How landscape plants have an impact on the carbon footprint

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A study out of the University of Kentucky provides a base of understanding of carbon footprint terminology and illustrates carbon footprint analyses using data from previous research that modeled nursery and greenhouse crop production systems and their life-cycle impact. Dewayne Ingram, Charles Hall, and Joshua Knight present the science underlying the determination of carbon footprint and the degree to which it is important in minimizing the negative impacts of new product development and assessing the positive or negative cradle-to-grave life-cycle impacts.

Their research is in the article "Understanding Carbon Footprint in Production and Use of Landscape Plants" in *HortTechnology*.

Carbon footprint relates to the efflux of greenhouse gases in the environment. The greenhouse gas emissions of primary interest or concern are carbon dioxide, nitrous oxide, and methane, and result from human and environmental activities. These warm the earth by absorbing energy and decreasing the rate at which energy escapes the earth's atmosphere to space. In other words, greenhouse gases increase the effectiveness of the atmosphere to act as a blanket that insulates the earth. Therefore, greenhouse gases have a measurable potential for trapping energy in the earth's atmosphere.

Life cycle assessment, with tools used to estimate greenhouse gases during the life cycle of a targeted product or activity, has been used to characterize representative field-grown and container-grown landscape plants. The dominant contributor to the carbon footprint and variable costs of field-grown trees is equipment use, or, more specifically, the combustion of fossil fuels.

Most of that impact is at harvest, when heavy equipment is used to dig and move individual trees. Transport of these trees to customers and subsequent transplantation in the landscape are also carbon-intense activities.

Greenhouse heating also can also have an impact on the carbon footprint of plants, depending on the location of the greenhouse or nursery and the length and season of production. Knowing the input products and activities that contribute most toward the carbon footprint and costs during plant production allows nursery and greenhouse managers to consider protocol modifications that are more beneficial to profit potential and environment impact.

Greenhouse gases differ in their effectiveness to absorb energy in specific wavelengths, primarily infrared. This is referred to as their radiative efficiency. They also differ in terms of how long they stay in the atmosphere, or their lifetime. Global warming potential was developed to categorize greenhouse gases based on their radiative efficiency and lifetime in the atmosphere.

The impact of landscape plants on atmospheric carbon dioxide during the production and use phases contributes to the life-cycle benefits. Although greenhouse gases are emitted during the production phase, carbon dioxide is sequestered from the air and is stored in the wood of plants, having an impact on atmospheric carbon dioxide levels for decades. The carbon will eventually be emitted when the tree is removed from the landscape at the end of its life cycle.

As the green industry continues to mature, differentiation is an increasingly important business strategy for green industry businesses. One such way to accomplish this is by adopting environmentally friendly behavior and/or selling products that offer environmental benefits.

Ingram adds, "Our research over the last decade has revealed activities and inputs in landscape plant production that can be modified to reduce carbon footprint. The analyses also documented

the many beneficial life-cycle environmental impacts, including carbon sequestration from the atmosphere, of landscape plants."

More information: Dewayne L. Ingram et al, Understanding Carbon Footprint in Production and Use of Landscape Plants, *HortTechnology* (2019). DOI: 10.21273/HORTTECH04220-18

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