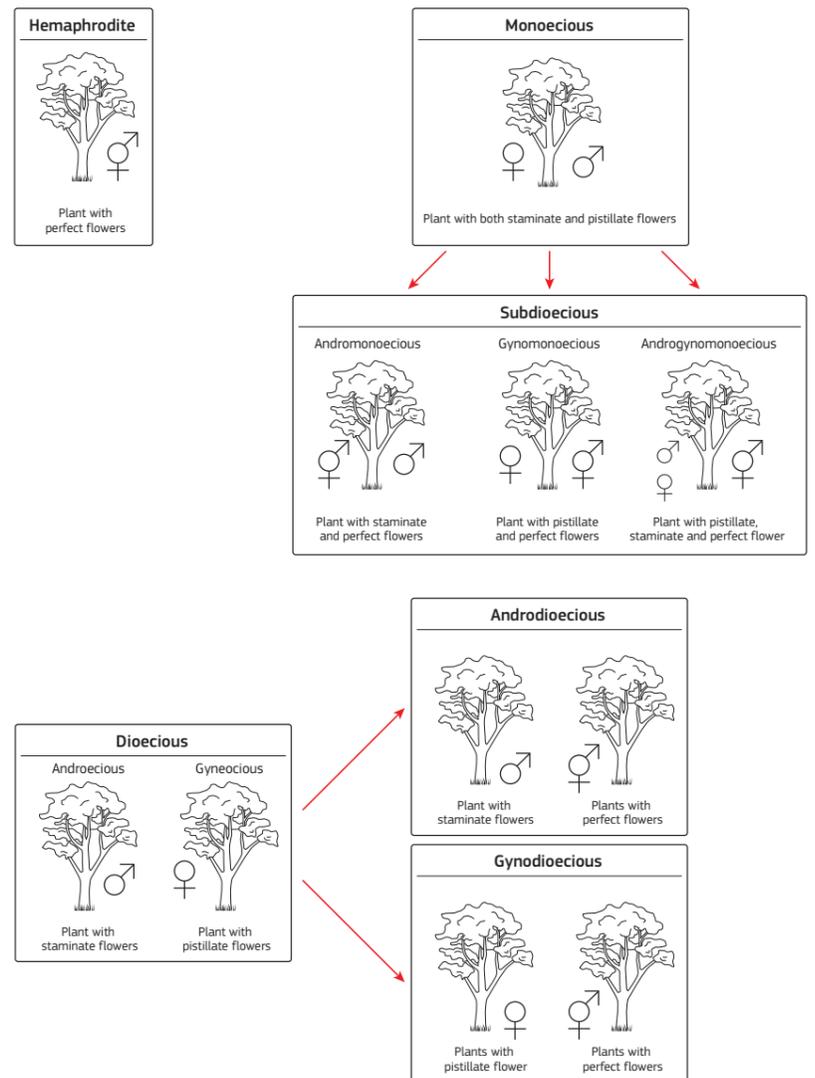


Fig. 3: Fruits

Fig 3a: Dry

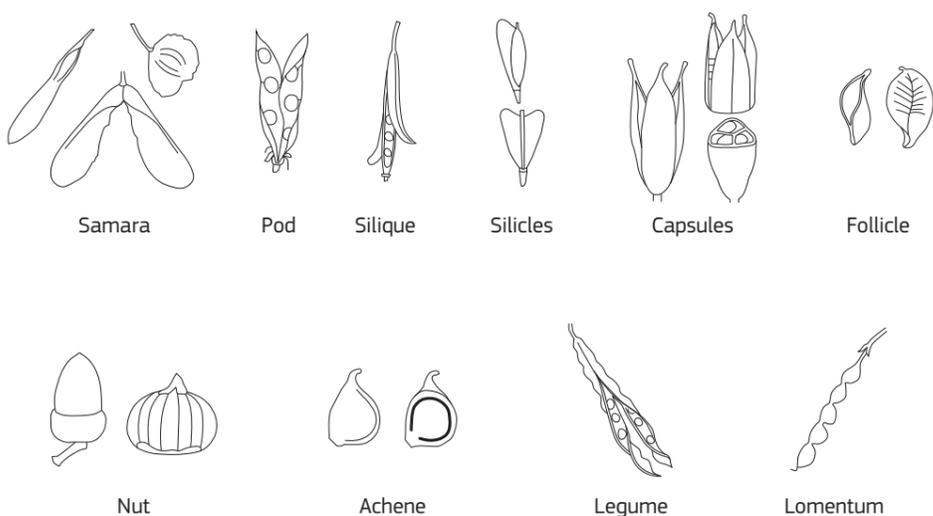


Fig 3b: Fleshy

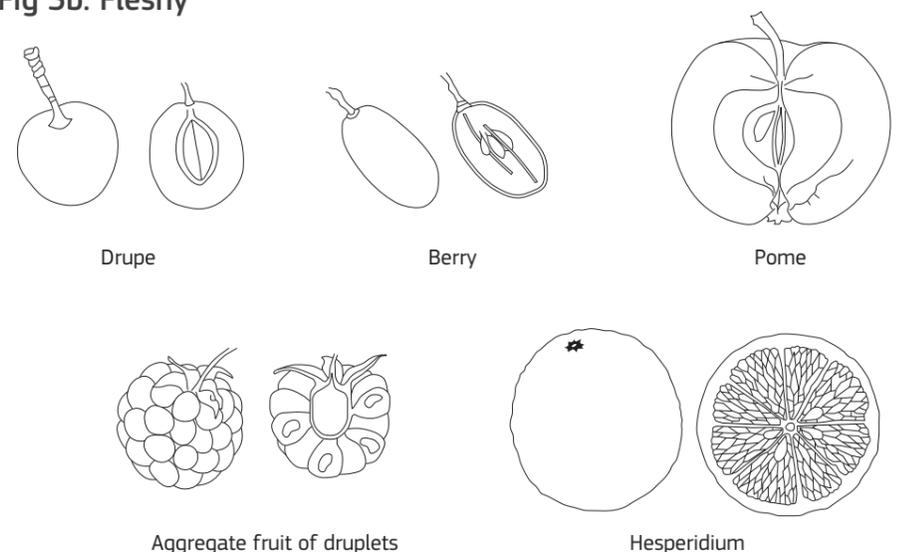
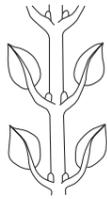


Fig. 4: Leaves

Fig 4a: Arrangements



Alternate



Opposite



Opposite and
decussate



Whorled



Imbricate



Fascicled

Fig 4b: Shapes

- simple



Cordate



Deltoid



Elliptical



Lanceolate



Linear



Oblanceolate



Oblong



Obovate



Ovate



Rhomboid



Spatulate

- compound



Palmately
Compound



Pinnately
Compound



Pinnately Compound
(terminal leaflet absent)



Pinnately Compound
(terminal leaflet present)

Fig 4c: Incisions

- pinnate



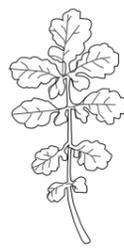
Lobed



Cleft

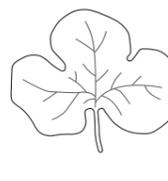


Parted



Divided

- three-palmate



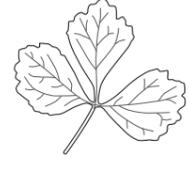
Lobed



Cleft

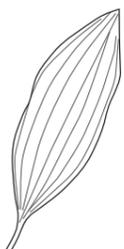


Parted



Divided

Fig 4d: Margins



Entire



Serrate



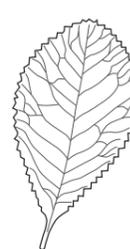
Double-serrate



Serrulate



Dentate



Denticulate



Crenate

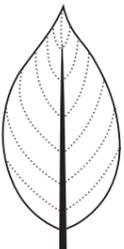


Undulate

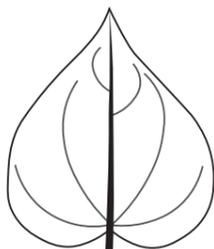


Ciliate

Fig 4e: Venations



Pinnate



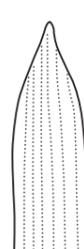
Palmate



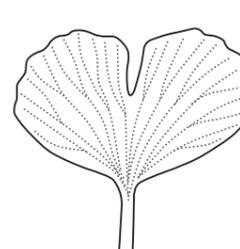
Palmate
reticulate



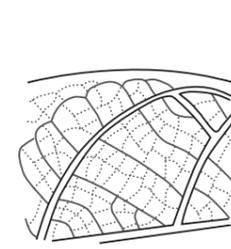
Longitudinal



Parallel



Dichotomous



Areolate



Reticulate

Fig 4f: Apex



Aristate



Cuspidate



Acuminate



Spine-tipped



Bristle-tipped



Mucronate



Acute



Obtuse



Rounded



Emarginate

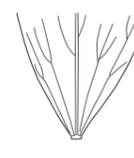


Retuse

Fig 4g: Base



Attenuate



Cuneate



Rounded



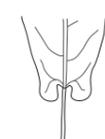
Truncate



Oblique



Cordate



Auriculate



Sagittate



Hastate