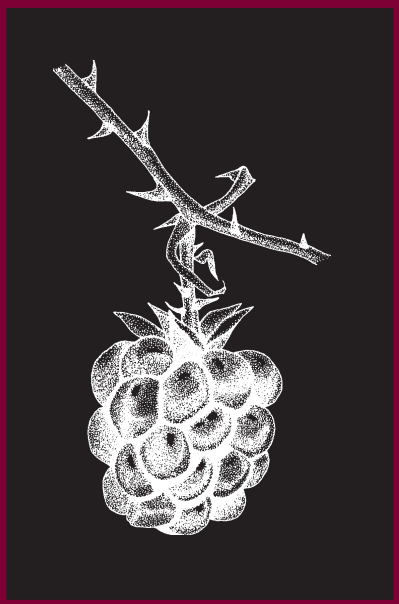
Research Contribution 9f *May 1995*

The Reproductive Ecology of Broadleaved Trees and Shrubs: Glossary

by

Edward C. Jensen and
Debra J. Anderson



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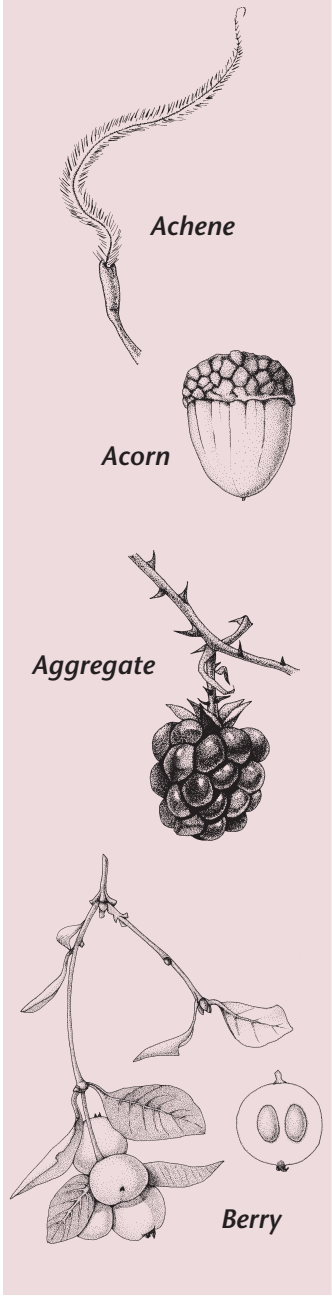
The Reproductive Ecology of Broadleaved Trees and Shrubs: Glossary

Glossary of Terms for Reproductive Ecology



This glossary was designed to support an educational program on the reproductive ecology of broadleaved trees and shrubs. Although it includes many terms commonly used in forest ecology and silviculture, it is not a comprehensive list of important terms in those fields.

Achene: A small, dry indehiscent fruit formed from a single-carpel ovary; achenes typically contain a single seed and are often dispersed by means of a plumed or feathery tail. The fruits of bitterbrush, sagebrushes, and mountain-mahoganies are achenes.

Acorn: A nut topped with a scaly or bristly cap (called an involucre). The fruits of oaks and tanoaks are acorns.

Adventitious: Plant organs are said to be adventitious when they arise in unexpected places—for example, roots that develop from the stem, or buds that develop from the cambium rather than from the apical meristem.

Aggregate: Multiple-seeded fruits in which each seed is borne inside its own fleshy covering. The fruits of raspberries and blackberries are aggregates of drupelets; the fruit of yellow-poplar (*Liriodendron*) is an aggregate of samaras.

Ament (catkin): A long, narrow inflorescence composed of numerous flowers; typically unisexual (all male or all female). May be erect or pendulous. Wind pollinated.

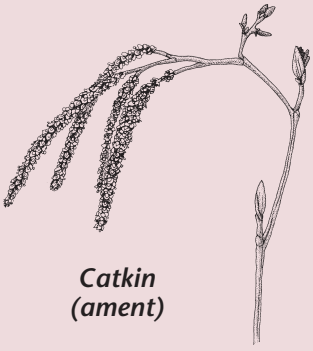
Angiosperm: A class of vascular seed plants characterized by flowers with male and female organs and ovules that are enclosed within ovaries; following fertilization, the ovary develops into a fruit.

Asexual reproduction: The formation of new individuals without the production of gametes or special reproductive structures. Because the exchange of genetic material between individuals is not involved, "parents" and "offspring" are genetically identical to one another.

Berry: A fleshy, multiple-seeded fruit that does not burst open (dehisce) at maturity; seeds are typically arranged loosely within the fruit. The fruits of salal, huckleberries, currants, and tomatoes are berries.

Broadleaf: Plants with wide-bladed leaves, such as Oregon white oak or bigleaf maple. Always refers to flowering trees and shrubs (angiosperms), in contrast to conifers or cone-bearing trees (gymnosperms); may be deciduous or evergreen, depending on how long

Capsules



Catkin (ament)

Dehiscent

their leaves live. Broadleaved trees are often called hardwoods, although not all of them have hard wood.

Browse: As a verb, browse means to eat the twigs and leaves of plants. As a noun, it refers to the twigs and leaves eaten by browsing animals. Deer and moose are browsers.

Bud: An undeveloped shoot consisting of a shortened stem and embryonic leaves or flowers. Most buds are enclosed in modified leaves called scales, although some are naked. Buds borne at the ends of branches are called *terminal*; buds borne in the axils of leaves are called *lateral*; buds that arise in unpredictable locations are called *adventitious*.

Canopy: The layer formed by leaves and branches of the forest's tallest plants. A canopy in which the branches of neighboring plants touch is called a *closed* canopy; if branches do not touch, the canopy is called *open*.

Capsule: A dry, multiple-seeded fruit formed from several fused carpels; the carpels split open (dehisce) at maturity to release their seeds. The fruits of rhododendrons, cottonwoods, willows, and mockorange are capsules.

Carpel: The female reproductive organ of a flowering plant, including the ovary, stigma, and style. A simple pistil or a single member of a compound pistil.

Catkin (ament): A long, narrow inflorescence composed of numerous flowers; typically unisexual (all male or all female). May be erect or pendulous. Wind pollinated.

Clearcut (clearcutting): The removal of all trees in a stand in a single cutting. A method of regenerating an even-aged stand in which the new age class develops in a fully exposed microclimate.

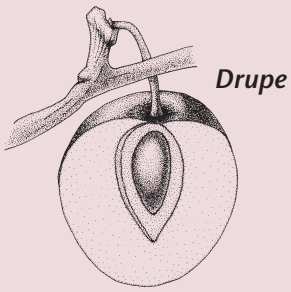
Clone: An individual or group of individuals that are genetically identical to a single parent plant. Clones result from asexual (vegetative) propagation. May be used as a noun or a verb.

Community: Used in several ways with small, but significant, differences. Sometimes refers to groups of similar life forms within a given area (*e.g.*, the plant community or the animal community of a site); sometimes refers to all living organisms within a particular habitat or site.

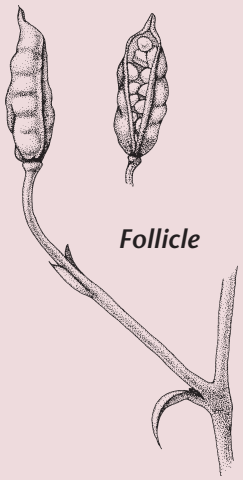
Conifers: Plants that bear their seeds inside woody or semi-woody strobiles commonly called cones; all conifers are gymnosperms, but not all gymnosperms are conifers. Similarly, most conifers are needle-leaved trees, but not all needle-leaved trees are conifers (yews, for example, do not bear cones). Most conifers are evergreen, but some, such as the larches, are deciduous. Examples of conifers include the pines, spruces, larches, true firs, hemlocks, and Douglas-fir.

Deciduous: Falling off at the end of a growing season or following a particular stage of development. Most North American broadleaved trees have deciduous leaves; Pacific Northwest examples include Oregon white oak, vine maple, red alder, and the willows. Only a few conifers have deciduous leaves; larches and baldcypresses are examples. The opposite of deciduous is persistent.

Dehiscent: Splitting along one or more pre-determined sutures at maturity. Many dry fruits are dehiscent; they split open, sometimes

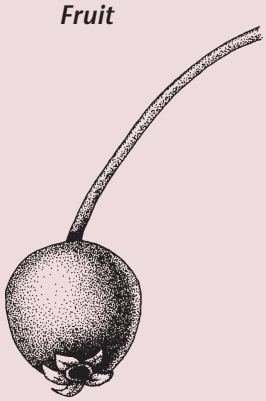


Drupe



Follicle

Fruit



violently, to expel their seeds. Legumes, capsules, and follicles are all dehiscent; nuts, samaras, and achenes are not.

Disturbance: Any relatively discrete event that disrupts the organisms or the physical environment of a site. Common examples are fire, wind, flood, and landslides.

Drupe: A fleshy fruit usually containing a single, hard seed. The fruits of cherries, plums, cascara buckthorn, and poisonoak are drupes.

Drupelet: A small drupe. The fruits of raspberries and blackberries are aggregates of drupelets.

Ecology: The science that deals with the relation of plants and animals to their environment and to the factors that control their reproduction, distribution, and growth.

Ecosystem: A term meaning ecological system. An ecosystem is made up of all the organisms living in an area, the physical environment that surrounds them, and the processes by which they interact. The term ecosystem represents a concept rather than a discrete, physical entity. Any boundaries drawn around an ecosystem are arbitrary.

Environment: The complete range of external conditions in which an organism lives. Includes physical, biological, and chemical factors.

Evergreen: Always green; a plant that adds new leaves before losing its older leaves is called an evergreen. Among trees, most conifers are evergreens; in temperate regions of the world most broadleaved trees are deciduous, but in tropical regions most are evergreen.

Follicle: A dry, multiple-seeded fruit formed from a single carpel that splits open along one side at maturity. The fruits of ocean spray, ninebark, and spirea are follicles.

Forage: As a verb, forage means to graze or eat. As a noun, it refers to leaves and other plant parts eaten by herbivorous animals.

Forest: A complex assemblage of plants, animals, and environment dominated by trees.

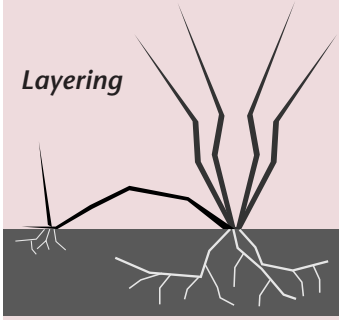
Fruit: The ripened ovary of a flower that develops following fertilization; seeds are contained within fruits. Fruits vary considerably in form, size, shape, and texture, depending on how they are to be dispersed. Apples and cherries are common fruits.

Germination: The initial emergence of roots, shoots, and leaves from a seed. Germination usually follows a period of dormancy and generally occurs in response to favorable external conditions, including warmth, moisture, and oxygen.

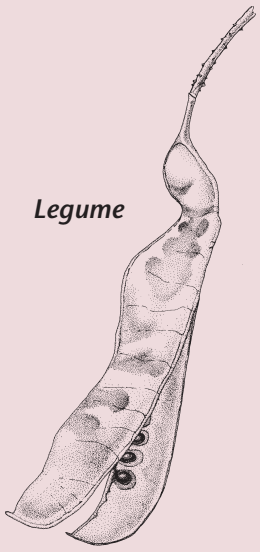
Gymnosperm: A class of vascular plants (mostly trees) that bear naked seeds—that is, seeds not enclosed inside ovaries. Some gymnosperms bear their seeds inside female strobiles commonly called cones; members of this group are called conifers.

Habitat: The physical environment in which an animal or plant occurs.

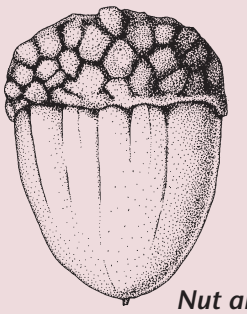
Hardwood: A general category of trees based on wood hardness. The term *hardwood* is commonly used as a synonym for the term *broadleaf*, although there are many broadleaved trees that do not have hard wood (*e.g.*, cottonwoods and balsa). All Pacific Northwest broadleaved trees are classified as hardwoods, although the wood of such species as black cottonwood and quaking aspen is relatively soft.



Layering



Legume



Nut and involucre

Imperfect: A flower that lacks either a pistil (female organ) or stamen (male organ) is imperfect (unisexual). Plants with female and male flowers borne on separate individuals are dioecious (as opposed to monoecious).

Indehiscent: Not splitting open at maturity. A fruit that does not open to release its seeds is indehiscent. Apples and cherries are indehiscent.

Layering: A branch's production of roots when it comes into long-term contact with the soil or other rooting medium. Layered branches typically have the ability to grow independently when separated from their parents.

Legume: A dry, dehiscent fruit formed from a single carpel and typically containing many seeds; legumes typically split open along two sides, often twisting explosively, to expel seeds. The fruits of Scotch broom, gorse, locusts, and honeylocusts are all legumes. Members of the family *Leguminosae* are also called legumes.

Lenticel: A raised, corky pore in the bark of a woody stem that facilitates the exchange of gases between the plant and the surrounding atmosphere. Lenticels often have distinctive shapes and colors.

Nitrogen fixation: The conversion of atmospheric nitrogen to organic forms more readily used in biological processes. In nature, lightning and certain bacteria are primarily responsible for this process. Nitrogen-fixing bacteria may be free-living, in the soil, or in nodules attached to the roots of plants such as alders, all members of the legume family, and members of the genus *Ceanothus*.

Nut: A dry, single-seeded, indehiscent fruit with a hard outer shell. The fruits of California hazel and golden chinkapin are nuts. The acorns of oaks and tanoak are nuts topped by an involucre (cap).

Old-growth forest: A forest dominated by large, old trees but also having the following properties: relatively open canopies with foliage occurring in several layers, multiple tree species, dead standing trees (snags), and dead fallen trees.

Ortet: The original plant from which members of a clone have arisen. The "offspring" are called ramets.

Ovary: The basal portion of a flower's pistil; the ovary bears the ovules, which develop into seeds.

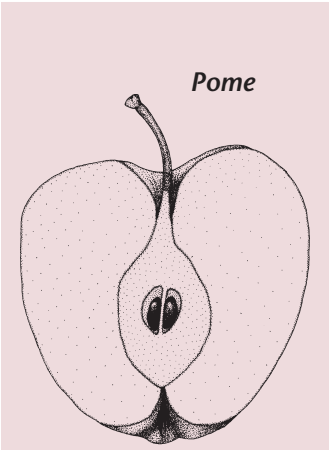
Perfect: Flowers that have pistils and stamens (female and male organs) within the same flower are said to be perfect.

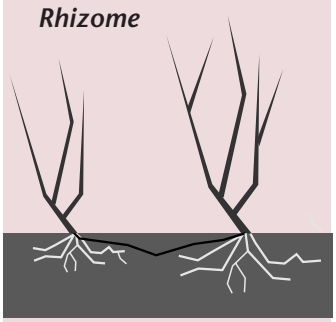
Pericarp: The wall of a ripened ovary; fleshy at maturity in species such as apples and cherries, but dry in other species, such as Scotch broom and rhododendrons.

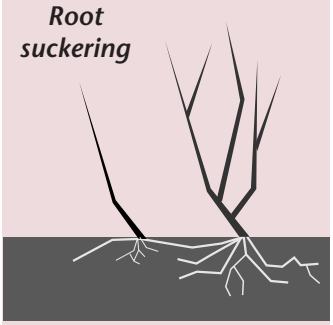
Persistent: Living longer than expected. Evergreen plants have persistent leaves; that is, leaves that live longer than one growing season. In some evergreen plants, leaves persist for little longer than a year; in others, they may persist 10 years or more.

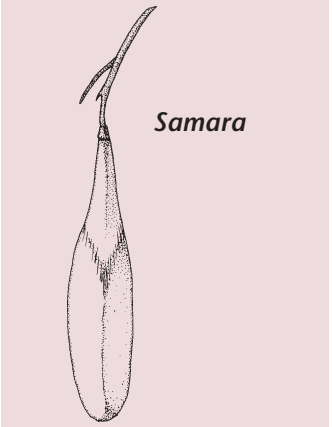
Photosynthesis: The process by which green plants convert carbon dioxide and water into sugar. Chlorophyll and sunlight are essential to the series of complex chemical reactions involved.

Pioneer: A plant capable of invading newly exposed soil surfaces and persisting until supplanted by successor species. Red alder is one example of a pioneer (species).









Pistil: The organ of an angiosperm's flower that bears the ovule (embryonic seed). A pistil is composed of an ovary, a style, and a stigma.

Pome: A multiple-seeded fruit in which the seeds are borne inside a papery capsule that is surrounded by a fleshy receptacle. The fruits of apples, pears, hawthorns, and mountain-ashes are pomes.

Primary dispersal: The distribution of seeds directly from the mother plant to their initial resting place (usually the ground). Gravity, wind, and animals are especially important factors in primary dispersal.

Pubescence: Hairiness. Plants have pubescence of many different types, lengths, and density; pubescence is often an important aid in identification.

Ramet: An independent member of a clone. The above-ground stems of salmonberry clones are called ramets. The "parent" plant is called an ortet.

Reforestation: The replanting of trees in forests that have been affected by cutting, fire, disease, or other disturbances.

Regeneration: The development of a new forest. Regeneration may occur naturally, from seeds dispersed by wind, water, gravity, or animals or through non-assisted vegetative reproduction, or it may be aided by humans who plant seedlings or clonal material.

Revolute: Rolled under. A leaf with a revolute margin has edges that are rolled under.

Rhizome: A horizontal underground stem that has the ability to bear roots and shoots and which usually persists from season to season. Although root-like in form, rhizomes are not roots. Salmonberry and salal are Pacific Northwest species that reproduce via rhizomes.

Riparian zone: An area near a stream or other body of water in which the vegetation, soils, animals, terrain, and habitats interact with the water. Depending on the type of water, the terrain, and the person doing the classifying, riparian zones may be very narrow or very broad.

Root suckering: The sprouting of new shoots from stored or adventitious buds along a plant's root system when the plant is disturbed.

Samara: A dry, single-seeded, indehiscent fruit with a prominent wing. The fruits of maples and ashes are samaras.

Scarification: The process of mechanically or chemically breaking the hard exterior coat of a seed in order to facilitate the penetration of water and atmospheric gases. In a different context, it also refers to the shallow loosening of soil surfaces.

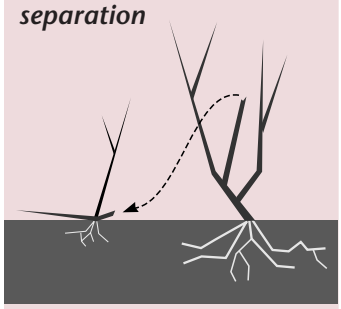
Secondary dispersal: The redistribution of seeds after they have left the mother plant and come to their initial resting point (usually the ground). Wind, water, and animals are especially important factors in secondary dispersal.

Serrate: Having marginal teeth pointing forward (toward the apex).

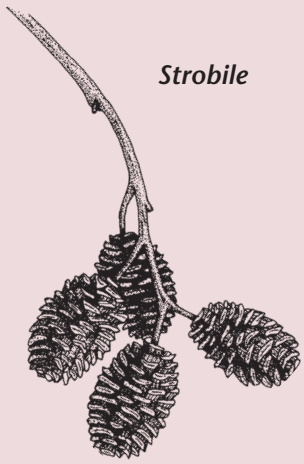
Sexual reproduction: The formation of new individuals by the fusion of two uni-cellular sex cells (gametes) to form a diploid zygote. Sexual reproduction results in new individuals that are genetically similar, but not identical, to each parent.

Shelterwood: A method of regenerating an even-aged stand in which the new trees develop under a partially shaded environment created

Shoot separation



Strobile



by the residual trees. Crop trees are typically removed in two or more cuttings and may be removed uniformly throughout the stand or in more defined groups (strips or patches).

Shoot separation: The ability of a shoot, when separated from the parent plant, to develop new roots and shoots. The shoots of cottonwoods and willows may develop such roots and shoots if separated from the parent plant through damage or cutting.

Shrub: A perennial woody plant that branches close to the ground and typically has multiple stems. Form may be erect or prostrate. Size varies dramatically, but shrubs are typically less than 20 feet tall.

Softwood: A general category of trees based on wood hardness. The term *softwood* is commonly used as a synonym for the term *conifer*, although not all conifers have soft wood. All Pacific Northwest conifers are classified as softwoods; however, some have wood that is harder than some Pacific Northwest hardwoods.

Sprouting: The development of new shoots and roots from stored or adventitious buds along a plant's stems, roots, or root collar.

Stamen: One of the pollen-bearing organs of an angiosperm's flower. A stamen consists of an anther and a filament.

Stem exclusion: The second developmental stage in a forest stand following disturbance. In this stage, existing trees begin to differentiate in height and diameter; new trees do not invade the stand and some existing trees and shrubs die.

Stem initiation: The first developmental stage in a forest following disturbance—characterized by the invasion and colonization of new species and new individuals, plus the sprouting of residual plants.

Stem re-initiation: The third developmental stage in a forest following disturbance. Gaps occur in the overstory, and understory herbs, shrubs, and trees begin to reappear.

Stratification: The damp chilling period that some seeds need in order to germinate.

Strobile: Has two meanings: 1) the reproductive structure of a gymnosperm (commonly called a cone), and 2) a type of dry, composite fruit in an angiosperm in which the individual fruits are achenes (the fruits of alders are strobiles).

Succession: The gradual replacement of one community of plants and animals by another. Succession is commonly described as being orderly, directional, and predictable, although this is an over-simplification.

Thinning: Removing individual trees from a stand, either singly or in clumps, in order to regulate stand density and achieve an array of objectives. In commercial thinnings, harvested trees are removed from the site and put to use, while in pre-commercial thinnings harvested trees remain on the site.

Tolerance: The ability of an organism to tolerate or withstand a certain set of environmental parameters. For example, a plant may be described as being tolerant of shade, sun, drought, moisture, etc. Most often, tolerance involves a set of environmental conditions—for example, a plant that grows well in the understory is often described as being shade-tolerant, when in fact it must also be tolerant of predation, crushing, browsing, and drought.

Tree: A perennial woody plant that typically has a well defined central stem (usually one main trunk) and a well defined crown. Heights of mature trees vary dramatically, from 10 feet to over 300 feet.

Understory: The layers of vegetation formed by smaller trees, shrubs, and herbs growing under trees that make up the forest canopy.

Valvate: Meeting at the edges without overlapping. Some buds have valvate scales.

Vegetative propagation: Synonym for vegetative reproduction.

Vegetative reproduction: Asexual reproduction; the production of new individuals without genetic recombination ("parents" and "offspring" are genetically identical). Some woody plants have the ability to produce new, genetically identical individuals through processes such as rhizome production, layering, basal sprouting, and root suckering. Human-assisted techniques include grafting, rooted cuttings, and tissue culture. Many herbaceous plants also produce vegetatively via corms, bulbs, stolons, and tubers.

Associated Literature

The following sources were consulted in compiling this glossary.

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Additional Notes

Educational Package

This leaflet is part of a larger educational program on the reproductive ecology of Pacific Northwest broadleaved trees and shrubs. The complete program consists of two audio-visual components—a videotape on the reproductive ecology of broadleaved trees and shrubs and a series of slide-tapes on shrub identification—and four printed compo-

nents: 1) an overview of plant reproduction, 2) a series of leaflets on PNW trees and shrubs, 3) a glossary of relevant terms, and 4) a list of associated literature. To obtain the complete educational package, contact: Forestry Media Center, College of Forestry, Oregon State University, Corvallis, OR 97331, (503) 737-4702. To obtain only the printed documents, contact: Forestry Publications Office, Forest Research Laboratory, Oregon State University, Corvallis, OR 97331-7401.

Program Funding Provided by

- Coastal Oregon Productivity Enhancement (COPE) Program, Oregon State University;
- USDA Forest Service, Pacific Northwest Research Station, Ecological Framework for Management Program; and
- Silviculture Institute, Oregon State University and the University of Washington.

Jensen, E.C., and D.J. Anderson. 1995. THE REPRODUCTIVE ECOLOGY OF BROADLEAVED TREES AND SHRUBS: GLOSSARY. Forest Research Laboratory, Oregon State University, Corvallis. Research Publication 9f. 8 p.

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