The Green Thumb

July - August – 1945
WATERSHEDS AND WATER YIELDS OF COLORADO

By JOHN W. SPENCER
Regional Forester

PEOPLE are funny. We do a lot of talking about things which we do not wholly understand. Many of us glibly repeat words and phrases without grasping their full import, or realizing their significance in our daily lives. In short, we take the basic things of life for granted.

Now, for example, I imagine that every man and woman in this community feels that he or she is quite familiar with soils, with erosion, with watersheds and water, but how much do we really know about these things? Take, for instance, our soil resource, which economists tell us is the source of all wealth. It is far more than this, for it is the very basis of all human existence. It is the soil which produces the grass, the herbs, the shrubs, the trees upon which our lives depend.

Furthermore, did you ever stop to realize that virtually all of this important vegetable life is produced from some 18 to 20 inches of top soil? The subsoil and the rock masses of the earth produce practically no vegetation whatever. It is humanly impossible to realize how exceedingly thin is this critical layer of top soil in relation to the mass of the earth itself. The thinnest coat of paint that could possibly be brushed on the largest office building in Denver would be several hundred times too thick to be in true scale.

In short, we human beings live or die, we feast or we starve according to the way we treat this almost impalpable coating of soil on the earth's surface.

When we stop to think of the carefree, irresponsible way in which we treat this skin of top soil, it is a wonder that any of us are here today. Erosion, if allowed to go unchecked, can destroy all prosperity, and even human life itself, more completely and more effectively than wars and pestilence combined. Scientists tell us that it takes nature approximately 5,000 years to produce an inch of top soil. I cannot testify to the accuracy of this from personal experience, and I can't see that it makes much difference whether it takes 1,000 years or 5,000 years to make an inch—I do know that we can easily lose this inch of soil in one year.

It's bad enough to abuse forests, brush, and grass lands and lose these crops. However, the real loss comes through the destruction of this protective vegetative cover which allows the soils to wash. This damage, all too often, reaches the point where it becomes irreparable.

Consequently, the preservation of our soil capital must be the foremost and dominating consideration in all forms of natural resource conservation. This applies equally to forest lands, range lands, and farm lands. This is the big job and the prime responsibility of our good friends in the Soil Conservation Service. It should also be the responsibility of every land-managing agency and individual. Just keep in mind, please, this little thin tissue paper of soil upon which we humans live and swarm like bugs, if ever you are inclined to feel that foresters and soils men are over-
Now, we are ready to talk about water.

To most of us, water is just something we get when we turn on a tap, something that we associate with more or less regularly on Saturday nights, or a substance that we see running loose in our streams. Most of us don’t stop very often to consider the significance of our water supply nor its origin.

In short, we usually think of water, when we think of it at all, as a gift freely provided as a matter of course by a kindly Providence. Wholly apart from personal or domestic uses, water occupies an especially important place here in the semiarid West. It is the economic life blood of all sustained enterprise and prosperity in this region. Without it, even human existence in terms of modern civilization becomes impossible.

Now for a few facts and figures. The Continental Divide is literally the backbone of the land areas of this nation. The highest portion of this divide lies squarely across Colorado. Colorado, with its actual mean elevation of 6,800 feet above sea level, towers 200 feet above Wyoming and far above all the rest of the states. Approximately 76 per cent of all land surfaces in the Continental United States, having an elevation of 10,000 feet or over, are located in Colorado alone. From this great roof top the run-off of surface water in measurable stream flow averages 16,600,000 acre feet in a year of normal precipitation. All of this tremendous quantity of water originates in this state, and, without question, is by long odds the most important and most valuable of Colorado’s natural resources.

Just what is the relationship between altitude and water production? All of our water comes from natural precipitation, principally in the form of rain or snow, and the amount of precipitation increases with increasing altitude. Water gathering values, sufficient to produce measurable and visible water in the form of stream flow, begin apparently somewhere around 7,500 feet above sea level and increase very sharply with increasing elevation. At the lower elevations the loss of water, through evaporation and transpiration, exceeds the amount of natural precipitation. Consequently, these areas contribute nothing in themselves to stream flow. Once in a while we get violent cloud bursts in the low foothills which create flash floods, usually doing a terrific amount of damage without producing any usable water. The high mountain country, however, produces more water than is lost through evaporation and transpiration, and does it year after year quietly, steadily, from melting snow and not in the form of cloudbursts.

Here are some figures compiled by the Colorado Water Conservation Board. The average precipitation for the entire state of Colorado is sixteen and one-half inches yearly. This is the equivalent of 93 million acre feet of water. Yet, the measurable stream flow in the same average year is only 16,600,000 acre feet. The difference between the 16,600,000 acre feet of stream flow and the 93 million acre feet of total precipitation represents this evaporation and transpiration loss I’ve been talking about — a loss of 82 per cent.

In brief, only 18 per cent of our precipitation becomes available in the form of stream flow. Yet, this residual 18 per cent makes...
Colorado one of the most important water-producing states in the Union. Parenthetically, Wyoming is the other major producer, and the two states combined lead the nation. Out of Colorado's available water production of 16,600,000 acre feet five and one-half million acre feet, or just about one-third are used within the state. The balance of a little over eleven million acre feet flows across the state boundaries, bringing life, industry, and prosperity to a thirsty arid empire. Part of this water goes to Nebraska and Kansas, and a much larger amount to Utah, Arizona, New Mexico, California, and the Republic of Mexico. Even sunny, self-sufficient southern California is vitally interested in Colorado's water.

Just what is an acre foot of water worth? Naturally, this depends upon the use to which it is put. Again, using Colorado Water Conservation Board figures, we find that Colorado field crops for the twenty years preceding 1942 averaged $7.45 an acre from dry lands and $28.75 from irrigated lands. Hay and grain and general farm crops averaged $10.00 per acre, while specialties like sugar beets, fruits, vegetables and truck crops yielded over $103.00 per acre. An acre foot of water in Colorado may be worth only $3.00 when used on mountain hay lands, but that same water may be worth four or five times as much when used with specialty crops. Colorado River water impounded behind the Boulder Dam is delivered to irrigators at $15.00 per acre foot. The City of Los Angeles valued its supply of Colorado River water at $100.00 per acre foot before the war and before its population figures started to jump. As a matter of fact, there is no ceiling when computing the value of water for domestic purposes. Just for the sake of having some figure to tie to, it is safely conservative to figure the cash value of Colorado's average annual crop of water at $3.00 per acre foot. For 16,600,000 acre feet, this means that our annual water yield is easily worth fifty million dollars. Actually, in terms of the downstream uses to which two-thirds of this crop is already directed, the annual value is probably four times as great.

As I told you before, the great bulk of this water comes from winter snows deposited in the high, wild, tangled mountain lands along the ridge tops of this state, beginning at perhaps 7,500 feet and over.

Probably the real water-producing lands of the state do not exceed an area of twenty million acres. Very well, if twenty million acres produce an annual water crop worth fifty million dollars, then the yearly production of each acre is worth $2.50. Capitalize this at 5 per cent, and you come out with a watershed value for these rough lands of $50.00 per acre. Fantastic? Well, that all depends upon the point of view, but no one can dispute the fact that these figures are almost absurdly conservative.

At any rate, it is evident that the perpetuation of this water crop, irrespective of what dollar value you give it, must and should dictate the management of the high mountain watershed lands. The national forests within Colorado contain a gross area of over fifteen million acres and include at least two-thirds of the important watersheds. Considering relative elevations, the national forests may control an even higher proportion of the water production.

The mere creation of a national forest does not, of course, increase the amount of snow and rain deposited upon any land surface. However, forest land management, as it affects the vegetative cover on the soil so as to profoundly affect both the character and the volume of water that is ultimately derived from any watershed.

The Rocky Mountain Forest and Range Experiment Station, operated by the Forest Service at Fort Collins, has, for some years, been conducting some extremely significant research in this field. Our scientists have found that by proper cutting and thinning of our high-altitude forests, the deposition of snow can be increased, evaporation losses cut down, better percolation into the ground induced, and the yields of usable water augmented. By proper forest management, the annual value is increased, evaporation losses cut down, better percolation into the ground induced, and the yields of usable water augmented. As I told you before, the great volume of water that is ultimately derived from any watershed can be increased, evaporation losses cut down, better percolation into the ground induced, and the yields of usable water augmented.

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This statement warrants a bit of explanation. You know, of course, that a watershed should bear a protective vegetative covering of trees, brush or grass. This covering is needed to maintain a porous absorbent top soil and to prevent erosion. But, if the mat of vegetation is too dense, it intercepts too much precipitation, particularly snow, and this results in a tremendous evaporation loss and the water that itself uses up a lot of water. In places where the timber is too thick, the snow is unable to reach the ground and pile up in large drifts. On the other hand, snow that falls on bare slopes or parks is constantly exposed to wind action and consequent evaporation losses. Furthermore, the snow that falls out in the open melts too fast in the first warm days of early spring and contributes to high flood stages without doing anybody much good. What this all boils down to is the fact that there is a nice point of balance between maximum usable water yields and just the right amount of vegetative cover.

The technique of proper watershed management to produce maximum water yields has never been fully worked out anywhere in the world, to the best of my knowledge. This is the sort of study the Forest Service is pioneering right here in Colorado. If the public, through Congress, will give the Forest Service enough funds for adequate research and will then support the land use policies resulting from such research, we will guarantee not only to maintain your water supply, but to actually increase it.

There is still another angle to this water question. I've been speaking of usable water. Now,
WHY DO WE PRUNE SHRUBS?

By D. W. SPANGLER
Pioneer Nurseryman of Longmont, Colorado

I. Pruning is a method where-by we enhance and perpetuate the beauty of the plant.

II. Pruning is a method where-by we remove the beauty of the plant, bit by bit, or in one swoop, and deposit it upon the ashpile.

In general, most of the shrubs in common use, if planted and given growing space, will in a few years, express their individuality, if not pruned in the meantime. They will be much alike in their general form. They will have few too many stems radiating out from the crown of the root, growing horizontal near the ground and perpendicular in the center of the plant—appearing fan-like in vertical section. Figure 1, the Colorado Red Dogwood, illustrates the point. This particular shrub was planted about ten years ago and had never been pruned until the snap-shot was taken. "Before" and "after" views were obtained and they looked so

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much alike that only an expert could see the difference, though an armful of stems had been removed. This pruning satisfied rule I.

Figure 2 shows what remains after a clump of dogwoods was pruned. They were the same age as that in Figure 1 and similar in appearance. They had never been pruned, and according to our judgment they were perfect in form and beauty. A well-meaning caretaker did the cutting last season. This represents pruning under rule II.

In fact a large percent of pruning is done under the same rule. The shrubs in Figure 3 were planted for a screen on the street side of a girls' physical training court. Before pruning they were leafy from top to bottom and formed a perfect screen. They typify the naked, unattractive shrubs seen in many places.

A few remarks about one of the most maligned shrubs may be in order. In a well-chosen place, a Bridal Wreath, I might say here that if anyone can name a shrub that will fit into more places and emit as much beauty, I am in the market for it. Our town looks its best during the month when it is in bloom, and the "neglected" plants are usually the most attractive.

Bridal Wreath is our modest shrub. It bends over so very gracefully to hide its legs.

Figure 4 is that of a Bridal Wreath planted upon one of our school grounds about ten years ago. It has never felt the blade of a pruning shears since it was planted. When in bloom, flowers and foliage almost touch the ground because of the added weight. Then its beauty is complete. It needs thinning now. In fact, Bridal Wreath and some other shrubs may be kept youthful by removing a few of the oldest canes each year and allowing as many new ones to mature. Many people do just the opposite—waste a wrong practice.

In general it may be stated that all the pruning most shrubs need is the removal of dead wood, straggly branches, and a thinning out of excess stems or canes.

Therefore, after you have landscaped and planted your home, throw your pruning shears into the cistern and let nature do the rest—and we mean this almost literally.

It is almost axiomatic to state that shrubs which bloom on new wood in the latter part of the season should be pruned when dormant, and the spring bloomers should be pruned just when the flowers have faded. We would add another rule almost correct: Prune shrubs down and trees up.

In some of the Viburnums, Beauty Bush, Mock Orange and some others, after well established they will send up new stems, which will reach considerably above the body of the plant. These should be cut out or topped off unless greater height is wanted.

Hydrangea A. G. Hibiscus and Tamarix should be cut off close to the ground when planted, and in every spring thereafter. Our arid climate kills the stems partially or entirely during the winter season.

A discussion of so called formal pruning is out of place here. By formal pruning we mean operations that will destroy the individuality of the plant as shearing of evergreens and trimming of hedges. An article discussing this phase might not be amiss.

The writer of this article spent his youth about twenty miles from the Missouri river in Kansas near the Nebraska line. This was in the eighteen seventies. Then the stream courses were margined with forests, in some places a mile or more in width. The outer zone was composed of scrub oak, sumac, hazel nut, prickly ash and other small species. The next zone included larger species, as hickory, linden and buckeye, and in the third, or middle zone adjacent to the streams were found the American elm, black walnut, sycamore and other large species. Intermixed among the latter were patches of smaller species. The forest was full of open areas, little jungles and canopied spaces, and what a place it was for picnics, for camp meetings, and for Chautauqua that lasted a week.

Man-made parks should contain all the characteristics of a virgin forest, and much more. Some do have them. Many small town parks occupy only a city block and some of them are so thoroughly pruned that one may see through them from any point around the outside. If one wants to picnic there no seclusion can be found and the whole country side may see him partake of his corned beef, pretzels and eggnog.

When these parks were established shrubs were planted among the trees. These shrubs, in many cases, are overshadowed by the trees, are more or less stunted, and leggy and almost leafless. They no longer add beauty, but rather detract from it. They should be removed but no one seems to have the nerve to do so.

It must be remembered that shrubs pass through periods of youth, maturity and old age, and when they reach the latter stage they should be removed and replaced by others. This applies to residence property as well as to parks.
In Colorado and nearby states that are “high and dry,” our ornamental plantings are largely dependent on Evergreens for several reasons. First and most important probably is that we have several months when deciduous trees and shrubs are without leaves, next is that most of the coniferous evergreens whether native or exotic revel in our thin dry air and freedom from danger of waterlogged roots.

Then native vegetation is always a safe guide as to what kind of material will feel most at home in our gardens and look most suitable. In pre-war days when you could drive over hill and plain haven’t you noticed how little of the native growth is deciduous in proportion to the area covered by evergreens?

Selection of species and varieties to plant? The size and structure of the house together with the size of the grounds will determine this. For specimen trees to be used as exclamation points, drawing attention to an especially good view or fine piece of architecture, Colorado Blue Spruce and Silver Cedar are tops. However they are too strongly individualistic to agree well in groupings of mixed evergreens. For this the native pines are excellent, western yellow, Foxtail, and Limber Pines for large bold groups and for windbreaks; where smaller scale material is indicated Pinon Pine is better.

White Fir may be used successfully either as a specimen or in groups. It is beautiful in either setting.

One prejudice that seems to survive is that against the willingness to sacrifice perfection in the individual tree in order to obtain a good group. Anyone who has played football or hockey knows that it’s the team that counts, not the individual. A group of pines cannot be a unit if we expect to keep each pine sufficiently far from its neighbor to achieve perfection as an individual.

One trap for amateur gardeners is difficulty in visualizing mature size of the little chaps they are planting now. Thus we see a Blue Spruce or White Fir planted so close to the house that either tree or house will evidently have to be moved if the tree is to have elbow room. It is well to think ten years ahead.

Low spreading evergreens have less individuality and so require less care as to placing. What they do require is pruning in time to prevent unwanted width or height. This is especially true of Junipers Chinensis Pfitzeriana and Sabina. Pfitzers have a way of spreading great mangy looking top wings that give the plant an unwieldy top-heavy appearance. Those who know tell me that this can be forestalled by careful out-of-sight pruning in time.

Sabines trouble is at the other end. Haven’t you seen old horned-legged specimens with just a little fuzz on top? Even these old fellows may be redeemed by cutting back severely about a third of the number of bare stems each year, thus providing foliage ahead for stems about to be cut next year.

So much for conifers. There are few broad leaved evergreens so far that seem to be happy in our
climate, but these few are really valuable helps in ornamental plantings. Two are natives, Ceanothus velutinus and Mahonia (Berberries) repens, Colorado Holly a half-sister of the taller Mahonia aquifolium. Oregon Grape, these Mahonias are desirable, and effective when planted together, Colorado Holly as a ground cover near Oregon Grape. Both take on the same crimson-to-purple winter color, so warm looking and attractive. Colorado Holly is a tolerant thing, grows equally well in sun or shade, in gravel, peat, loam and even in clay.

Ceanothus velutinus is not easy to establish but is extremely hardy, and useful in a shady corner.

The hardier evergreen members of the Euonymus clan are valuable chiefly as climbers, especially in shade where winter sun can't bleach them. The large leaved Euonymus radicans vegetus also makes a good shrub if well disciplined in youth. Euonymus kewensis with its tiny leaves and neat ways is a real godsend in the shady parts of the rock garden. Euonymus radicans colorata's red winter coat makes a pleasant variation. This is useful too as a ground cover.

While there is no questioning the value of evergreens in our home plantings there is danger of over-planting them to the exclusion of shrubs. A few years ago there was an epidemic of all-evergreen foundation planting. Nine out of ten new houses looking spic and span proudly boasted a pair of tall narrow junipers or arborvitae standing sentinel by the front door—fixed bayonets (not very inviting, were they?) Then snuggling close all around the foundation was a spotty mixture of every texture and color to be found in dwarf conifers, the whole creating rather a somber effect. The variety, in twig leaf flower and form, of a few well-chosen shrubs could add interest to such plantings and incidentally relieve that smugness.

It promises well for the planting of the thousands of new homes to be built after the war that people generally are becoming conscious of the need for attention to scale structure, form, texture and color of plants to suit buildings, and that there is increasing a popular literature to help them.

BOOK NOTES

"The Book of Naturalists," an anthology of the best natural history. Edited by William Beebe, Alfred A. Knopf, Publisher, 1944. "The development and growth of natural history are reflected in the writings of many naturalists, from Aristotle the present day, and the inspiration for these writings comes from interest and love of living animals and plants observed under natural conditions."—From the editor's preface.

"Green Cargoes" — the story of the transportation of seeds and plants from their original homes to the four corners of the earth. By Anne Dorrance. Doubleday, Doran & Co., Inc., publishers, 1945 — $2.00. "Green Cargoes" is a book for students of horticulture as well as for anyone interested in the believe-it-or-not facts of plant life. A most readable little volume.

ATTRACTING THE BIRDS

BY ENID ORTMAN

At "Havenwood" the home of the Ortman's south of Englewood, you will find many kinds of birds. "Green Cargoes" — the story of the transportation of seeds and plants from their original homes to the four corners of the earth. By Anne Dorrance. Doubleday, Doran & Co., Inc., publishers, 1945 — $2.00. "Green Cargoes" is a book for students of horticulture as well as for anyone interested in the believe-it-or-not facts of plant life. A most readable little volume.

A WOMAN once complained to John Burroughs that no birds frequented her garden, to which he replied, "You must first have birds in your heart, Madam, if you would find them in the bushes." And, therein lies one of the secrets of attracting them to your garden. Unless you love them you will not have must success, but then, you probably would not be interested if you did not love them, so we shall proceed from that premise.

There are various degrees and kinds of bird consciousness, from the benighted individual who kills them for what he considers the fun of it, to the one who loves them for one of the sweetest expressions of the Infinite; and somewhere in between is the one who loves them enough to want them around his home and sets about contriving ways and means of attracting them. Love, in itself, may not be sufficient to turn the trick, but you will not get far without it; and mixed with consideration for their simple material needs, such as food, water and shelter, the results are certain.

Of these needs, shelter comes first, and shelter means trees and shrubs. Birds and trees are natural couples the same as ham and eggs (when pigs used to grow hams). Deciduous trees of course are the backbone of any garden, but the evergreens give much greater protection to birds, providing snug quarters the year around. The birds that winter with us surely deserve extra consideration for the pleasure they bring through the long bleak winter months.

Because of its dense habit of growth our native Colorado Spruce, lovely in itself, is just about the birds' dream of Paradise. Cats find them extremely difficult, if not impossible to climb, and even hawks are usually stopped short in pursuit of the small bird who darts into their spiny arms. They are indeed an open umbrella, protecting against hail, rain and snow storms; and when the wind is blowing high the birds nestle close in the heart of them, riding out the gale in comfort. In winter, it takes no stretch of the imagination to understand why they are also favorite nesting sites of several species.
The Juniper is a close second for the same reasons, offering in addition, berries which are relished by some birds.

If you are planting to attract birds, don't overlook fruit bearing shrubs and small trees. The list of those which may be grown in our rigorous climate is quite long, and many of the good local nurserymen can supply lists of suitable material. Over a period of eighteen years it has been our observation that while fruiting shrubs and trees are host to the fruit eating birds. The Russian olive ranks high, as do the hawthorns, viburnums and buckthorns. Japanese barberry, wild currants, thimbleberry, cotoneasters and honeysuckles are enjoyed by some kinds of birds. Probably the three fruits most enjoyed by birds (even above tame cherries) are mulberries, elderberries and bird cherries.

We have found that the thorny trees give considerable protection against prowling cats, one of the worst destroyers of bird life. Cat lovers who may have been mildly interested in reading this article are not going to like what follows, so here is warning if they want to spare themselves a brain storm. Be it known here and now, cats and birds do not mix, except with disastrous consequences to the birds. If you really want birds the cats must go, but in heaven's name don't try to have both. It is cruel to offer inducement to the birds to come only to be made into cat food. Leaving all sentiment out of the question, boiling it down to the cold logic of economics, the cat has less than no rating because it destroys great numbers of birds whose economic value is widely recognized and acknowledged, even by the U. S. Bureau of Statistics which has published many pamphlets on the subject.

Some 90 millions of birds are destroyed annually in the United States by the cat; according to no less an authority than Edward Howe Forebush, who made extensive research into the matter, compiling enough damaging evidence in his book, "The Domestic Cat" to convince the worst skeptic.

Naturally that which attracts desirable birds also brings in the English sparrow, and he can become a real problem; the answer to which is a little .22 calibre rifle, if you live in the country. If you live in town, that is out, and unless you have a yen to see the inside of a nice quiet jail you will find some other way, or just grin and bear them. If you are one of those who consider them something less than a pest, you will probably not mind their taking over your feeding stations, as take over they will. Traps offer effective control where other means are not possible.

Part of the pleasure of feeding birds is selfish, albeit a benign selfishness; so place your feeding stations where you can have full enjoyment of them from your windows.

Keep the color of stations and bird houses neutral, preferably weathered or brown, as birds are decidedly color conscious and seem to prefer old, much used and weathered things, feeling perhaps the same ease in them that we do in old clothes. Even of bird baths in our garden, a very lovely terra cotta surmounted by the "Goose Boy" does not hold half the attraction for the birds that a small dilapidated nook at the very edge of the garden does. Here community bathing goes on all hours of the day in the summer, and even quite frequently in winter when the water is free of ice.

Here at "Havenwood" they are fed everything from soup to nuts, and few indeed have been the things they would not eat. The menu includes fruit, meat, mashed potatoes, sweet potatoes, glazed carrots, cottage cheese, corn bread, muffins, biscuits, preserves, pie, cake, doughnuts and cookies. Most everything to demi-tasse, and with some coaxing they might even take that. All this with a reckless disregard for rationing and the O. A.—the daring little beggars. It would be no more surprising to see a bird drink coffee than it was to find an Audubon hermit thrush eating cottage cheese with obvious relish. Once he got the taste of it he came back daily for the feast during the migration stop-over.

The piece de resistance to all the birds which visit the feeding stations is corn bread. They even feed it to their young in season; regurgitated in some instances, as it comes from the pan in others. Most of the baby robins, Brewer's black birds, finches, orioles and others are practically finished off on it. We make it with sour milk or buttermilk with soda for leavening and shortening added; much as for our own table, except for the eggs. Suet, of course, is a regular, and a large chunk fastened to a tree trunk will furnish you, as well as the birds, much pleasure. Here again the cat enters the picture, for unless you want your suet to mysteriously disappear overnight you will have to fasten rabbit wire over it. The birds have no difficulty feeding through it but it presents a real problem to Tabby.

The staple food we prepare is ground dry bread mixed with what fat can be collected, melted and poured into the crumbs. Then all cooked meat scraps ground and added along with millet, hemp and finely ground corn or wheat. (They like most any grain which is fine enough so that they can eat it.)

If you want to see a finch smile put some sunflower seeds where he can find them, either in the head or loose. From your point of view it is a bit more fun to watch them dig the seeds out of the head, a trick at which he is most expert.

For an added pleasure to you and convenience to the birds fasten bunches of cotton to a tree. Tear narrow strips of white or faded out light soft rags, cutting them in two or three inch lengths and scatter over the branches of a spruce, if you have one—this of course in nesting season. We have even ravelled out burlap, cutting it into short lengths to avoid tangling the birds' feet. One oriole nest, the framework of which was constructed of this material, became a golden cradle with the sun shining through it.

Once you have succeeded in attracting birds, keep faith with them especially during the late spring snows to which Colorado is subject. Many migrants are coming in at that time and such storms prove real hardships—frequently fatal. Birds will continue to come for feed only where their needs are met. You may gather from this that it is necessary to own your own home and live in the country to fill all requirements necessary to attract birds, and to a certain extent this might be said to be true, but only as it relates to numbers and those species which avoid cities. It is admittedly the ideal combination, but feed boxes can be found on window ledges high up in many a downtown office building. With a little ingenuity and patience, most any place where there are a few trees and shrubs, plus the earnest desire and effort requisite to success, can be made a bird sanctuary.
DECIDUOUS TREES FOR COLORADO'S PLANT ZONE 4. (DENVER)

ON THE following pages we present the first installment of our report on the statewide tree survey recently taken. We are starting the series with zone 4 because we have had the most reports from this area and also because it is of interest to the greatest number of people. We appreciate greatly the work that many horticulturists all over the state have done in giving us their experience and observations about trees in their zone. Will any others, who did not receive the original check lists, use the list following to check trees which will grow in their zone, and let us know at once so that we may make up later lists with greater accuracy.

The next lists published will be from that zone which has the greatest number of reports in relation to their population. Refer to the March 1945 number for zone map and explanations. Extra copies of the map may be had on application.

As no list such as this is ever final, we urge each reader to let us know of additional trees observed by them, and give us any additional information or corrections concerning the kinds listed here.

For convenience we are dividing each list into groups of those trees recommended and those which MAY grow under favorable conditions. We are also dividing as to small and large trees. Names have been checked with "Standardized Plant Names." "Cl." following a name indicates that it is a clone (clone) or horticultural variety produced by hybridization or selection. "Sp." indicates species. X indicates hybrid.

CLASS A. THE MOST USEFUL LARGE TREES.
(Most highly recommended in bold face type.)

Acer saccharinum, Silver or SOFT MAPLE—A clean and beautiful tree. Of medium fast growth. Has few pests. Likes rich moist soil.

Acer saccharinum, Cl. CUTLEAF WEEPING MAPLE—A little more difficult to establish, but makes a beautiful tree of rather "light" effect when given favorable conditions.

Betula pendula, Cl. CUTLEAF WEEPING BIRCH—Beautiful, clean, light tree. In a class by itself. Difficult to establish and sensitive to severe drouth.

Celtis occidentalis, COMMON HACKBERRY—A slow-growing, drought-resistant tree. Difficult to establish and sometimes has leaf galls. Survives storms and attacks of pests.

Praxinus americana, WHITE ASH—A stiff "heavy" tree. Slow growing and will stand much abuse.

Praxinus pensylvanica lanceolata, GREEN ASH—Preferred by most horticulturists to other species of ash. Other species of ash, than these mentioned, have been found here, but they are very similar and difficult to identify.

Gleditsia triacanthus, HONEYLOCUST—Probably the best all-round tree for this area. A little hard to move and slow to grow, but will survive under difficult conditions.

The species has large compound thorns, but there is a thornless variety which is preferred by many. Tiny flowers and large seed pods. Is not subject to attack of borers.

Gymnocladus dioicus, KENTUCKY COFFEE TREE—Deep rooted and slow growing. Makes a nice shaped tree of bold appearance.

CLASS B. LESS USEFUL LARGE TREES.
(Some because of lack of "hardiness," some because of attacks of insects and diseases, and some because of inferior habit of growth.)

Acer negundo, BOXELDER—Short lived native tree. Useful where nothing else will grow. Susceptible to damage by insects and diseases, and of ragged appearance when older.

Acer platanoids, NORWAY MAPLE—Difficult to establish and subject to sunscald, but with favorable conditions it makes a fine tree.

Acer platanoids, Cl. SCHWEDLER MAPLE—Leaves red in spring. Very beautiful but difficult to establish and sensitive to severe drouth.

Acer saccharum, SUGAR OR HARD MAPLE—Similar to above but with corky bark.

Betula papyrifera, PAPER BIRCH—Has only been tried by a few, but has been rather successful in most places.

Betula pendula, EUROPEAN WHITE BIRCH—Seems to be more difficult than the cut-leaf form. Subject to borers and disease.

Catalpa speciosa, NORTHERN OR WESTERN CATALPA—Loved because of its beautiful flowers, large leaves and picturesque seed pods. Hated for its dropping flowers, pods and leaves. Has irregular habit of growth and winterkills to the ground often when young.

Juglans nigra, EASTERN BLACK WALNUT—Deep-rooted, slow growing and of bold appearance. Bears edible nuts. Should be moved when small.

Populus acuminata, Lanceleaf or SMOOTHBARK POPLAR—Of neat and clean appearance and rather upright growth.

Populus sargentii, Plains Poplar or WESTERN BROADLEAF COTTONWOOD—The most distinctive native tree of this area. Must have plenty of room as it soon grows large and spreading. Grafts or cuttings from male or staminate trees should be used to start all cottonwoods to avoid the objectionable cotton.

Quercus macrocarpa, BUR OAK—A sturdy bold tree. Of slow growth, but tolerates our soil better than other oaks.

Ulmus americana, AMERICAN ELM—Our most common shade and street tree. Must be given good soil better than other oaks.

Ulmus americana, Cl. MOLINE ELM—A narrow vertical form which seems to be our best substitute for the upright poplars.

Ulmus grandifolia, ENGLISH ELM—Our most common shade and street tree. Must be given good soil better than other oaks.

Ulmus thomasi, ROCK OR CORK ELM—Similar to above but with corky bark.

Ulmus americana X pumila) HYBRID ELM—Of variable habit but usually combines the sturdiness of the American with the rapid growth of the Siberian. If the type could be fixed this would be the best tree for Colorado.
Platanus occidentalis, SYCAMORE OR AMERICAN PLANETREE—Slow growing and kills back frequently when young. When established it makes a beautiful large tree.

Populus alba, Cl. BOLLEANA POPULAR—Has been the most popular of the columnar type poplars but is hardly worthwhile planting now as it is susceptible to borer and blight damage. As with all poplars it is a rank feeder and robs surrounding areas of food and water.

Populus angustifolia, NARROWLEAF POPULAR—Will grow here but chiefly valuable at higher altitudes.

Populus balsamifera, BALSAM POPULAR—A native from higher altitudes. Will grow here but not as good as others.

Populus canadensis eugenei, CAROLINA POPULAR—Extensively planted a few years ago. Furnishes quick shade but soon begins to go bad. Native cottonwood is better.

Populus nigra, Cl. LOMBARDY POPULAR—The familiar upright poplar of old gardens. Subject to attacks of scale and diseases.

Populus rigida, CHINESE OR SIMON POPULAR—Of upright shape similar to Bolleana and Lombardy. Some think it is better, but it still has all the faults of the poplars.

Prunus serotina, BLACK CHERRY—When established it makes a tall clean tree. Tend to bark and difficult root system makes it hard to move when large.

Quercus alba, WHITE OAK—Very slow growing and hard to move.

Quercus coccinea, SCARLET OAK—Requires a rich, slightly acid soil. Very beautiful especially in fall color.

Quercus falcata, RED OAK—Difficult but beautiful when established.

Quercus palustris, PIN OAK—As with all of the black oak type, this one does not like our soil, but when conditions are suitable it makes a beautiful tree.

Quercus robur, ENGLISH OAK—A few specimens have become established around Denver and are doing well.

Robinia pseudoacacia, BLACK LOCUST—A tree once planted extensively because of its hardiness, valuable timber and beautiful flowers. Is not worthwhile planting in most places now because of attacks of borers.

Salix alba, WHITE WILLOW—All the willows are rank feeders and will choke out adjoining plants and stop up sewer lines. Most are short lived and subject to storm damage.

Salix alba vitellina, YELLOWSTEM WILLOW—Striking for its winter color.

Salix babylonica, BABYLON WEEPING WILLOW—A striking weeping kind.

Salix babylonica, Cl. GOLDEN WEEPING WILLOW—The most beautiful of the willows. Planted by water in large grounds it is very effective, but it is too rank a grower for most city yards.

Salix babylonica, Cl. GOLDEN WEEPING WILLOW—Similar to above but green barked.

Salix lasiandra, PACIFIC WILLOW—The large willows naturalized years ago near Boulder have been identified as this species.

Salix nigra, BLACK WILLOW—A native tree of stream banks.

Ulmus fulva, SLIPPERY ELM—Kills back often but a few have become large trees.

Ulmus glabra, SCOTCH ELM—Nice shape but not as adaptable as the American.

Ulmus pumila, CHINESE OR SIBERIAN ELM—Has been our most popular elm for several years, but is losing favor because of its breakage in storms. Grown slowly under dryland conditions it makes a good tree. With irrigation it grows very rapidly and must be carefully trimmed each year to avoid storm damage.

CLASS C. THE MOST USEFUL SMALL TREES
(The ten best in bold face type)

Crataegus coloradensis, COLORADO HAWTHORN—Slow growing but long lived. Beautiful in flower, fruit and foliage.

Crataegus crusgalli, COCKSPUR HAWTHORN—Distinctive low, round-shaped head. Dark red fruit, small but numerous and hang on all winter.

Crataegus mollis, DOWNY HAWTHORN—Good as a tall shrub or single-stemmed tree. Large red fruit in fall.

Crataegus phaenopyrum, WASHINGTON HAWTHORN—Nice shape and leaf. Good for Colorado.

Crataegus saligna, WILLOW HAWTHORN—A native species with black fruit and narrow leaves.

Elaeagnus angustifolia, RUSSIANIVE—A tree with picturesque habit of growth and attractive silver leaves. Useful for foliage contrasts. Very hardy and adaptable to many uses.

Malus sp. Cl. DOLOGO CRABAPPLE—White flowers and brilliant red apples which are as good for jelly as they are good to look at. One of the hardiest and blight resistant. Good to use for espalier.


Malus purpurea Cl. ELEY CRABAPPLE—Light rose-red bloom. Somewhat similar to Hops but more spreading habit of growth. Quite hardy.

Malus ioensis Cl. BECHTEL CRABAPPLE—When in full bloom the large double light pink flowers almost cover the tree. No fruit. The faded petals hang on for a long time making a dirty effect.

Malus sp. Cl. RED-SILVER CRABAPPLE—Leaves green above and red silvery below. Very attractive rose-red bloom and large fruit.

Prunus americana, AMERICAN PLUM—A shrub or tree of low rambling habit. Beautiful in flower and sometimes bears good fruit. Very hardy and useful for thickets and backgrounds.

Prunus cerasus var. SOUR CHERRIES—The variety Montmorency, in particular, makes a beautiful low-headed tree. Flowers are nice and fruit is very useful.

Salix amygdaloides, PEACHLEAF WILLOW—A low native willow for moist places where other trees will not grow.

Sorbus aucuparia, EUROPEAN MOUNTAIN ASH—One of the most attractive small trees for use in Colorado. Neat appearance with rather vertical habit. Heads of white flowers and very attractive orange-red fruits. Tender bark of trunk must be shaded when young.

Syringa japonica, JAPANESE TREE LILAC—A clean small tree of slow growth and very hardy. Large heads of creamy white flowers.

CLASS D. LESS USEFUL SMALL TREES

Aesculus glabra, OHO BUCKEYE—A tree hard to establish, but of beautiful shape and very attractive in flower.

Aesculus hippocastanum, COMMON HORSECHESTNUT—More attractive bloom and shape than the Buckeye, but not as easily established.

Alnus glutinosa, EUROPEAN ALDER—Only a few trees have been successful here.

Aralia spinosa, Devils Walking Stick or HERCULES CLUB—Large prickly stems and very large double compound leaves. Kills back frequently.

Carya sp. HICKORY—Very difficult but a few have managed to survive in this area.

Catalpa bignonioides, Cl. UMBRELLA CATALPA—A small formal tree. Likely to winterkill in bad seasons.
Cladrastus lutea, AMERICAN YELLOWWOOD—Uncommon tree here, but is hardy in some locations.

Crataegus oxyacantha, ENGLISH HAWTHORN—Beautiful cut leaves, white flowers and red fruit. Most subject to blight.

Crataegus oxyacantha, Cl. PAULS SCARLET THORN—Very attractive double red flowers, when it does bloom, but subject to blight and difficult to establish.

Fagus sylvatica, EUROPEAN BEECH—A beautiful tree in the east but most unhappy in our soil and climate.

Ginkgo biloba, GINKGO—The most ancient of trees. Usually very difficult and unhappy here.

Koelreuteria paniculata, PANICLED GOLDENRAIN TREE—Kills back frequently, but once established makes a wonderful show of flowers and fruit.

Liriodendron tulipifera, TULIPTREE—There have been many attempts to raise this tree, with a few successes.

Malus arnoldiana, ARNOLD CRABAPPLE—A beautiful tree but difficult here.

Malus atrosanguinea, Cl. CARMINE CRABAPPLE—Beautiful in the east but not dependable here.

Malus baccata, SIBERIAN CRABAPPLE—Has been considered a dependable tree for fruit and flowers, but lately has been badly damaged by blight.

Malus floribunda, JAPANESE FLOWERING CRABAPPLE—Subject to blight and difficult to grow here.

Malus halliana, Cl. PARKMAN CRABAPPLE—Usually unreliable here.

Malus hupehensis, Cl. NIEDZWETZKYANA CRABAPPLE—The Redven Crab. Usually hardy and attractive here.

Malus pumila, Cl. WEEPING MULBERRY—A formal "upside-down" tree. Frequently kills back.

Populus tremuloides, QUAKING ASPEN—A beautiful native but is difficult to transplant and very subject to attacks of scale.

Salix pentandra, LAUREL WILLOW—Attractive glossy leaves. Has all the faults of other willows.

Sophora japonica, JAPANESE PAGODA TREE—Attractive leaves and flowers. Several are established in Denver parks.

Sorbus americana, MOUNTAINASH—A beautiful tree when established. Subject to sunscald and blight.

Sorbus hybridra, OAKLEAF MOUNTAINASH—Similar to European mountainash but has entire leaves.

Tilia cordata, LITTLELEAF LINDEN—Some think that this is the best of the lindens, but it is not well known.

Xanthoceras sorbifolium, Shinyleaf Yellowhorn or CHINESE CHESTNUT—Attractive flower, fruit and foliage. Somewhat like sumac or mountain ash. Several are well established in Denver parks.

**CLASS E. USEFUL TALL SHRUBS, SOMETIMES TRAINED AS TREES**

Acer ginnala, AMUR MAPLE—Nice small tree with brilliant red fall color.

Acer glabrum, ROCKY MOUNTAIN MAPLE—Makes a nice hardy small tree.

Alnus tenuifolia, Thinleaf or MOUNTAIN ALDER—Easily trained as a tree. Very hardy and attractive.

Betula fontanalis, Water or ROCKY MOUNTAIN BIRCH—Beautiful cherry-like bark. Makes a neat and hardy tree.

Caragana arborescens, SIBERIAN PEASHRUB—Pine foliage and small yellow flowers. Very hardy and drought resistant.

Crataegus integrata, THICKET HAWTHORN—When trimmed to a single stem it makes an attractive small tree.

Euonymus europaeus, EUROPEAN EUONYMUS—Attractive orange and red fruit hangs on late. Usually quite hardy.

Hippophae rhamnoides, COMMON SEABUCKTHORN—Easily trained as a tree. Attractive gray leaves and orange fruit.

Maclura pomifera, OSAGEORANGE—Drought resistant but wintertails in exposed places.

Prunus americana, Cl. NEWPORT PLUM—A striking red-leaf variety. Small pink flowers and edible fruit.

Prunus pensylvanica, PIN CHERRY—Easily trained as a tree. Attractive in flower and fruit. Birds enjoy the fruit.

Prunus virginiana demissa, WESTERN CHOKECHERRY—Attractive fragrant flowers and useful fruit. Suckers from the roots.

Rhamnus cathartica, COMMON BUCKTHORN—Very hardy. Black fruit.

Rhododendron, STAGHORN SUMAC—Easily trained as a tree. Very easy to grow, but shallow-rooted and short-lived. For quick temporary effects.

Shepherdia argentea, SILVER BUFFALOBERRY—Small gray leaves and bright red edible fruit. Root suckers.

Syringa villosa, LATE LILAC—The tree-form specimens west of the Cheesman memorial in Denver have attracted a great deal of interest.

Viburnum lentago, NANNYBERRY VIBURNUM—When trained as a tree it is very attractive. Good flowers and fruit.

**LANDSCAPE ARCHITECTURE FRAMES A PICTURE IN A GARDEN**

An important function of landscape architecture is to protect and enhance existing beauty.

The residence of Mr. and Mrs. Delos Chappell, on the Morrison Road, faces Mt. Evans, and has vistas to the 200 mile range of the Rockies. Their garden has been designed to give the maximum effect of this thrilling and beautiful picture.

The cut illustrates the view from the dining room over Bear Creek Valley. Long lines of foliage frame the view and the vista has been narrowed to increase the effect. The balustrade at the end completes the frame. Inside the garden there are a series of pools and flower planting along each side, with small beds to the right and left for cut flowers.
The Colorado Arboretum

TWO very interesting and instructive articles relating to the formation of arboretums were published recently. In the Saturday Evening Post for April 14th the story of the formation of the Arthur Hoyt Scott Arboretum at Swarthmore College was related, and on May 18th Dr. Donald Wyman devoted 23 pages of Arnoldia to “The Park Arboretum—How To Establish One As A Living Memorial.” (Arnoldia is published by the world famous Arnold Arboretum of Harvard University.)

Ever since its first issue, the Green Thumb has been stressing the imperative need of an Arboretum or Botanical Garden for this area. Some of the functions of a Park Arboretum, as stated by Dr. Wyman, are:

“1. To grow ‘the best’ woody plants hardy in the area in order that home owners may become acquainted with their names, their ornamental characteristics and the proper methods of culture.

“2. To show a complete selection of all that is considered the best from an ornamental standpoint among the woody plants that it is possible to be grown in the area.

“3. To serve as a means of introducing new woody plants into the area, regardless of the source from which they may come.

“4. To disseminate a knowledge of woody plants to the public. This would include information on culture, pruning, fertilizing and possibly a continual study under local conditions of just what varieties are ‘the best,’ including even cooperation with schools, garden clubs and other organizations.

“5. To test the hardiness of untried varieties.

“6. To provide an out of doors laboratory for students of botany, horticulture and nature study.

“7. To increase the productivity, economic importance and beauty of an area, by intelligent and interesting planting, and by introducing plants not grown there before.

“8. To provide recreational stimulus to the public by means of walks, drives and beautiful displays, and to stimulate the pleasure of learning to know new plants which might be adapted to planting on private property.

“9. To serve as a ‘Permanent Living War Memorial,’ beneficial to the people living in the area and attractive to visitors from outside the area.”

It is hoped that both of these splendid articles have come to the attention of our readers. Mr. L. C. Shoemaker (our officer manager) has a limited supply of reprints which he will furnish to interested persons as long as they last.

There will never be as opportune a time as the present to commence such a project in Colorado. More and more are people favoring beautiful Living Memorials over cold marble and stone.

The Swarthmore College Arboretum was made possible by an endowment of only one hundred thousand dollars. The great Park Arboretum in Rochester, New York, started with a gift of 484 acres to the city, which has maintained the area ever since. Shall we not complete Colorado’s preeminence in this general field, by adding to our Natural History and Art Museums, a suitable Arboretum of the living Colorado treasures!