

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 May 26, the topic is pesticide misconceptions followed by plants of the Edinburgh Royal Botanical Garden on June 2. 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.

Part 2: Lawn and Garden Equipment: California's Recent (2021) Law

As I wrote in the April *Greenscene*, California is moving toward tools for landscapes that are not powered by gasoline engines. I want to show more of those below and offer a bit of discussion.

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.)

"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 (NO_x), 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. The American Physical Society (APS) has 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. So for batteries, the energy density is about 100 times less than that of gasoline. For the same power output, the higher energy density of gasoline typically means a replenishment of the power source (a “fill” for gasoline) is needed less often than a battery change.

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 make these comparisons. 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 if work is to be done in a shorter period of 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.)

For tools, a major consideration is the amount of activity or area that needs to be covered. Is it a few cuts with a saw, or many? Is it a few square feet of turf, or many?

More power for tools typically means greater rpm and the ability to overcome larger resistances, say, for a mower or chain saw.

Battery-powered tools are much quieter than their gasoline-powered cousins, which should always be used with hearing protection.

Unlike mowers, gasoline-powered tools like those discussed below generally have two-cycle engines, so mixed gas (gasoline with two-cycle oil mixed in) must be prepared and kept on hand. Of course, battery-powered tools eliminate the need for gasoline storage.

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.

String trimmers

Let's start with string trimmers. I remember when the first string trimmers entered the market, and these tools have proven their use for weed management. They have also been used, inadvertently, to kill small trees through girdling. Shown below is a battery-powered unit. It is lightweight and easy for me to use with one hand.



Below is a gasoline-powered string trimmer. It is heavier than its battery-powered cousin—I cannot easily one-hand this machine—and I have found it to be effective against semi-woody plants as well as herbaceous plants.



Such a unit can be fitted with a brush blade (below), which allows small-diameter wood to be cut as well as roots of plants. It is difficult for me to see that a battery-powered model could work well with a brush blade because of the power requirement.



Chain saws

Chain saws are inherently dangerous because of their exposed cutting surface and ease with which they cut through rope, cloth, and fingers. However, they can be very useful for cutting tree trunks and branches. Chains will need to be sharpened periodically.

A chain saw with a plug for an electric cord (corded model) is shown below. Such a saw can be used to cut up firewood at home, but it is not very useful for pruning (an electric cord has to be connected) and it is NOT for climbing—although I’ve seen a few people do that. It does have an automatic chain oiler.



A gasoline-powered chain saw is shown below. Such saws are available with varying engine sizes and bar lengths, and always have an automatic chain oiler. They are dangerous but useful if operated carefully. Chain saws are not simple tools that can be operated intuitively (with no training or reference to their instruction manual). In recent years, chain saws have anti-kickback features that increase operator safety. Appropriate safety clothing should be worn.



A tool I like more than I thought I would is the battery-powered alligator chain saw shown below. This tool must be operated with two hands for tool balance, to engage the safety switches, and because of its weight, and thus also keeps hands away from the cutting chain. I like this tool for working in close quarters. This tool has a small oil reservoir that has to be refilled often. Shown are the tool itself and the cutting chain inside its guards.



A chain-pole-saw allows an operator to cut overhead branches—with caution! Below is a battery-powered chain saw that can be used with a short pole or a longer pole using all three segments. A major disadvantage of this unit is that it does not have an automatic chain oiler. The unit comes with a squirt bottle to be filled with oil and applied to the chain at regular intervals.



A gasoline-powered pole saw is shown below. It has more power than its battery-powered cousin and is heavier, although well balanced. It does have an automatic chain oiler.



Please note that for home use non-powered loppers, hand pruning saws and pole saws work well for many pruning tasks.

Hedge Trimmers

Hedge trimmers can be very useful for rapid pruning of vines and groundcovers as well as ornamental grasses. Shown below are a battery-powered unit and one with a gasoline engine. In my experience, the difference in performance between gasoline- and battery-powered units is not as great as for many of the other tools.





Blowers

Finally, air blower tools. The battery-powered tool below calls itself a leaf sweeper, and it does not have the air velocity or airflow of its gasoline-powered cousin. Either can be used with one hand. Backpack blowers (not shown) offer still greater airflow and velocity.



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