

## Meetings and Announcements

### Weekly Horticulture Zoom Talks, Thursdays at 4:30 pm

Horticulture Zoom talks have resumed. I offered 52 of these in 2020-2021. Although most were focused on notable gardens of Europe and Asia, I also did a series of talks on climate change and other topics about the environment. For April 28, the topic is the Dallas Arboretum followed by a session on xeriscape design on May 5. I don't have a Zoom link to share in this newsletter, but I welcome your participation, and if you to send me an email and I'll send you a link. If you were on past Hort Zoom talks, you'll receive an invitation from Travel Gallery, which is acting as host.

### Lawn and Garden Equipment: California's Recent (2021) Law

As reported in the LA Times and elsewhere, California will ban the sale of new gasoline powered lawn mowers, leaf blowers, and chain saws as early as 2024. (Citation: [www.latimes.com/california/story/2021-10-09/california-moves-toward-ban-on-gas-lawnmowers-and-leaf-blowers](http://www.latimes.com/california/story/2021-10-09/california-moves-toward-ban-on-gas-lawnmowers-and-leaf-blowers).)

“The law requires all newly sold small-motor equipment primarily used for landscaping to be zero-emission — essentially to be battery-operated or plug-in — by that target date or as soon as the California Air Resources Board determined it is feasible. New portable gas-powered generators also must be zero-emission by 2028, which also could be delayed at the discretion of the state agency” (article cited above).

The rationale for this law is air quality, not greenhouse gas emissions. Small engines are without catalytic converters, and they can emit substantial amounts of unburned hydrocarbons (VOC) and oxides of nitrogen (NOx), which are the principal precursors of ground-level ozone—the most important air pollutant in California, especially in urban areas.

One can see emissions from a landscape edger in the photo below. However, what is visible is only an indication and not a measurement of the quantities and identities of various hydrocarbons.



A consideration in the practicality of a move to battery-powered or plug-in garden equipment is the energy density of gasoline compared to common 20V or 40V batteries. It is a little difficult to see how riding mowers, and also reel mowers (“front-throw”) of any size, can be powered by batteries. However, battery technology is improving, both in capacity and in rates of charging and discharging.

The American Physical Society (APS) in an online article discussing energy density (<https://www.aps.org/publications/apsnews/201208/backpage.cfm>). The article gives a value for gasoline of 47.5 MJ/kg (MJ = megajoules = million joules) and 34.6 MJ / L, and since 3.785 L = 1 U.S. gallon, we can see the energy in a gallon of gasoline is considerable. For a lithium ion battery pack, the energy density is about 0.3 MJ/kg or 0.4 MJ/L. That’s about 100 times less energy density for the battery as compared to gasoline.

One could do comparisons of primary energy use needed to produce electricity and/or lifecycle analyses of all the energy needed to extract crude petroleum and refine it vs the energy needed to mine lithium and make batteries. I shall not attempt to discuss these comparisons here. See the APS article cited above for additional discussion. Note that the article is about 10 years old, but to my knowledge the basic considerations of chemistry and physics have not changed much in that time period.

One additional word we will use is power. In a simple definition from physics, power = work / time. That means the greater the work, the more power is needed or if work is to be done in a shorter time, more power is needed. (We could further define “work” but I don’t think it is necessary here.)

I think we all have an intuitive sense of what power means. For example, to bring a car to 70 mph in a short time requires more power than to bring a car to 70 mph in a longer time. (The same is true for stopping distance. More power—and brake wear—if the stopping distance is short vs if the stopping distance is long.)

So, for tools, a major consideration is the amount of time and area that needs to be covered using a specific tool. Is it a few cuts with a saw, or many? Is it a few square feet of turf, or many?

#### DISCLAIMER

I’ve been trying battery-powered equipment at the office, and to some extent at home. Comments I offer are by no means some sort of Consumer Reports™ study based on careful testing and repeated measurements. I offer no recommendations as to

manufacturer. My comments reflect my experience with a few tools, some of which Greenscene readers might find useful. I wish to look at mowers first. I do not attempt to show mowers with a background of finished and finely cut turf, and the turf shown does not reflect the cutting effect of any particular mower.

Shown first is a reel mower, also called a push mower. While this may seem to be a museum piece, people actually use mowers like this back east, and this type of mower can be used locally. It cuts with a scissor action, pushing the grass blades against a bed knife. The power source is the human – although one can see similar mowers drawn by animals in other parts of the world. This mower is not effective for cutting hybrid bermudagrass, which needs very low cutting heights, but could be used for tall fescue.



For hybrid bermudagrass, a gasoline-powered reel mower (“front-throw”) is usually used, shown here in a display at a home store. Because of the cost and maintenance requirements of such a mower, many people employ gardeners who have this tool.



Rotary mowers cut with the blade parallel to the ground, and because the blade spins fast grass leaves don't have time to be pushed out of the way, resulting in a sort of hatchet-like cut that shatters the leaf blade. Shown below are examples of gasoline-powered rotary mowers at a

home store. They are simpler mechanically than reel mowers, but also more dangerous, although in recent decades design features and guards have improved safety. These mowers will not give a smooth cut on hybrid bermudagrass, but can be used for common bermudagrass and tall fescue. Riding mowers with rotary cutting blades are often seen on larger turf areas, like parks.



Not really a mower, I tried a battery-powered tool for cutting grass ('El Toro' zoysia, specifically). The unit shown is a string trimmer set into a sort of mower deck to keep the trimmer action parallel to the ground. It is limited in adjustment of cutting height, and because of its narrow width of cut it would be time-consuming to use on a larger turf area. It does feel like walking a Chihuahua.



I had an electric mower with a cord ("corded mower") for my house since my lawn is quite small. It worked well, but I got tired of pulling cord, so I have tried a battery-powered mower, shown below. Because my lawn is so small, one charge of the battery is sufficient. However, as one would expect, the blade rpm is a lot less than a gasoline-powered rotary mower, and the cutting width is smaller. Again, not a good choice for hybrid bermuda but OK for common bermuda, tall fescue, or 'El Toro' zoysia. An advantage is that it's quiet and I don't need to store gasoline. I think there is applicability for small turf areas of upright grass types.



In the next Greenscene, I plan to show photos and briefly discuss battery- vs gasoline-powered hedge trimmers, leaf blowers, and chain saws. Unlike mowers, gasoline-powered tools like these generally have two-cycle engines so mixed gas is needed (gas with oil mixed in), an additional step of preparation for their use.

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