

Tree Services[®]

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Taking Tree Care to New Heights



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EDITOR'S LETTER



As an editor, you simply can't be planning a main issue on Sustainable Landscaping and a special issue on Tree Care without Dr. Doug Tallamy coming to mind. Entomologist, college professor, and author of 2020 *NY Times* Best Seller, *Nature's Best Hope*, Tallamy pioneered the concept of treating residential yards as "conservation corridors" within the larger eco-system. *Smithsonian Magazine* called the book, "not just a horticultural revolution, but a cultural one, bridging the

human-dominated landscape and the natural world," while the *Washington Post* described it as "A full-blown manifesto that calls for the radical rethinking of the American residential landscape, starting with the lawn."

His most recent book, *The Nature of Oaks*, champions the mighty tree species for its ecological benefits. As you can imagine, I was thrilled when Dr. Tallamy agreed to write for *Turf* on why we should be planting more oaks in our landscapes (page T-5).

When it comes to planting, another college professor, Dr. Bert Cregg, and his team are doing important research on container-grown trees. He shares the latest findings on what transplant methods we should be using for greater success (page T-3). A selection of tree care equipment (T-7) and suggestions of tough trees for tough conditions (T-10) round out our coverage. Happy Spring tree planting!

Christine Menapace

cmenapace@groupc.com
TreeServicesMagazine.com

Tree Services®

Taking Tree Care to New Heights

2 Bridge Avenue, Suite 231,
Red Bank, NJ 07701
SUBSCRIPTIONS: (732) 559-1256
GENERAL: (732) 842-7433 / (800) 524-0337
treeservices@groupc.com

BUSINESS DIRECTOR

Dan Ulrich (303) 974-0620 / dulrich@groupc.com

BUSINESS DIRECTOR

Bill Corsini (732) 559-1269 / bcorsini@groupc.com

EDITORIAL DIRECTOR

Christine Menapace (732) 559-1255 / cmenapace@groupc.com

ASSISTANT EDITOR

Jessica Schwartz turf-editor@groupc.com

WRITERS

Bert Cregg, Riley Rouse, Doug Tallamy

PRODUCTION MANAGER

LuAnn Rathemacher (732) 559-1270 / luann@groupc.com

CREATIVE DIRECTOR

Jessica Toal (732) 559-1268 / jtoal@groupc.com

SENIOR ACCOUNT EXECUTIVES

Bill Corsini (732) 559-1269 / bcorsini@groupc.com

Betty Anne O'Malley (732) 559-1253 / baomalley@groupc.com

GROUP EDITOR

Anne Cosgrove (732) 559-1250 / acosgrove@groupc.com



CO-PRESIDENT / OWNER

Susan L. Coene
scoene@groupc.com

CO-PRESIDENT / OWNER

Ted Coene
tcoene@groupc.com

CONTROLLER

Danielle DePasquale (732) 559-1271 / ddepasquale@groupc.com

VICE PRESIDENT, MARKETING

Neil Eisenberg (732) 559-1254 / neil@groupc.com

MARKETING ANALYST Ksenia Stsepyetkina

ksenia@groupc.com - (732) 559-1262

MARKETING ASSISTANT / SUBSCRIPTIONS

Matthew Sham (732) 559-1256 / msham@groupc.com

WEB EDITOR

Mary Ellen McCandless (732) 559-1272 / maryellen@groupc.com

WEB PRODUCER / DIGITAL AD OPS LEAD

Jason Berardi (732) 559-1263 / jberardi@groupc.com

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ON THE COVER

A STIHL HTA 50 battery pole pruner on the job. See this issue of *Tree Services* for tips on tree planting and tree species selection. (Image: STIHL)

COVER: JESSICA TOAL,
GROUP C CREATIVE DIRECTOR



“Teasing” apart the outer roots is one method of eliminating circling roots.

Stop Going In Circles

Improving transplant success of container-grown trees.

By Dr. Bert Cregg & Riley Rouse

Cregg and Rouse are involved in a research project at Michigan State University on “Improving transplant success of container-grown landscape trees.” Here’s some of the findings they’ve shared with Turf Tree Services.

Trees provide a myriad of functions and benefits in landscapes including shading, screening unwanted views, serving as focal points, and even capturing air pollutants and mitigating urban heat island effects. No wonder clients want to plant more of them!

One of the first steps in the tree planting process is deciding on whether to plant ball-and-burlap (B&B) trees or trees grown in containers. Increasingly, landscapers and homeowners are opting for container-grown trees because they weigh less and are easier to handle and plant than conventional B&B trees.

However, a major downside to growing trees in containers is the development of circling roots during production. The production of most container-grown shade trees starts with bare-root tree liners (or whips) that are planted in plastic containers, which typically range between 7 and 25 gallons. As roots grow, they eventually encounter the wall of the nursery container, deflect, and begin to circle. Container trees also commonly produce a heavy mat or “pancake” of roots at the container bottom.

Both the circling roots around the sides as well as the pancake on the bottom of the root-ball are defects that can limit root egress into surrounding soil after planting. Root egress is essential to successful long-term establishment and for providing tree stability. Moreover, when roots continue to circle around the base of the tree, they have the potential to girdle the stem and effectively “choke out” the tree.

Nurseries have grown trees in containers for decades, and landscapers have observed container-related root defects for nearly as long. Over the years, researchers have investigated a variety of approaches to mitigating container effects including slicing, butterflying, and teasing apart roots—often with mixed results. More recently, research has shown that shaving—removing the outer periphery of the root systems of container-grown trees—can eliminate circling roots and improve root egress into soils.

Shaving can be done with a pruning saw, reciprocating saw, or sharp spade. In some cases, the container root-ball is cut into a square and is referred to as “box-cutting.” Over the past decade, our lab has conducted research trials on the response of container-grown trees to an array of pre-plant root modifications. Here we discuss these trials and some of the key implications for landscapers planting container-grown trees.

A Close Shave

In 2012 we installed a trial to investigate the impacts of planting practices on survival and establishment of container-grown Bloodgood London planetrees. Before planting, we divided the trees into three groups and assigned them to three root treatments:

1. Shaving, in which we removed the outer 1 1/2” of the periphery of the root system along with the bottom pancake of roots;
2. Teasing, where we “teased” or pulled apart any circling roots; and
3. Control, which we planted as-is.

We planted all the trees in landscape test plots at the Michigan State University Horticulture Teaching and Research Center and monitored their survival and growth. We excavated the root systems of a subset of trees two and four years after planting. We found that shaving increased root egress into the surrounding soil and reduced circling roots. Teasing also improved root system quality and increased root egress compared to the control, but not to the same extent as shaving.

However, one concern with root shaving is the potential negative impacts of root

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Stop Going In Circles

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removal on subsequent tree stress and growth. Yet in our trial, tree height and diameter growth was comparable among all three root treatments.

How Does It Work?

While root shaving can improve new root growth into the surrounding soil, how exactly does it happen? And why isn't teasing apart circling roots just as effective? When thinking about root modification strategies, the first thing we have to do is eliminate the circling. If circling roots are not mitigated, they will continue to circle and ultimately become woody. This further limits growth into the backfill and can contribute to tree instability down the road.

When done properly, both shaving and teasing can reduce circling roots and improve long-term root quality. But one challenge with teasing roots is that it can be physically challenging to pull apart roots, especially on large, densely matted root systems. We also find that when we straighten out roots, the roots tend to spring right back to their original position.

Another advantage of root-ball shaving compared to teasing is that pruning roots helps to stimulate new root growth, similar to how pruning branches can result in new growth below the pruning site. When we cut through roots, callus tissue forms at the point of pruning, and there is a proliferation of new roots formed that can increase root egress into backfill soil.

Slicing & Bare-Rooting

In talking with tree care professionals, we find slicing—making a series of vertical slices through the root-ball—is a frequent practice when planting container-grown trees. Although slicing is widespread, there is relatively little research to support the practice and the few studies available yield conflicting results. Dr. Ed Gilman at the University of Florida found that slicing roots of container-grown live oak trees reduced development of circling roots, but also decreased tree stability during controlled



Top left: The first step in shaving the root system on container-grown trees is to remove the 'pancake' of roots from the bottom of the root-ball. Top right: When shaving is complete, all of the circling roots on the periphery have been removed. Right: The root system of this London planetree was excavated four years after transplanting. The root system was shaved before transplanting and outward root growth is excellent.

“pull tests.” Researchers at the University of Minnesota found that slicing root systems of littleleaf linden and weeping willow trees did not improve new root growth compared to untreated controls.

More recently some have advocated bare-rooting container-grown trees prior to planting. In bare-rooting, all container substrate is removed in order to access the entire root system and correct any root defects, including circling roots and other root deformities. Again, little systematic research has been conducted to support bare-rooting. We have trialed bare-rooting trees prior to planting and found that tolerance of trees to bare-rooting varied widely among species (planetrees were tolerant while tulip poplar, hornbeam, and hophornbeam had extensive dieback and mortality following bare-rooting) and by season (bare-rooting resulted in severe dieback and mortality when performed during Summer).

A preventive approach to circling roots is growing trees in alternative containers. Over the years various container types have been developed with air-pruning slits or other designs to minimize circling. Fabric grow-bags or root pouches have also been promoted. Dr. Alison Stoven O'Connor with Colorado State University Extension evaluated root development after transplanting Callery pear trees that were grown in either standard black plastic containers or fabric grow bags, and found that trees grown in



fabric bags had fewer circling roots and better overall root quality.

While circling roots can negatively impact tree establishment and long-term structural issues, root-ball shaving is an effective technique for eliminating circling roots, improving root quality, and stimulating new root growth. Fortunately, the availability of trees grown in alternative containers, which may reduce root circling, is increasing. Landscapers should consider trialing trees grown in alternative containers if they are available in their area. ■



Cregg is a Professor and Extension Specialist in the Department of Horticulture and Department of Forestry at Michigan State University. Rouse is an ISA Certified Arborist and a Research Assistant in the Department of Horticulture at Michigan State University. Collaborators on their research include: Michigan State University Project GREEN; J. Frank Schmidt Family Charitable Foundation; ICL Specialty fertilizers; Rainbow Scientific; J. Frank Schmidt and Sons Nursery; Renewed Earth, Inc.; and Nursery Supplies, Inc. For more on Cregg's research, visit canr.msu.edu/people/ber_t_cregg.

Do you have a comment? Share your thoughts in the Comments section of the online version of this article at TurfMagazine.com. Or send an e-mail to the Editor at cmenapace@groupc.com.

PHOTOS: BERT CREGG & ROUSE

Mighty Oaks

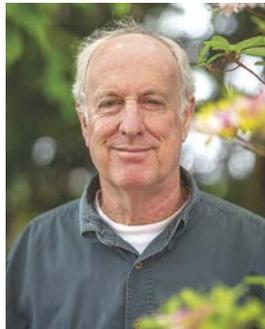
Why they should be on your planting list.

By Doug Tallamy

To many, Doug Tallamy needs no introduction. A renowned ecologist, his 2020 NY Times

Best Seller, *Nature's Best Hope*, showed homeowners how to turn their yards into conservation corridors. His latest book, *The Nature of Oaks*, was released in March 2021. Here he offers a message

specifically written for Turf readers about why we should be planting more oaks.



In case you haven't heard: life on Earth is in trouble. Distressing statistics about declining biodiversity are being reported so fast they are running into each other. North America has lost three billion breeding birds in the last 50 years; Earth has lost 45% of its insects with continuing declines reported nearly everywhere; and the UN predicts one million species will go extinct in the next 20 years. Not only are we in the midst of the sixth great Earth extinction event, but loss of populations in species not yet extinct is rampant. We hear much about the climate crisis, and rightly so. What many fail to appreciate is that our disregard for the well-being of biodiversity is as grave a threat to humans as climate change, because it is healthy, productive ecosystems—not Best Buy or Costco—that support us, and it is biodiversity that makes ecosystems healthy and productive. To put it bluntly, we are destroying the natural world that we cannot live without.

It's not that we purposefully have nature in our sights. Rather, we have simply refused to share our spaces with the natural world. We have clung to the notion that humans and nature cannot coexist as if it were true (it's not). And so, as our population has expanded, we have exiled nature to parks and preserves that are too small, too

few in number, and too isolated. The grim statistics cited are a stark reminder that our protected lands (just 12% of the U.S.) are not sufficient to sustain the amount of nature our ever-growing populations require.

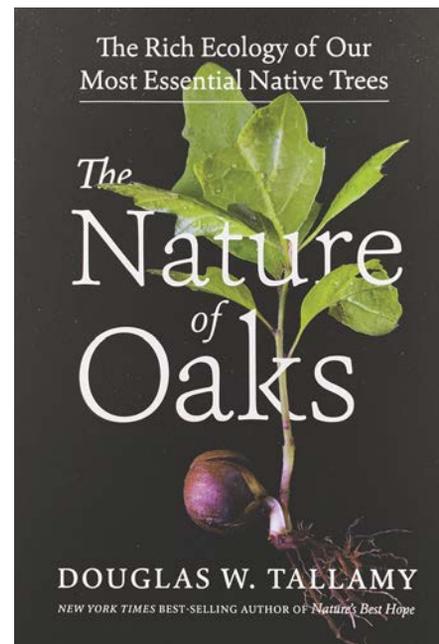
Four Landscape Imperatives

Fortunately, there is a solution to this existential crisis. We can save nature by learning to live with it. Rather than practicing conservation only within parks and preserves as we have done in the past, we must now also conserve nature outside of protected places, where we live, work, shop, farm, and play: that is, in built, human-dominated landscapes. There are four roles every landscape must play if we are to forge a sustainable relationship with the natural world that supports us.

1. We must landscape with plants that support local food webs, for it is the transfer of energy from plants to animals that enables the animals that run our ecosystems to exist.
2. All landscapes must pull CO₂ from the atmosphere and store the carbon first in plant tissues and then long-term in the soil.
3. All landscapes must help manage the local watershed. No one has the ethical right nor ecological permission to design a landscape that degrades its watershed.
4. Finally, all landscapes must nourish a complex community of native pollinators by supplying the pollen and nectar they require to successfully reproduce.

Why Oaks

This is where the mighty oak can help. Oaks accomplish three of these four essential landscape roles better than any other tree genus in North America. By adding one or more oaks to our yards, our corporate landscapes, our roundabouts and cloverleaf interchanges, and public parks, we can support more animal species in higher



numbers; sequester more CO₂ by virtue of their large size, great age, and densely packed xylem cells; and improve our watersheds more quickly and thoroughly than if we choose other tree species (or no trees at all) due to their large crowns, immense root systems, and long-lived leaf litter.

The only thing oaks do *not* do better than other plants is support pollinators (oaks are wind pollinated), but three out of four isn't bad.

Why are oaks best at helping animal populations? Two reasons: they serve as host plants to more species of caterpillars than other trees, and they produce large sources of fats and proteins in the form of acorns—up to three million acorns in the life of a single oak tree. The importance of acorns in supporting jays, titmice, towhees, chipping sparrows, nuthatches, woodpeckers, turkeys, ducks, rodents, squirrels, deer, and bears is self-evident; acorns are produced in the fall, right when these creatures need to store fat for Winter survival.

Beyond birds and animals, caterpillars are every bit as important in our landscapes, though the reasons are not so evident. Think back to grade school biology when we learned about photosynthesis. To be sure, plants are beautiful landscape decorations, but in terms of nearly all animal life on earth, plants are far more. They are the only life forms that, through photosyn-

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Mighty Oaks

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thesis, can turn light energy from the sun into food. Plants enable us and every other animal species to “eat” sunlight. But unless an animal has access to the food that plants make, it doesn’t do them any good at all.

How do most animals get plant energy? Not by eating plants themselves, as you might think, but by eating something that ate a plant. Most vertebrates do not eat plants directly; they eat insects that ate plants. And not just any insects. In most ecosystems, it’s caterpillars that transfer more energy than any other plant-eater.

Take birds, for example. Most (96%) of the terrestrial bird species in North America rear their young on insects, and in 16 out of the 20 most common bird families, caterpillars dominate nestling diets. And not just a few. Typical birds, like Carolina chickadees, require 6,000 to 9,000 caterpillars (depending on the number of chicks) to raise nest-

lings until they leave the nest. Parents then continue to feed caterpillars to their young for another 21 days after fledging. It takes well over 10,000 caterpillars to make one clutch of a bird that weighs 1/3 of an ounce, four pennies worth of bird. And chickadees are not exceptions. Most birds rely just as heavily on environments that produce huge numbers of caterpillars.

My point is simple: if we want robust populations of birds to be able to breed in human-dominated landscapes, we need to create landscapes that produce lots of caterpillars. Choosing plants that support many caterpillar species is a must, then, and no plant genus supports more species of caterpillars than *Quercus*, the oaks. In fact, oaks are the primary host for more than 950 caterpillar species nationwide. To put this extraordinary ecological accomplishment in perspective: in the Mid-Atlantic, native tulip poplars support 21 caterpillar species, crepe myrtles support three, and ginkgoes support none. A yard landscaped with typical Asian

ornamentals has no chance of producing the insect food birds need to reproduce.

Oaks At Risk

Despite these vital attributes, oaks are in trouble. The old giants that provided unique niches for layers of biodiversity are now largely absent from our landscapes. Oaks were prized suppliers of wood products and most large specimens were logged centuries ago. Long after the giants were gone, we continued to degrade oak habitats across the country. Vast tracks of oak forests have been ‘developed,’ converted to crop or pastureland, or have been highly altered by fire suppression. In fact, the oaks in eastern forests has dropped from 55% pre-European settlement to 25% today. Add pressure from the climate collapse that favored oak health over 8,000 years, as well as the human introduction of sudden oak death, oak wilt, and oak leaf scorch, and invasive pests like the spongy moth, and many oak species are now on the ropes. An analysis by Morton Arboretum in Lisle, IL has found that 28 of the 91 oak species in North America (over 30%) are so diminished in numbers, they may soon disappear from the wild forever.

We humans live our lives out in a brief instant of ecological time. We cannot return ancient oaks to our landscapes during that instant, but we can (indeed, we must) start. I’ve planted a number of massive old oaks on our property, except they are only 20 years old and not so massive yet. They are growing, though, and several have topped 50’ at this writing. In a blink of time they will be large enough and old enough to assume their keystone positions in our yard. ■

Tallamy is the T. A. Baker Professor of Agriculture in the Department of Entomology and Wildlife Ecology at the University of Delaware, where he has authored 106 research publications and has taught insect-related courses for 41 years. Chief among his research goals is to better understand the many ways insects interact with plants and how such interactions determine the diversity of animal communities. Besides the aforementioned books, he has written Bringing Nature Home, and The Living Landscape (co-authored with Rick Darke). His awards include recognition from The Garden Writer’s Association, Audubon, The National Wildlife Federation, Western Carolina University, The Garden Club of America, and The American Horticultural Association. Doug lives with his wife, Cindy, on their restored property in Oxford, PA.

Homegrown National Parks

“... what if each American landowner converted half of his or her yard to productive native plant communities? Even moderate success could collectively restore some semblance of ecosystem function to more than 20 million acres of what is now ecological wasteland.” —TALLAMY

Homegrown National Park®, a term coined by Doug Tallamy, is a call-to-action catalyzing the collective effort of individual homeowners, property owners, land managers, and anyone with some soil to plant in, to start a new HABITAT® by planting native plants and removing most invasive plants. The idea is to regenerate biodiversity and ecosystem function and create new ecological networks.

In Tallamy’s words: “Our National Parks, no matter how grand in scale are too small and separated from one another to preserve species to the levels needed. Thus, the concept for Homegrown National Park, a bottom-up call-to-action to restore habitat where we live and work, and to a lesser extent where we farm and graze, extending national parks to our yards and communities.”

The HNP’s initial goal is 20 million acres of native plantings in the U.S. This represents approximately ½ of the green lawns of privately-owned properties. Progress is tracked in an interactive community-based visual map that shows each person’s contribution to planting native by state, county, and zip code. There’s also a gauge showing progress towards the goal. The map is also an important way for individuals to see their part in the greater whole—creating new ecological networks and restoring biodiversity. *For more information, visit homegrownnationalpark.org.* ■

Tree Care

Notch Flow Rope Wrench & Fusion Flow Combo

Notch Equipment and Kevin Bingham have come together to release a new Flow Rope Wrench and Fusion Flow Combo, giving tree professionals the freedom of custom friction on their ropes. The new Notch Flow Rope Wrench returns to the use of an adjustable bollard, which is an evolution from the ZK-1 model. The new Rope Wrench also features an improved ultra-low drag ascent which can be customized to a setup to save climber energy. With an adjustable concave stainless steel bollard providing custom friction setting and an improved ultra-low drag descent, the Notch Flow Rope Wrench fits rope diameter ranging from 7/16" to 1/2".



DeWALT DXGP210 Gas Pole Saw

The DXGP210 is designed with a low-kickback 10" bar and chain for added safety and an automatic oiler that keeps the bar and chain well-lubricated to minimize maintenance and extend equipment life. A 27 cc full-crank, commercial-grade engine delivers reliable power for routine use. Reach farther with a 7' extension pole and get a comfortable grip with overmold handles designed to lessen hand strain. This versatile pole saw can be converted into other tools to tackle more tasks with attachment capability and TrimmerPlus system compatibility.

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Tree Care

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Brushcat™ Rotary Cutter Attachments

The 44" and 54" Rotary Cutters are the newest attachments to the Brushcat lineup from Bobcat. The smallest two models in the lineup, they deliver powerful cutting and access to areas of untamed growth where larger rotary cutters cannot go. These new size offerings expand the company's current attachment choices for the mini track loader and small articulated loader lines. The models feature a high-efficiency, direct-drive motor that maximizes hydraulic horsepower for cutting and mulching of tall, thick vegetation in one pass. The high cutting speeds and heavy-duty blades maximize inertia to cut and mulch vegetation up to 2" in diameter.



Arborjet Supersonic Air Knife

Revamped and redesigned with the LT Standard and LT Vacuum attachment, this lightweight model is now even more maneuverable, while offering the same functionality and even more comfort. The body has been redesigned to be lighter and offers easier access to the pressure gauge and internal valves. The trigger handle is longer, wider, and more ergonomic and the new barrel handle is now longer and wider. The collar makes adjustment easier and reduces scratching. Coming this Spring 2022 is a bag attachment for the vacuums. A heavy-duty mesh bag with strong zippers and handles, it can catch debris from the vacuum to be moved or returned to the dig site, as well as help with general cleanup.



STIHL HT 105 Pole Pruner

The STIHL HT 105 pole pruner is designed to help pros tackle low-hanging and high branches while also minimizing operator fatigue and maximizing cutting precision. Its new lightweight square telescoping shaft increases rigidity while extending to a variety of heights and easily locking into position. With its semi-automatic choke lever, one-touch stop, no-slip grip design, and 1/4" STIHL PICCO™ (PM3) saw chain, the HT 105 makes tough jobs easier. Upgrades from the previous model include a new durable metal gearbox with a metal branch hook, outboard guide bar and saw chain mounting, and a quick-adjustment shaft design.



Deere ME36 & ME50 Mulchers

John Deere has introduced new attachments for excavators: the ME36 and ME50 Mulchers. Ideal for clearing standing/felled trees and brush, the mulchers are available as dealer installed kits for the Deere 50/60 and 75/85 excavators but are also compatible with many competitive 5–10 ton excavators. Equipped with knife-style cutting teeth on a split ring rotor, the mulchers' spiral, double helix tool pattern and innovative tool shape allow for efficient cutting of up to 5" material. A controlled and metered cutting depth allows the operator to maintain high rotor rpms and a productive mulching rate. The teeth may be sharpened and easily flipped for a fresh cutting edge, extending the tool's life.



Corona ClassicCut® Bypass Lopper

Corona's 36" ClassicCUT Bypass Lopper has new, improved elliptical aluminum hands that are lightweight and strong. This 2" cut-capacity lopper has a resharpenable FORGED Radial Arc bypass blade and slant-ground hook with self-cleaning sap groove. Other features include: a fully heat-treated steel alloy Precision-made, self-aligning bolt; a Shock Stop® bumper to reduce shoulder fatigue; and the ClassicCUT design.

Kubota U10-5 Compact Excavator

Kubota has a new addition to its excavator lineup: the U10-5 minimal tail swing excavator. Ideal for working in tight spaces, the U10-5 is for someone who requires a compact excavator in the 0 to 1-ton range, but in a more compact frame with minimal tail swing for agility and flexibility. The U10-5 offers easy, single-level maneuverability with hydraulic adjustable track widths that quickly contract to 2' 6" to fit through small spaces like doorways, fence gates, and more. The tracks can then widen out to 3' 3". The U10-5 extends to a 5'11" digging depth with a bucket breakout force of 2,337 lbs. A hydraulic control system offers smooth operation and an increase in digging productivity; while the side lever joystick operational controls are the same as found on larger Kubota excavators.



Tough Trees

Wind, salt, fire ... these trees can handle nature's onslaught.

By Turf Editors

Climate extremes and storms seem to increasingly dominate headlines. Drought, forest fires, hurricanes, and flooding are just a few of the weather-related crises we saw in the U.S. in the last few years.

Such weather impacts can wreak havoc on prized, irreplaceable, and otherwise long-lasting landscaping. While the simple solution is a return to natives, even natives or zone appropriate plants can suffer when the zone experiences extremes. The record breaking freeze in Texas and the blazing heat in Oregon last year damaged or killed otherwise healthy zone-appropriate plantings in just a matter of days.

According to a 2018 Yale School of the Environment paper, U.S. plant hardiness zones are moving north at 13 miles per decade. When the map was last updated in 2012, nearly half the country was upgraded to half a zone warmer than it had been in 1990. The Arbor Day Foundation says this affects which trees are right for planting. In 2015 it completed an extensive updating of zones and documented the shifts since 1990 at arborday.org/media/map_change.cfm.

While maps shift, mature trees can't shift with them. We can fertilize, prune, and keep them at optimum health to better weather adverse conditions, but ultimately our most valuable landscape elements must often just bear up. Which is why we need to give them a fighting chance. We need to pick the right trees for potentially wrong conditions. This is the era of the tough tree.

What makes a tough tree? One that is proven to best withstand nature's onslaught. *Turf* perused university extensions and other reputable sources to create tree lists for weather extremes. Got a windy spot? Learn from Florida experts, who deal with hurricanes, a resilient choice that grows in your zone. If there's a native that solves your problem, even better.

It should be noted that no tree is hurricane-proof or fireproof, but some are more "resistant" than others. Placement, other plants, and maintenance are equally important factors to consider beyond species. But we hope this provides a handy first reference for problem areas.

Hurricane Resistant

It's no surprise the University of Florida Institute of Food & Agricultural Sciences (UF/IFAS) Extension has a whole website entitled "Trees and Hurricanes." They even list trees with the *least* wind resistance: sand pine, Chinese elm, water oak, and laurel oak. While UF research showed that sand live oaks (*Quercus geminata*; Zones 8-10) are the *most* resistant to wind damage, other good choices include (numbers represent zones):

- Southern magnolia (*Magnolia grandiflora*) 7-9
 - Live oak (*Quercus virginiana*) 7-10
 - Bald cypress (*Taxodium distichum*) 4-10
- Those *somewhat* resistant to storm damage include:

- Sweetgum (*Liquidambar styraciflua*) 6-7
- American holly (*Ilex opaca*) 5-9
- Sycamore (*Platanus occidentalis*) 4-9
- Swamp chestnut oak (*Quercus michauxii*) 6-9
- Spruce pine (*Pinus glabra*) 8-9
- Gumbo limbo (*Bursera simaruba*) 10b-11
- Tupelo or Blackgum (*Nyssa sylvatica*) 3-9

Not technically trees, sabal palm are an excellent choice. Ornamentals like crepe myrtle and dogwood are also mentioned.

Salt Tolerant

The Clemson Cooperative Extension Home & Garden Information Center has a list of salt tolerant plants for the South Carolina coast. Trees are rated high or moderate tolerance. High tolerance means a tree can handle direct salt spray. These include:



- Southern Red Cedar (*Juniperus virginiana* var. *silicicola*) 3-9
- Live Oak (*Quercus virginiana*) 8-10
- Southern magnolia (*Magnolia grandiflora*) 7-9
- Yaupon Holly (*Ilex vomitoria*) 7-10

Trees with moderate tolerance can grow beachfront adjacent, but should be sheltered. They include:

- American Holly (*Ilex opaca*) 5-9
- Loquat (*Eriobotrya japonica*) 8-10

Fire Resistant

Fire Resistant Plants For Home Landscapes—produced by the Pacific Northwest Extension of Oregon State University, Washington State University, and the University of Idaho—is a 48-page free downloadable guide of plants that are both fire resistant and attractive. Not just trees, it also covers ground covers, perennials, and shrubs.

When it comes to conifers, ponderosa pine (*Pinus ponderosa*; 3-6) and western larch (*Larix occidentalis*; 4-7) are among the most fire-resistant due to their thick bark, and high-moisture-content foliage.

The list of deciduous trees is long. Here's just a sampling (zones not included):

- Amur, Bigleaf, and Red maples
- Horsechestnut
- Red & Mountain alders
- Hackberry
- Hawthorn
- European beech
- Green & White ashes
- Kentucky coffeetree
- Chokecherry (*Prunus virginiana*) 3-8
- Oregon white, Pin, & Red oaks.

More to come on drought and flood-tolerant trees in *Turf's* June Water issue. ■