

## Development and Dispersal of Some Woody Plant Seeds

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A major factor in the continuance of the plant species has been the remarkably effective procedures that have evolved for seed dispersal. Knowledge of these methods allows one involved in plant propagation to collect seeds when they are properly developed but before they are lost to the natural agencies of dispersal.

In autumn when the nesting season has passed and birds have reared their young, some species gather in multitudes and roam the countryside. In nature's scheme of things, this timing coincides with the dispersal of many kinds of plant seeds. Fleshy fruits containing seeds dependent on birds for dispersal ripen and change to a variety of highly attractive colors. Birds have no teeth, do not chew but gulp their food. Therefore, cleaned and undamaged seeds pass through the birds and are scattered about the countryside in their droppings.

Many other seeds that rely on wind for dispersal are contained in vertical capsules which when ripe open only at their tops. Therefore, it takes strong winds to enter and carry the seeds away. Some that spread by wind are so firmly attached that it requires gale force winds to effect their release. This adaptation is designed to propel seeds greater distances.

### ***Magnolia* species**

*Magnolia* fruits which are highly attractive to birds, ripen and are ready for collection about mid-September in the Boston, Mass., area. They have developed in colorful aggregates of follicles (called cones). When ripening occurs, the chambers split open and expose the highly conspicuous fruits. These are attached by slender cords called suspensors. This design makes fruits available to birds while still on the tree. If fruits happen to fall from the tree to the ground, they are consumed by creatures that have no interest in the fleshy outer portion and destroy the seeds by eating only the more highly nutritious embryo contents. Usually cones are symmetrical. However, if some chambers are not filled they are overgrown by those that are, and this leads to distorted shapes.

### ***Euonymus* and *Celastrus***

These two members of the Celastraceae also disperse seeds in a somewhat similar manner. *Celastrus scandens*, the American bittersweet, ripens its yellow capsules in the autumn, exposing bright red seed arils. The colorful fruits of euonymus dangle on slender stems. When they open they also reveal brilliantly attractive arils. In New England, in autumn, the outstanding fall color of *Euonymus* reveals its presence along wooded areas and roadsides, and tells of its successful dispersal.

### ***Juniperus virginiana***

In the northeast it is not uncommon to see red cedar as a pioneer woody plant along highways or on abandoned land. Roaming flocks of birds stop at these locations to eat seeds found on the vegetation. In the course of such visits red cedar seeds acquired elsewhere are left in their droppings.

Wide variation in plant shape and growth habit is found in these masses, some of which could have horticultural merit. Occasionally, one sees hedge-like rows of cedar plants growing beneath utility wires on which birds had perched.

### ***Cedrus libani***

The cedar of Lebanon was first introduced to cultivation from the Lebanon mountains of Syria in 1638. In the British Isles, one sees many spectacular specimens that thrive in that climate. However, when brought to the United States, those of Syrian origin proved hardy only as far north as Southern New York. The species is also found in the Anti-Taurus Mountains of Turkey where, at higher altitudes, the climate is quite severe. At the turn of the century, Professor Charles S. Sargent of the Arnold Arboretum learned of this and arranged to have seeds collected from that region. They arrived at the Arnold Arboretum in 1902. This introduction was highly successful and those now found growing in the northern United States, no doubt, resulted from it, as throughout the years the Arnold Arboretum has provided seeds to botanic gardens and nurserymen. These superb trees were considered distinctive enough to be given a varietal name and are known as *C. libani* var. *stenocoma*.

In the Boston area pollen dispersal takes place about mid-October. The staminate strobili produce vast amounts of pollen and when a gust of wind moves the branch bearing them, the nearby air becomes yellowish. If the branch is shaken by hand a dense cloud of pollen arises. At this time the scales of the much smaller female strobili are open to receive the wind-borne pollen. Both male strobili and female cones are vertical. Spent staminate strobili often remain on the branches into the following summer.

In spring the pollinated female strobili start developing and achieve full size by autumn. However, at this stage they are immature and will not be ready to open and disperse their seeds until early autumn of the next year. It is not unusual to see cones of the first and second year on the same tree.

Harvesting is best done by removing the cones with pruning shears just before they open. If natural dispersal is allowed to take place, the cones disintegrate with the winged seeds being carried away by the wind while the heavier scales fall to the ground. When this occurs the central cone axis remains and can remain on the tree for many years. On occasion, one finds seedlings of *C. libani* var. *stenocoma* in the vicinity of the Arboretum's trees.

### ***Pseudolarix kaempferi***

*Pseudolarix kaempferi*, golden Larch, is a very beautiful deciduous member of the Pinaceae and is native to China. The oldest tree growing in the Arnold Arboretum is 93 years of age and has never presented any problems. It is monoecious with male and female flowers borne separately on the same tree. Each sex develops in individual clusters. These cones mature and start to shatter about mid-September and must be collected prior to that time.

### ***Enkianthus***

This member of the Ericaceae bears its flowers in clusters. They are bell-shaped and suspended on slender stems with the openings pointing downwards. Such orientation shelters the reproductive parts from rain. When fertilization has taken place, the

capsules quickly turn upwards and assume a position they will maintain for ripening and dispersal.

***Oxydendrum arboreum***

This beautiful tree, native to the Eastern United States, develops its flower clusters late in the season. They terminate branches of the current season's growth and are produced in profusion. When contrasted against the foliage of the mother tree, they present a very attractive picture.

Each flower cluster is composed of racemes on which individual flowers develop. A raceme separated from the cluster shows the progression from flower to capsule. At the proximal end are fertilized capsules that have turned upward, followed by capsules that are in the process of turning up. Next on moving toward the distal end are pendulous open flowers, followed by flowers not yet open. At dispersal time, all capsules are vertical or very close to vertical, despite the fact that many are borne on racemes positioned at various angles.