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ORNAMENTAL PLANTING FOR HIGHER ALTITUDES  
IN ARIZONA

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The diversity of our State as regards rainfall, temperature, seasons of growth, and range of vegetation, all of which are more or less influenced by altitude, may readily be appreciated when it is recalled that two arbor days are observed annually, one in early February for the southern portions of the State and the other in April mainly for the northern counties. Practically speaking, those sections lying at the lower altitudes secure best results from planting done during the period December to February inclusive, while at moderate or high elevations March to April is ordinarily the best time.

In the southern portion of Arizona except at altitudes above 4500 feet there are seldom more than 20 degrees of frost in winter, and in many localities even less, while the maximum summer temperatures range from 102 to 115 degrees F, with low humidity and intense sunlight. Trees that are resistant to zero F. in addition to extreme heat and aridity, are generally successful under these conditions. In the northern and eastern parts of the State, and generally where the altitude is 4500 feet or more, zero and even colder winter weather prevail for at least a part of the winter season, the summer temperatures, on the other hand, being very moderate. Plants succeeding under these conditions must be tolerant to lower winter temperatures, and also tolerant to drought and aridity, the two latter conditions being less marked than at the lower altitudes, though characteristic of the State as a whole.

DECIDUOUS SPECIES

The deciduous trees that may be expected to flourish in the higher and cooler parts of the State, by virtue of actual

test, nativity, or growth under similar conditions elsewhere, are as follows: native box-elder (*Acer interior*); native ash (*Fraxinus velutina*); Arizona walnut (*Juglans major*); Arizona sycamore (*Platanus Wrightii*); honey locust (*Gleditsia triacanthos*); black or yellow locust (*Robinia Pseudo-Acacia*); osage orange (*Maclura pomifera*); white and Russian mulberries (*Morus alba* and var.); China tree of heaven (*Ailanthus glandulosa*); black cottonwood (*Populus acuminata*); Carolina poplar (*Populus deltoides*); white or silver poplar (*Populus alba*); Bolley's poplar (*Populus alba* var. *Bollevana*); Lombardy poplar (*Populus nigra* var. *italica*); and Russian oleaster (*Elaeagnus angustifolia*.)

The well known box-elder occurs native over a considerable portion of Arizona and can be depended upon as a reliable shade tree above altitudes of 4000 feet. It is a rapid grower, doing best, naturally, in moist, alluvial soil. The writer has noted excellent specimens of this tree throughout the State between the altitudes 3000 and 7000 feet, many of which have attained diameters of 12-15 inches during 15 years growth. At altitudes of 7000 feet and above, it is, naturally, slower growing than where the seasons are longer and the summer temperatures warmer. On account of its rather irregular habit of growth and low branching, it should not be planted extensively as a street tree. Occasionally, it is infested with a large, reddish bug which is difficult to control, and which often renders it undesirable.

The native ash of our lower mountain altitudes is a valuable tree for lawn, avenue and shade planting; and it is notably resistant to drought and low temperatures. It develops into an upright, symmetrical tree which requires but little pruning. The writer has observed it growing successfully on Mount Graham at altitudes of 7000 feet. The seeds may be collected from native trees or secured from reliable seed and plant companies, and likewise young trees, at nominal cost. Though this tree leaves out rather late in the spring, it has a wealth of bright green foliage during the summer and fall months.

The Arizona walnut is another tree that deserves to be planted generally. It appears to have a range in altitude from 2400 to 8000 feet, and occurs quite commonly throughout the State. In common with other members of this family, it does best in moist, alluvial soils, i. e., those of our flood plains and canyons, under which conditions it is very drought resistant. If properly pruned, it makes a shapely tree, otherwise it is inclined to branch low, which renders it objectionable for street planting. In the northern parts of the State its leaves are subject to injury from a small insect, which causes them to turn yellow and fall prematurely. At this time it is being used successfully in Arizona as a resistant stock upon which to graft the French walnut.

The Arizona sycamore occurs commonly in our mountain canyons up to elevations of 6000 feet. Though little planted as yet, it gives promise of becoming a valuable tree for altitudes of 3000 to 6000 feet. It is the largest of the deciduous trees of our mountains.

canyons and one of the most abundant. In habit of growth it is rather erect; this, in connection with its sharply lobed leaves, and clean, smooth, whitish trunks and limbs, the thin bark of which is shed annually in small flakes, render it a tree of more than usual note. Young trees cannot be secured from nurseries, but seeds may be gathered in the fall, or cuttings can be taken any time during the dormant season and preserved until spring, in moist sand.

The honey locust, though not native, commends itself to Arizona planting because of its general hardiness. It is shapely and well adapted for street planting. With its delicate green, fern-like, though not dense, foliage, it is one of our handsomest trees in mid-summer. Even at 2000 feet altitude or less, with rather limited irrigation and extreme summer heat, it presents a thrifty appearance, while at Flagstaff it appears to succeed as well as any deciduous tree planted. Unfortunately, its large seed pods remain on the bare limbs during the winter, and the ordinary types develop ugly branched thorns on the trunks and larger limbs. It also leaves out late in spring. Trees that are spineless, or practically so, may be had by selecting seed from spineless individuals, which are not uncommon in most communities. Since not all the seeds come true to the spineless type, they should be sown thickly in rows, preferably in the fall, and those showing a tendency to develop spines weeded out during the following summer. When seeds are sown in the spring, they should stand for 12 hours in warm water which is nearly at the boiling point when poured over them.

The black or yellow locust may be planted with success between the altitudes 3000 to 7000 feet. Its graceful dark green foliage is always pleasing, while in April and May, with its white fragrant flower clusters, it is the handsomest tree on the landscape. It is considerably planted at Snowflake, St. Johns, and in the Upper Gila Valley, where it develops into shapely trees. At Flagstaff, it is slower growing, though hardy and ornamental. It appears to endure some alkali. The numerous small pods remain on the tree in season and out, thus giving these trees an untidy appearance during the dormant season. Unless properly sprayed, the tree is subject to ravages from the basket worm. The New Mexican locust is a closely related tree occurring native in our mountains; it appears to do equally well under cultivation, though as yet it is little planted. Both these species are grown readily from seeds when treated as indicated for the honey locust.

The osage orange or *bois d'arc* is very successful under our conditions, thriving best in alluvial soils. It is rapid growing and both heat and frost resistant. On account of its spiny branches it is scarcely desirable for ornamental planting. The leaves are uninjured by the summer heat, and at maturity are dark green and shining. The tree is of upright habit. Like the black locust, the tree suckers somewhat from its roots. The wood is strong and durable, and valuable for posts, poles, and other similar uses on the farm. It is best planted rather closely together.

The Russian mulberry and the white mulberry, the former being but a variety of the latter, are very resistant trees for south-western planting. Both are extremely tolerant to heat, frost and drought, and develop into large trees with ascending spreading branches. Many object to their use as lawn and street trees because of the quantities of fruit produced annually, but in the farm lot, barn yard, and poultry yard they have no equal, since here the fruit is a real asset. In southern Arizona the white mulberry compares well in growth with the hardy native ash trees. The leaves are valuable forage for sheep and goats and the wood may be used for a variety of purposes.

Of the various poplars, native and introduced, growing within our borders, the black cottonwood is the most promising one for higher altitudes. It occurs native in the mountain canyons of eastern and northern Arizona, and is invariably successful under cultivation. Good types of this tree may be seen at Camp Verde, Springerville, and Snowflake. At the latter place there are several fine rows of these trees, some of which are 80 feet in height with a trunk diameter of two feet at 25 years of age. In some respects this is our most magnificent avenue tree, being erect though not strict in habit, and developing a symmetrical, oblong-rectangular head. In common with other cottonwoods, the black cottonwood does best in deep, alluvial soil with an abundance of water. The Western poplar also does well at our higher altitudes, where it is more planted perhaps than any other variety, although in the writer's opinion it does not rank with the black cottonwood. It may be distinguished readily from the native cottonwood of the lower altitudes by its larger, glossy and more angular leaves. The white or silver poplar is another member of the same family that may be planted safely at altitudes of 4000 feet and above. Groups of this tree are decidedly picturesque in parks on account of their irregularity of form, white bark, and silvery foliage. Since it sprouts badly from the roots, and since also it is inclined to branch low and grow unshapely, it scarcely merits a place in private lawns or on the street. A much more desirable tree for the latter purpose is a variety of the white or silver poplar known as Bolley's poplar, which has the leaves of the silver poplar combined with the general habit of growth of the Lombardy poplar. The Lombardy poplar is too well known to need description. Perhaps the finest specimens of this tree to be seen in the State are growing at Snowflake and St. Johns. In spite of good care, Lombardy poplars, in common with certain other members of the poplar family, have a tendency to die early, for which reason they should not be planted where permanency is desired.

The Russian oleaster, though of recent introduction, is among the more promising of our smaller ornamental trees. Besides being resistant to drought, frost and alkali, it is also a rapid grower. It may be pruned closely for hedges, grown as a large shrub or trained as an ornamental tree. Its olive-like leaves, silvery-white below and light green above, together with the abundant yellow sweet-scented flowers and glossy brown or purplish-brown bark, makes it one of the

most attractive of plants. After 15 years it has been accorded first place among deciduous trees in western Nebraska, where the conditions are in many respects similar to those of our moderate altitudes. The writer saw some trees of this species growing in Flagstaff a few years ago, where they appeared to be entirely at home. It is mostly propagated from seeds, and since these begin growth at rather low temperatures, they should be planted in the fall. It should be a very valuable tree in sections of our State where dry farming is practicable.

The China tree of heaven, or ailanthus, can be successfully grown throughout the State. Its fine large leaves are very ornamental, but in habit of growth it is quite formal, and the flowers of the staminate tree have a very disagreeable odor. It has no insect enemies or fungus diseases. As a young tree, at least, it is quite rapid growing. The writer has never observed any large trees of this species in Arizona, though it should attain a diameter of 2 or 3 feet. It is resistant to all of our climatic conditions and in addition resists some alkali. While the wood is soft and rather weak, it appears to resist rot. Unfortunately, this species suckers considerably, which might become a serious matter in irrigated lands.

#### EVERGREEN SPECIES

Of the evergreen trees that may be recommended for planting above altitudes of 4000 feet, the following list is suggested. One-seeded juniper (*Juniperus monosperma*); Utah juniper (*Juniperus utahensis*); alligator bark juniper (*Juniperus pachyphloea*); Rocky Mountain red cedar (*Juniperus scopulorum*); Arizona cypress (*Cupressus arizonica*); the native pinyons or nut pines (*Pinus cembroides* and *P. edulis*); yellow or bull pine (*Pinus ponderosa*); Arizona yellow pine (*Pinus arizonica*); white or silver fir (*Abies concolor*); Douglas spruce (*Pseudotsuga mucronata*); Colorado blue spruce (*Picea Parryana*). With the exception of the Colorado blue spruce the above trees grow native in the mountains of our State. The first seven, including the nut pines, occur native between the altitudes 3800 and 6500 feet. While they are of slow growth, which is characteristic of coniferous trees, when once well established, they are extremely resistant. The one-seeded juniper and the Utah juniper, both native to northern Arizona, grow at altitudes somewhat lower than the alligator bark juniper or the Rocky Mountain red cedar, often over very sandy areas. The Arizona cypress has proved to be well adapted to arid, exposed situations. Its graceful outline, bluish-green color and pronounced aroma combine to make it a pleasing species for ornamental planting. It is very successful on the University grounds at Tucson, Arizona. It should be hardy up to altitudes of 6000 feet. The remaining five species are inhabitants of the higher mountain slopes and plateaus, and very likely cannot be grown successfully below altitudes of 5000 feet, on account of aridity and heat. Of these, the species of yellow pines are the most widely distributed over our mountains, and also the most heat and drought resistant. The white or silver fir, and the Douglas spruce

occur almost entirely on the northern exposures of our higher mountains.

Great difficulty is experienced here and elsewhere in transplanting pines, spruces, and firs from the surrounding mountains and hills to city parks, cemeteries, and home grounds, even when temperature and rainfall are such as to make possible their natural growth over the same area. This is due largely to the fact that in digging up even small trees, a large portion of the moisture-absorbing rootlets are destroyed and the remainder so disturbed as to be unable to perform their work normally. Accordingly, recently transplanted evergreen species look fresh and green for a time, when as a matter of fact they may actually be suffering for water, even with an abundance of moisture in the soil. Moreover, roots of coniferous trees are, in general, sensitive to dryness, and when once dry no amount of soaking can restore them to their normal condition on account of the resinous nature of their sap which hardens upon becoming dry. Evergreen trees give off considerable moisture at all times through their leaves, so that if they suffer for want of water on account of the root area being greatly reduced, or the roots being exposed to the drying effects of the air, or the lack of moisture in the soil after being transplanted, they are almost certain to die. Failure in transplanting them is all the more pronounced where the soil covering is scant and the absorbing roots tend to spread out over a relatively large area. It can thus be seen that if the difficulties of transplanting small pines and spruces are considerable, they are many times greater in the instance of larger trees.

If transplanting of these species is attempted, healthy, symmetrical plants one to two feet in height should be selected, and watered heavily a few days before being dug up. As much soil as possible should be retained about the roots, at least a ball 15 to 20 inches in diameter, and this should not be disturbed any more than necessary. As soon as loosened from the ground, the mass of soil enclosing the roots of the young tree should be bound together tightly with wet burlap, and the whole removed to the place of planting which should be made ready in advance. Transplanting should be done just as the buds begin to swell for spring growth, and if possible the specimens should be selected from those growing in deep, heavy soil, which will hold together much better than sandy soil. To make the matter more certain, especially in the instance of pines whose lateral rootlets are rather meager, it is desirable to cut off the larger roots at some distance from the tree—12 to 15 inches, without other disturbance, at the beginning of the rainy period of the previous season. This will have, in part, the effect of transplanting, as it will encourage the tree to develop lateral roots for feeders, which will be included in the mass of balled earth removed with the tree.

Strange as it may seem at first thought, nursery stock of the above varieties of evergreen trees can usually be depended upon to grow with ordinary care. This is due to the fact that they have been shifted or potted one or more times after leaving the seed bed, which

encourages a good growth of fine roots. For this reason the writer recommends that evergreens, especially when wanted in small lots, be purchased from reliable nurseries to be shipped by express where possible. They should be shipped in five gallon cans, or balled, and should be not more than two or three feet in height, as these transplant more readily and are also less expensive in handling than larger ones. Young coniferous trees upon being planted, whether native or exotic, should be watered regularly during the first year or until they become permanently rooted, after which irrigation may be less frequent. They should be protected from animals with a netted wire guard three or four feet in diameter, and foliage should never be wet during the day from lawn sprinkling.

#### PLANTING AND CARE OF TREES

This is a matter of no small concern in Arizona, as more or less irrigation is required throughout the year, and this must be continued during the life of the tree. Since the number of trees planted about our homes and in many towns and cities in our State must always be limited on account of the expense of digging holes and irrigating, we should plant only the best varieties and give them care accordingly. In order to thrive, trees must have reasonable soil area for their roots to grow in and a moderate amount of moisture. It is largely a waste of time and money besides being a disappointment in after years, to plant trees a foot or so deep with hard pan, caliche, or a stony formation below. Under such conditions, holes of considerable size, 4 to 6 feet in diameter and as deep, should be dug; this can usually be facilitated by blasting, which pulverizes or loosens up the stony mass below. It is always desirable to mix well-rotted manure—not fresh, or other similar material, in the proportion of one to four or five, in the soil used in filling the holes, especially where there is a tendency for the soil to become heavy and packed. Besides adding nutriment, the rotted, organic matter assists in aeration of the otherwise lifeless soil, which is entirely essential to healthy plant growth. During the first few months after young trees are planted, they should be watered moderately about every week or ten days. After they are well established, a heavy irrigation once in three or four weeks will be found sufficient ordinarily; at least this has been the writer's experience. Such an irrigation should be followed shortly by cultivation of the soil to a depth of six inches, so as to form a dry, loose soil-mulch. Where possible, a mulch of rotted straw, chip dirt, or other available material should be used, since this will prevent to a large extent loss of soil water by evaporation. Basins six inches or so in depth and about six feet in diameter may be constructed about trees to aid in irrigation. If the adjoining surfaces are properly sloped, these will be found to collect sufficient water during heavy rains to keep the tree growing for months at a time. In our dry climate evergreens in particular should be watered during the winter months, and failure to do this is one of the most common causes for the dying out of these trees during the winter period.

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