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fall. For the southland, the bermudagrasses (*Cynodon*), St. Augustine (*Stenotaphrum*), and bahia (*Paspalum*) are used in the deeper Southeast. These warm weather species spread mostly by trailing stolons. Because of their aggressive spreading nature, they tend to form solid patches,

and are seldom planted as mixed populations. Thus, most southern lawns are meant to be a monoculture. Select varieties seldom come true from seed, so improved strains are used for the most part, planted vegetatively from sod, plugs, or sprigs. Indeed, only common bermudagrass, bahia-

**Cultivars of Northern Lawngrass Species approved by the Lawn Institute's Variety Review Board.**

**Kentucky Bluegrass**, *Poa pratensis* - makes good sod from spreading rhizomes, easily maintained, but somewhat slow to establish.

**Adelphi** - Rutgers hybrid, on most recommended lists; good quality, habit, and winter color; resists diseases and iron chlorosis; endures low maintenance.

**Arboretum** - Ecotype from stressful Missouri habitat, with good stick-to-itiveness under minimum care; natural type best mowed fairly tall.

**Baron** - Low-growing selection from Holland with allround good traits and wide adaptability; a leading sod cultivar; blends suggested for lengthier persistence.

**Birka** - Top rating selection from Sweden; persistent, tolerant of low maintenance and light shade; winter color and drought resistance not outstanding, but adapts well generally.

**Bonnieblue** - Hybrid beauty from Rutgers, decumbent, with excellent color and long season; good disease tolerance and endures acidity.

**Enmundi** - Selection of high quality from Holland, noted for *Fusarium* resistance; decumbent, leafy, attractive even under low mowing; endures acidity.

**Fylking** - Swedish selection, elegant, decumbent, adapted to low mowing; some disease, but usually not too serious; has shown good salinity tolerance in California; not aggressive, so especially suited to mixtures and blends.

**Glade** - Selection from New York, low, dark, rather slow-growing; good in shade because of resistance to mildew; endures acidity; well-suited for blends.

**Majestic** - Handsome Rutgers hybrid, dense, strongly rhizomatous; excellent general qualities; among best in hot weather in California.

**Merion** - The original standard of excellence among bluegrasses; exceptionally dense and aggressive, wearing well; suffers from certain diseases, but has excellent resistance to leafspot; not a low-maintenance cultivar, needing generous fertilization; drought and iron chlorosis tolerance is good but salinity tolerance is low.

**Nugget** - Selection from Alaska, neat, dense, dark green; gives great summer performance, but greens late; best adapted northward; suffers somewhat from dollarspot and *Fusarium*; good in shade because of mildew tolerance; adapts to low maintenance.

**Plush** - Selection from New Jersey with moderate disease resistance that seems widely adapted; withstands low maintenance, drought and acidity rather well; a good general purpose cultivar.

**Ram I** - Discovered on a Maine golf course, endures low mowing and acid soils; good in blends and mixtures; spreads unobtrusively to make stout sod.

**Sydsport** - Vigorous, fairly broad-bladed Swedish introduction with excellent ratings in Europe and America; only mildly susceptible to most diseases; resists iron chlorosis much recommended for sportsturfs.

**Touchdown** - Highly thought-of selection from a Long Island fairway, becoming widely recommended; dense, low and strong even with only moderate fertilization (so may thatch a bit); resists disease well.

**Perennial Ryegrasses**, *Lolium perenne* - ryegrasses sprout quickly, but do not spread, and are generally not so hardy as bluegrasses in extreme climates. Almost all leading cultivars are polycrosses, most based upon germplasm developed at Rutgers. Compared to common ryegrass they are low-dense, rich green, winter hardy, and mow neatly.

**Blazer** - A dark green Pickseed proprietary, with good heat tolerance and nice appearance.

**Citation** - A Turf-Seed cultivar, resistant to heat and wear, companionable for mixtures.

**Derby** - An International Seeds variety rating highly nationally; among the top three in California.

**Diplomat** - A Loft cultivar of overall fine quality.

**Fiesta** - An excellent Pickseed proprietary that withstands stress and most diseases.

**Manhattan** - Whitney-Dickinson's definitive Rutgers polycross, utilizing bloodlines mostly proved by natural selection in Central Park; excellent hardiness; among top three in California.

**NK-200** - A Minnesota selection by Northrup-King, noted for winter hardiness (may be weaker in hot weather).

**Omega** - A Turf-Seed cultivar attractive summer and winter; wears well.

**Pennfine** - A leading national cultivar developed at Penn State, competitive and especially strong in summer; among top three in California.

**Regal** - North American Plant Breeders proprietary, attractive and strong under summer heat.

**Yorktown II** - Lofts high-rating variety, elegant and durable.

**Fine Fescue**, *Festuca rubra* - Well adapted to dry, infertile soil and shaded locations; often suffers stress from summer humidity, so that permanency is better in northern climates. northern climates.

**Banner** - Rutgers 45-clone Chewings polycross, doing especially well under coastal conditions.

**Ensylva** - A spreading polycross from Holland, well adapted to mixtures.

**Highlight** - Handsome Chewings introduction from Holland, one of the most brilliant of the fescues.

**Koket** - A Chewings polycross from Holland, strong, generally untouched by diseases.

**Ruby** - A spreading fescue from Holland; most used in mixtures and for special purposes (e.g. roadside seeding).

**Colonial Bentgrass**, *Agrostis tenuis* - A natural ecotype that persists under minimum maintenance, **Highland**.

**Creeping Bentgrass**, *Agrostis palustris* - Two lawn types are of note, **Emerald** is a pedigreed pureline out of Congressional, attractive and not too demanding; and **Prominent** is an eight-clone Scandinavian selection that survives neglect and resists *Poa annua*.

**Rough Bluegrass** *Poa trivialis* - **Sabre** selected at Rutgers, is an excellent golf green winterseeding species; adapted to moist shade in the North

grass, and to a limited extent centipedegrass, are offered as seed.

Pure lines from seed are the norm with the temperate species of northerly regions. Except for bentgrasses and a few specialty cultivars, the grasses spread by underground rhizomes or are bunchgrasses. They accommodate well to mixed plantings (i.e. seed mixtures), which broadens adaptability and usefulness. For example, fine fescue in a mixture survives in dry shade on poor soil, while in more favorable habitat bluegrass contributes the stoutest of sods needing only moderate care. The new perennial ryegrasses look just as handsome as the bluegrass, and contribute quick-starting cover. A sampling of the modern cultivars of these favorite seeded lawngrasses is given in Table 1.

The new cultivar explosion has had monumental influence. Only a decade or two ago, there was little or no choice among lawngrasses, even though agriculture had bred select varieties for better yield and improved adaptability for years. Discovery of Merion bluegrass on a Philadelphia golf course about mid-century was an inkling of things to come. Here was a superior Kentucky bluegrass, but one that yielded seed sparingly so that its cost was appreciably higher. Would the public, accustomed to inexpensive lawnseed, pay a premium for quality? Although it seemed questionable at the time, the answer proved to be a resounding "yes."

The floodgates opened. In the South, Glenn W. Burton hybridized bermudagrasses to yield the "Tifton series" now widely planted. And, more adventurous American seedsmen, such as Jacklin with Fyking bluegrass from Sweden, started importing the premier selections of Europe. In the United States, legislation was not passed until late 1970 granting varietal protection to sexually propagated cultivars (i.e. from seed); European countries, profiting from years of such protection, had gained quite a head start in commercial lawngrass breeding. The gap has since closed, and, as might be expected, some of the better cultivars for America come from American stock.

The introduction of new cultivars has turned into a deluge, and it is reshaping turfgrass considerations throughout the country. A wide array of selections is now available, some of them specialized for certain regions or for certain usages, but all of them improvements in one way or another over the common grass of yesteryear. A new cultivar would not be brought to market if it did not show advantages, especially in tolerance to commonplace diseases, low-dense growth well suited to mowed turf, maintenance of genetic quality, and (with northern grasses especially) competitive production of high quality seed.

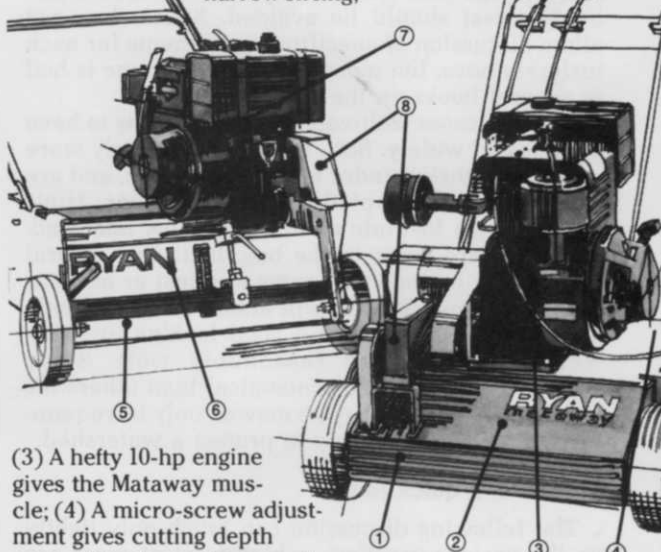
Still newer turfgrass cultivars will be bred, screened, and brought to market as demands of the future are met. In addition to the qualities enumerated, breeding for low-maintenance will receive much attention. Perhaps not too surprisingly, the same cultivars which show well under high maintenance often rate best under low. Expect more emphasis on bred-in insect resistance (disease tolerance has been the primary focus of pest mitigation by breeding so far), drought

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tolerance, recuperativeness, quality (preferably without increased thatching), and so on. If large enough regional markets form, it may even prove feasible to mold cultivars for a particular pH, soil salinity, weather cycle, or similar local peculiarity of the environment.

While turf for parks and recreation runs the gamut from intensively managed golf greens to untended open space, most acreage calls for moderate maintenance. Well-timed seedings to a prepared soilbed can yield turf economically in northerly locations and also in the South with seeded grasses (such as common bermudagrass, and strains of bahiagrass) if they are given a bit of care. Where labor is scarce or unskilled and emphasis is on economy, species requiring intensive management (such as improved bermudas and bentgrasses) should be avoided. Space does not allow discussion of specific requirements for each turfgrass here, but more thorough coverage is had in several books on the subject.

In many cases, cultivars are still too new to have been tested widely. Still, some are obviously more aggressive, thrive under less maintenance, and are especially well adapted to certain regions. Hints for the Lawn Institute's Variety Review Board acceptances are given in the box. Including several cultivars in a blend (the same species) or mixture (more than one species) will almost surely provide potential these days for a good looking turf that wears and survives reasonably well. Some cultivars will be more economical than others for functional turf that may be mowed only infrequently and be meant merely to protect a watershed.

#### **Turf care, a quick review**

The following discussion can touch only lightly on the various practices, which in most cases are well known and thoroughly covered in standard advisories. I will attempt in the space available mainly to examine trends as they seem to be affected by the new lawngrass cultivars.

**Mowing**—By and large, trailing grasses, especially those clipped fairly low (3 centimeters or less), mow most neatly with reel machines. Rotaries are more flexible, and more easily maintained, for the less meticulously kept swards mowed 3 centimeters tall or taller. In general, high mowing is advantageous, the greater amount of green leaf thus retained contributing to vigor, deeper rooting, and better suppression of weeds. Newer cultivars are for the most part selected for more decumbent, denser growth than old fashioned grass, and can be expected to withstand somewhat more rigorous mowing that might be anathema to common sorts. Even so, 50 percent of the green foliage is the maximum that should be sacrificed at any one mowing; clipping should be undertaken frequently enough so as to assure this.

Of course, grass must be mowed to be called a turf, and it is clear that unmowed swards soon give way to weeds and brush. Experience with roadside berms shows that mowing quite tall, even if only a few times during the growing season, is adequate for functional cover, which is not viewed as being unsightly by most people so long as the contrasting

vegetation (broadleaf weeds) is occasionally cleaned out with herbicides. Some new cultivars have been and are continuing to be selected primarily for proletarian uses such as berms and relatively untended open areas.

**Weeding**—One of the turf "miracles" of the last quarter century has been perfection of selective and preventive weeding. The 2,4-D (phenoxy) group of chemicals provided a breakthrough, in that these highly selective herbicides are lethal to most broadleaf plants (dicotyledons) at rates harmless to grasses. Thus it is not difficult to keep once ubiquitous dandelions, plantains, and similar pests out of turf. The phenoxy chemicals are deleterious to some southern grasses, especially St. Augustine, and in the southlands one should follow recommended local practices (in the South weeds may be a greater problem than in the North because of the longer growing season and the greater diversity of species).

Because of restrictions and costly development, flow of new herbicides to market is not what it was some years ago. A number have been prohibited as being hazardous. Yet, of all pest control measures, weeding with herbicides is most gratifying; it's labor saving, and not damaging to the environment if properly carried out. Silvex and 2,4,5-T have been banned by EPA; however, 2,4-D fortified with dicamba, mecoprop, or other additives serves remarkably well for freeing grass from dicotyledonous weeds. Several effective preemergence chemicals are at hand to stop annual grasses, such as crabgrass, worth the expenditure for prominent swards. Oxadiazon is one of the more recent, effective against goosegrass (*Eleusine*) as well as crabgrass (*Digitaria*).

It is still difficult to remove perennial weed grasses from turfgrass, but glyphosate (and paraquat, on the restricted list) do a nice job of wiping out all vegetation prior to renovating with improved cultivars. Such are some of the labor-saving tools now available for managing turf, as applicable with the new cultivars as with common grass (slight differences in the risk of burn do show among cultivars). Some new cultivars are especially vigorous in fighting their own battles, in the image of Merion bluegrass. Few volunteer grasses or weeds gain entry into a flourishing turf of Touchdown bluegrass, for example.

**Irrigation**—For arid regions irrigation is essential if first class turf is to be had at all. However, functional cover can often be attained in the western plains with secondary species such as buffalograss (*Buchloe*), gramagrass (*Bouteloua*), and wheatgrass (*Agropyron*), with little or no watering. Even in humid climates where rainfall is usually ample, irrigation is nowadays demanded for more important turf plantings in order to keep them lushly green no matter what the weather. This is especially true for golf courses and athletic fields which must be ready for play "rain or shine." Installation or irrigation systems has become a highly specialized engineering operation. Most are underground, and many are equipped with automatic controls.

*Continues on page 74*



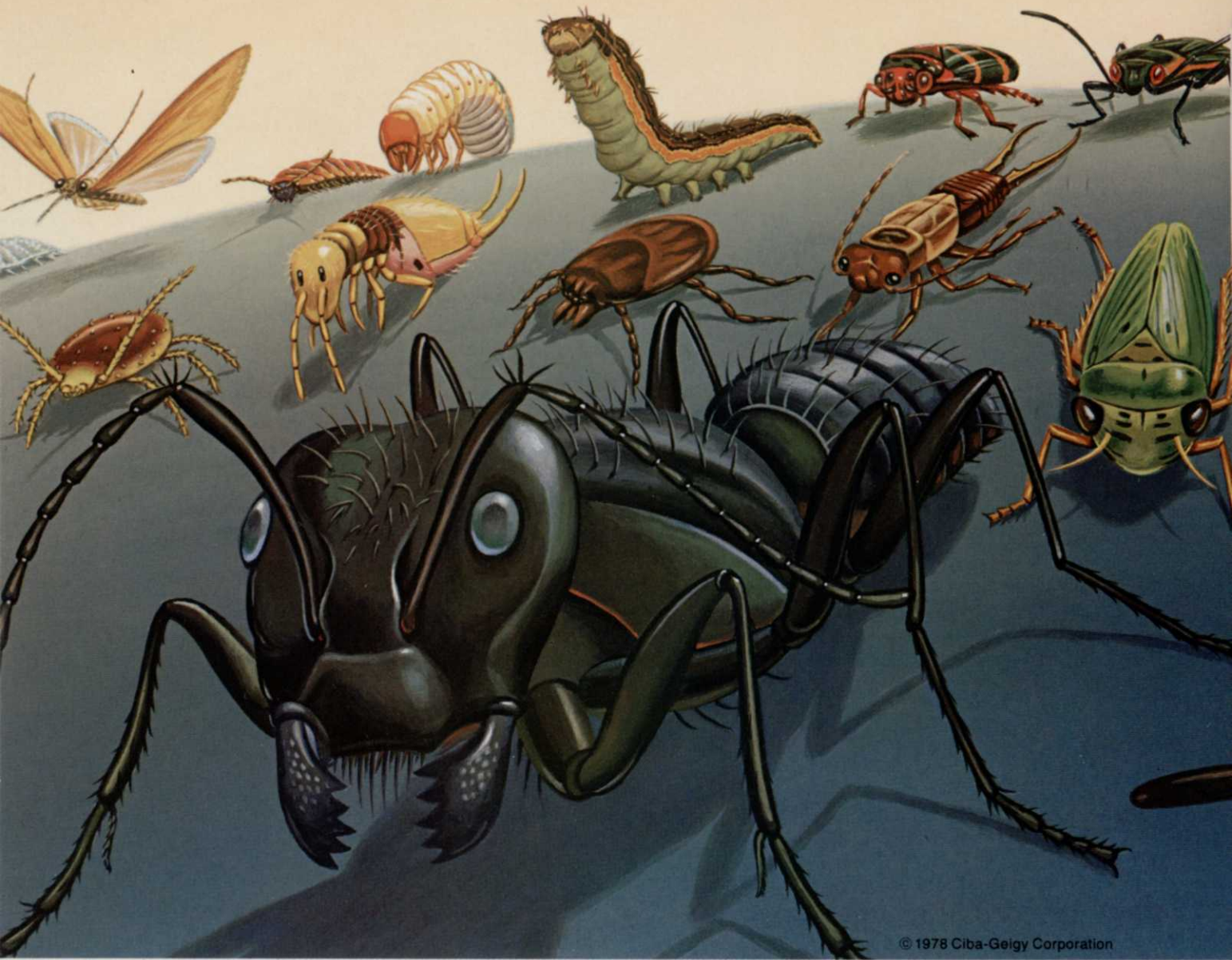
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# MAPLES OFFER VARIETY, COLOR IN ELEVEN IMPORTANT SPECIES

by Douglass Chapman, Horticulturist, Dow Gardens, Midland, MI



The genera *Acer* is a most-widely used and well-known group of shade and/or street trees. The maples differ greatly when considering maintenance requirements (pruning, site and soil adaptation, insect and disease resistance, and tolerance to pollutants (ozone, sulfur dioxide, etc.) and highway salt (chloride). We shall discuss eleven important *Acer* species and their cultivars.

Hedge Maple (*Acer campestre*), an introduction from Europe, is effective when used as a hedge, low-branched specimen, or street tree. This dense, rounded tree often reaches 30 ft. in height. Its dark green summer leaf holds color late into the fall, seldom being blemished by insects, disease, or drought (leaf scorch). When Hedge Maple does develop fall color, which is rare, it is a clear yellow. This small, tolerant tree is one of the lowest maintenance trees and should be used more extensively as an urban landscape or street tree. It requires little pruning, tolerates poor sites, grows well under street tree conditions with no major insect or disease problems.

Amur maple (*A. ginnala*) is effective as a multiple-stemmed shrub or small tree. In Central



**Bark of Paperback Maple** (top) is an attractive addition to a landscape.

**Japanese Maple** (right) has unique branching and red foliage (insert above).

**Striped Maple** (insert right) is an exciting understory plant.





Michigan this round-headed tree normally reaches 18 to 25 ft. in height. The grayish bark helps to accent the rich green summer fall foliage as well as the yellow to scarlet color. Amur maple is perfectly winter hardy as far north as Traverse City, MI. It should be grown in moist, well-drained soil. There are no major insect problems, but verticillium wilt is a major disease and should limit slightly the use of this outstanding small tree.

Paperback Maple (*A. griseum*), a native of China, is an outstanding small tree but borderline hardy in Central Michigan. This 25 to 30-ft. oval tree, with its cinnamon colored exfoliative bark which develops on three- to five-year-old plants, is a real addition to the year-round landscape. Paperback Maple can make the winter landscape more tolerable. It should be used as a specimen in protected sites and planted in fertile, well-drained soil. Fall color, which is a reddish-bonze, develops so late it is seldom effective. Although the plant requires little maintenance and shows tolerance to most insect and disease problems, it should be used sparingly. It is scarcely found in the trade because of its difficulty to propagate from seed.

Boxelder (*A. negundo*) which grows under the most adverse conditions is seldom used because of boxelder bug and soft wood. This round-headed tree, reaching 35 to 40 feet, can be grown as a low branched specimen or limbed up. If a male cultivar acceptable were developed, this plant could be used as a street tree, remembering it is somewhat shortlived (30 to 40 years). When the bright yellow fall color contrasts the relatively dark bark, this plant is breathtaking.

Japanese Maple (*A. palmatum*) is valuable for its unique branching, green-striped bark when young and gray bark at maturity, and unique leaf shape (varying from medium to fine texture). This round-headed 15- to 20-ft. plant is borderline hardy as far north as Central Michigan. Japanese Maple, grown as a specimen tree in a sheltered location with northeast exposure or part shade, can be a dependable plant.

Two outstanding cultivars are available in the trade. *A.p.* 'Atropurpureum,' the hardiest of the cultivars, has a light red foliage throughout the growing season 'Oshio-beni' is in demand for its rapid rate of growth and brilliant red foliage, but one should realize it is not as hardy. Many selections are available but are usually so confusing in the trade that simply asking for Japanese Maple is probably the best course to follow.

Striped Maple (*A. pensylvanicum*) is a northern native which must be grown in moist, well-drained soil. This 15 to 20-ft. small tree is an exciting understory plant or in a tree border. The large red buds and stems with green and white striped bark are outstanding winter characteristics. The yellow fall color can accent this uniquely branched plant. When in full bloom, this plant is outstanding with a somewhat weeping chain-like yellow flower. This

plant should be utilized in tree borders or mass plantings and not as a specimen tree.

Norway Maple (*A. platanoides*), a native of Europe, is outstanding when used as a street or park tree. Its upright, oval crown often reaches 50 to 55-ft. in height. Norway Maple is frequently used in the urban landscape, some suggest too frequently, but it is tolerant of salt, air pollutants (ozone, sulfur dioxide), heavy, poorly-drained soils, and rarely shows leaf scorch. Further, Norway Maple grows rapidly, is relatively free of insect and disease problems, needs little pruning, and has many outstanding cultivars available in the trade.

The main detractant of Norway Maple is the recent increase in reported deaths due to verticillium wilt. This plant rarely develops fall color, but when it does, as it did in 1979, it is an exciting clear yellow.

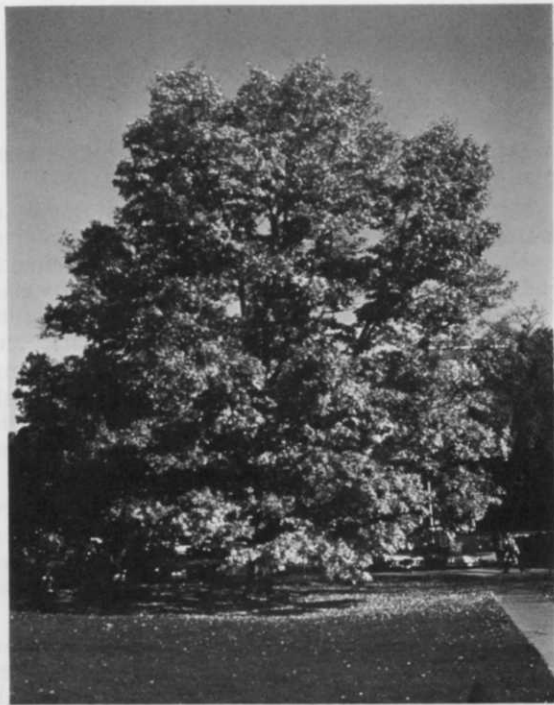
There are many outstanding cultivars of Norway Maple. 'Cleveland' Norway Maple has dark green summer foliage, showing little or no leaf scorch. This 40-ft. tree is almost perfectly oval at maturity and is good as a shade, specimen or street plant. 'Summershade' is a rapid growing cultivar which maintains a good central leader. This cultivar shows exceptional heat tolerance, making it outstanding as a street tree.

'Crimson King' is the most vigorous of all the red-leaved forms. It maintains the red leaf color all summer, is heat tolerant, and is effective as a specimen or street tree.

'Schwedleri' was one of the first of the maroon types. It has bright maroon leaves during the spring which contrast the light green flowers. The summer foliage is dark green. The silhouette of 'Schwedleri' is wide and spreading, almost perfectly round. 'Columnare' Norway Maple is outstanding as a border specimen or street tree. This narrow, upright selection reaches 60-ft. in height with only 20-ft. in width. It has demonstrated good heat tolerance.

Planetree Maple (*A. pseudoplatanus*) has a round habit of growth, reaching 40 to 60-ft. in height. Its unique leaf shape makes it an outstanding specimen plant. It thrives on well-drained soils in full sun, thus limiting it to a landscape or park tree.

Red Maple (*A. rubrum*) is outstanding as a specimen or street tree. This 65 to 75-ft. upright, oval tree tolerates heavy, poorly-drained soil and has a range from northern Florida to Michigan's Upper Peninsula. The gray bark, accented by brilliant scarlet fall color, is reason enough to use this tree. It does require frequent pruning and shows little tolerance to air pollution. It is not a good selection for downtown urban conditions. There are many outstanding cultivars of this tree, but in recent years, graft incompatibility is limiting its use. Since it can be propagated by cuttage, the industry should actively look at trees grown on their own root system and develop cultivars adapted to sec-



**Sugar Maple** becomes rounded at maturity at a height of 70 feet.

tions of the country, e.g. Great Lakes. The ability to propagate by cuttage and work with known, hardy selections should greatly increase the use of this highly qualified plant.

Some of the selections available in the trade include 'October Glory' and 'Red Sunset', both displaying outstanding fall color. 'Columnare' ('Bowhall') is a good narrow, pyramidally-shaped tree with bright red fall color that has received high ratings from the Shade Tree Evaluation Tests in Wooster, OH.

Silver Maple (*A. saccharinum*) is a native fast growing specimen, usually 50 to 70-ft. in height, becoming oval to round as the plant matures. The interesting gray bark, deeply serrated leaf, rapid rate of growth, tolerance to poorly drained sites, make this plant ideal as a specimen or street tree.

Some selections of this plant can have exciting yellow fall color.

Silver Maple is a high maintenance plant which requires continuous corrective pruning (every three to four years) with wood susceptible to decay, e.g. forms a poor compartment, further compounding the need for continuous pruning (branches under two in.) If this plant is grown correctly in the nursery, (grown for two years, cut off, and regrown as a single stem, high-branch plant) it can effectively be used in urban landscapes. One must understand its limitations to be excited about the plant.

Sugar Maple (*A. saccharum*) is a 65 to 70-ft. specimen plant with a somewhat rounded habit of growth. When young, the branching is somewhat upright to oval, becoming more rounded at maturity. Leaf color is usually a medium green in summer, changing to brilliant yellow-orange or scarlet in the fall. Although this plant does not require pruning, it is not tolerant of salt, heavy soils, or restrictive urban conditions. It should be grown in open, well-drained fertile sites (parks).

Black Maple (*A. s. nigrum*), a sub-species of Sugar Maple, thrives in lowland conditions, is extremely heat tolerant, and requires little pruning. This 75-ft. rounded tree can be used equally as well as a street or specimen tree. The summer foliage is a dark green leaf with little fall color developing. If fall color does develop, it is usually a darker uniform yellow.

When considering maintenance requirements or tolerance to environmental stress, the maples are rather easy to rank. If pruning and low maintenance are main criteria, the order of ranking would be Norway, Hedge, Sugar, Amur, Planetree, Japanese, Red, Boxelder, and Sugar Maple.

When considering site adaptation or tolerance to urban conditions, the plants would rank (from high to low) Hedge, Norway, Boxelder, Silver, Red, Amur, Sugar, and Japanese.

If the plants are near where highway salts (sodium or calcium chloride) are regularly applied, then their ability to withstand these conditions would rank (from tolerant to intolerant) Norway, Hedge, Boxelder, Red, Silver, Amur, Japanese, Planetree, and Sugar Maple.

In making this decision, air pollutants should also be considered if sulfur dioxide is a problem. The tolerant to intolerant rating goes from Norway Maple being very tolerant to Planetree, Hedge, Silver, Sugar, Red, Boxelder, Japanese Maple showing little tolerance. The air pollutant ozone is becoming more common and affects the maples differentially with Norway Maple being most tolerant and Sugar, Boxelder, and Red Maple being least tolerant.

It is clear to see that several of the maples are outstanding in almost every category but in certain situations, each one of the eleven would be the prime tree to use. The main consideration should include selecting the maple that is best adapted to the conditions and the level of maintenance one is able to provide with an eye toward diversity.

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