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Home // Magazine // A prescription for plants

## A prescription for plants

FEATURES - COVER FEATURE

Horticulture provides a bevy of health benefits

NM STAFF | February 8, 2013



Trees and green spaces offer more than just aesthetics. Exposure to plants provides a variety of physical and mental benefits for people including lower anxiety, lower blood pressure, stress relief, better concentration and increased overall happiness. It's an impressive list of benefits that is backed by science. We take a closer look at some of those studies, including one by the U.S. Forest Service released in January.



But are people really getting the message? Dive into the research yourself, then share it with your employees and your customers, as well as your local and national lawmakers.

### Trees and human mortality

Evidence is increasing from multiple scientific fields that exposure to the natural environment can improve human health. In a new study by the U.S. Forest Service, the presence of trees was associated with human health.

For Geoffrey Donovan, a research forester at the Forest Service's Pacific Northwest Research Station, and his colleagues, the loss of 100 million trees in the Eastern and Midwestern United States was an unprecedented opportunity to study the impact of a major change in the natural environment on human health.

In an analysis of 18 years of data from 1,296 counties in 15 states, researchers found that Americans living in areas infested by the emerald ash borer, a beetle that kills ash trees, suffered from an additional 15,000 deaths from cardiovascular disease and 6,000 more deaths from lower respiratory disease when compared to uninfested areas. When emerald ash borer comes into a community, city streets lined with ash trees become treeless.

The researchers analyzed demographic, human mortality and forest health data at the county level between 1990 and 2007. The data came from counties in states with at least one confirmed case of the emerald ash borer in 2010. The findings—which hold true after accounting for the influence of demographic differences, like income, race and education—are published in the current issue of the *American Journal of Preventive Medicine*.

"There's a natural tendency to see our findings and conclude that, surely, the higher mortality rates are because of some confounding variable, like income or education, and not the loss of trees," said Donovan. "But we saw the same pattern repeated over and over in counties with very different demographic makeups."

After accounting for demographic differences, the increased mortality rates were highest in wealthier counties, indicating that higher-income areas face the most potential harm from the spread of the emerald ash borer. This could be because wealthy areas have more trees to begin with and provide safer havens for people to enjoy the benefits of public outdoor space.

Although the study shows the association between loss of trees and human

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mortality from cardiovascular and lower respiratory disease, it did not prove a causal link. The reason for the association is yet to be determined. But past research has shown that trees can improve air quality and reduce stress, and both air quality and stress have been linked to cardiovascular and respiratory disease.

The emerald ash borer was first discovered near Detroit, Mich., in 2002. The borer attacks all 22 species of North American ash and kills virtually all of the trees it infests.

This research highlights the important contribution trees make to community health, Donovan said. In addition, results support programs to prevent the introduction and spread of invasive forest pests.

The goal of this study was to measure the impact of tree loss on cardiovascular and lower-respiratory mortality rates, he said.

Growers need to share this information with customers and lawmakers. And that's what Nancy Buley, director of communications at J. Frank Schmidt & Son Co. in Oregon, has already done. She forwarded this study to Oregon's senators and representatives to remind them of how important it is to support urban forestry via reauthorization of the Farm Bill. She also plans to share this kind of information with landscape architects and urban foresters.

"We share this information with our customers who sell trees to consumers, and hope they are using it in their marketing efforts," Buley said. "People do want to live a greener, more sustainable lifestyle, and this kind of information certainly makes a good argument as to why they should plant trees to improve their personal garden environment as well as contributing to the overall health of their community."

"U.S. Forest Service research that quantifies the value of trees and our urban forests is invaluable information that we growers should be using to market our trees. Geoff Donovan's most recent study draws a clear relationship between trees and human health, and one that we can leverage into more tree sales."

The study was conducted in collaboration with David Butry, with the National Institute of Standards and Technology; Yvonne Michael, with Drexel University; and Jeffrey Prestemon, Andrew Liebhold, Demetrios Gatzolis and Megan Mao, with the Forest Service's Southern, Northern and Pacific Northwest Research Stations.

For more: [www.fs.fed.us/pnw/](http://www.fs.fed.us/pnw/); [gdonovan@fs.fed.us](mailto:gdonovan@fs.fed.us).



*This Toledo street was filled with ash trees in 2006. By 2009, the emerald ash borer had wiped out all the ash. Photo by Dan Hems, Ohio State University*

### **A calming effect**

Research at the Landscape and Human Health Lab (University of Illinois at Urbana-Champaign) has shown that performing activities in green settings can reduce children's Attention Deficit-Hyperactivity Disorder symptoms. In an initial, Midwestern-based survey, parents of children with AD/HD were more likely to nominate activities that typically occur in green outdoor settings as being best for their child's symptoms and activities that typically occur in indoor or non-green outdoor settings as worst for symptoms. Also, parents rated their child's symptoms as better, on average, after activities that occur in green settings than after activities in non-green settings.

In the subsequent, nationwide survey, parents again rated leisure activities—such as reading or playing sports—as improving children's symptoms more when performed in green outdoor settings than in non-green settings. A more recent study tested children with AD/HD in a controlled setting after they had walked in one of three environments that differed from one another in the level of greenery: a park, a neighborhood and a quiet downtown area. The findings confirmed that the attention of children with AD/HD functions better after spending time in more natural settings.

AD/HD affects up to 7 percent of children. Those afflicted have chronic difficulty paying attention and focusing on tasks and can be impulsive, outburst-prone and sometimes aggressive. These behaviors often result in family conflict, peer rejection and academic failure. Current treatments, drugs and behavioral therapy, do not work in all cases and in many cases offer only limited relief, said Frances Kuo, director of the Landscape and Human Health Lab.

"These research findings suggest adding trees and greenery where children spend a lot of time, such as near homes and schools, and encouraging kids with AD/HD to play in green spaces may help supplement established treatments to improve children's functioning," she said.

For more: <http://lhlh.illinois.edu/index.htm>

### **Stress relief**

Life in urban areas can present many demands and challenges. Stress is one of the most important factors related to ill-health in modern times, and is a malady that includes psychological, physiological and behavioral components, said

Kathleen Wolf, projects director at the University of Washington's College of Forest Resources. Unresolved, long-term stress can lead to secondary symptoms and illnesses. The experience of nature is one antidote to stress, and the body's positive response is remarkably fast. The region of the brain that reacts to stress is linked to the autonomic nervous system, which controls basic physiological functions. When experiencing stress our attention heightens, muscle tension increases, blood pressure rises, the pulse quickens, respiration increases, the digestive system slows, and the body produces more adrenaline, she said.

The cumulative effect of everyday, low-grade, chronic stresses (such as demanding driving conditions or work pressures) can have a greater impact on health and well-being than 'acute' or extreme events that occur at infrequent intervals (such as loss of a family member or divorce).

Humans are able to manage moderate and high stress levels for a short period of time. Chronic stress, with little opportunity for recovery, can lead to unhealthy levels of psychological and physiological reaction.



Green spaces help people more effectively cope with everyday stress and hardship, according to a University of Illinois study.

The experience of nature appears to be an antidote to the stress effects of urban living. In a key experiment, people who viewed a video of a natural setting after viewing a visual stressor, displayed faster and more complete physiological recovery than those seeing built environments.

Exposure to nature in the form of trees, grass and flowers can effectively reduce stress, particularly if initial stress levels are high. Measureable recovery benefits are detected solely from visual encounters with nature.

Mental restoration is also gained from spending time in an urban green space, and increased length of stay (up to 1½ hours) increases the restorative effect.

Studies in Japan of *Shinrin-yoku*, or forest walking and breathing, have found effects of improved immune system response, lowered stress indicators, reduced depression and lower glucose levels in diabetics.

For more: [www.naturewithin.info](http://www.naturewithin.info)

#### Help for the elderly

Having access to nature and the outdoors has long been considered therapeutic for elderly residents in long-term care settings. Research is beginning to confirm that spending time outdoors may improve sleeping patterns, reduce pain, decrease urinary incontinence and verbal agitation, speed up recovery from disability and even increase longevity, according to Susan Rodiek, assistant professor at the Texas A&M School of Architecture. Unfortunately, in spite of potential benefits, outdoor areas at long-term care facilities are often reported as underutilized by residents.

Rodiek led research that assessed how landscape design influenced outdoor usage at assisted living facilities. After evaluating 68 randomly selected facilities in diverse climates and surveying 1,560 residents and staff, several landscape features were found to be strongly associated with outdoor usage. Those features include: has a variety of plant materials; walkways have good views; has views of vehicular activity; and viewable from windows.

Although several landscape design guidelines have been published, very few outcome-based studies have attempted to measure the effect of landscape features on outdoor usage. This study addressed the lack of evidence by measuring how the landscape impacted outdoor usage. The findings can help landscape architects design to support the actual needs and preferences of frail, elderly long-term care residents, and in doing so, contribute to public health by improving the well-being of those residents in long-term care settings.

Aside from questions relating to the main outcomes, a number of personal variables were considered that might influence outdoor usage: gender, age, health, vision, history of falls, mobility, assistance needed with daily activities, urban vs. rural background, and attitudes and preferences about the outdoors. These items were included in the survey, and tested for their significance in the model; those found to be significant were controlled for in the analysis. This allowed each of the rated landscape features to be considered separately, to see how they influenced outdoor usage.

For more: [rodiek@tamu.edu](mailto:rodiek@tamu.edu)

#### Cure plant blindness

The wealth of benefits provided by plants is not ingrained knowledge in modern day American culture, said Susan Barton, extension specialist at the University of Delaware. Humans often have difficulty in even seeing plants in their own environment, much less connecting plants to tangible benefits, Barton said.

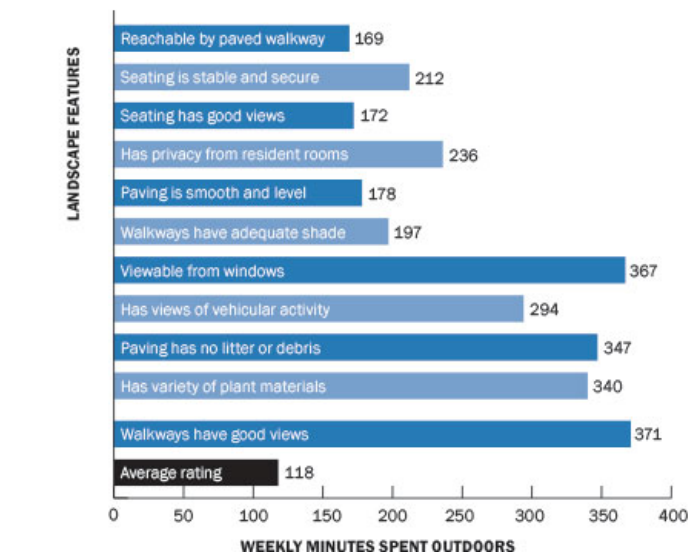
"For most people, plants are the subconscious sector of mental life, perceived as the backdrop, not the actors, in the playing out of our everyday lives," she said.

James Wandersee called it "plant blindness," she said. Plant blindness aside, it remains difficult for humans to clearly track the cause and effect between presence of plants and resulting benefits due to the cumulative nature of these benefits.

"Further research and widespread education – especially of city planners and local governments – may serve as the best tool for helping us recognize the advantages of green spaces."

### Landscape features and outdoor usage at assisted living facilities

This portion of the bar graph shows features that increased time spent outdoors up to approximately 3.5 times the base line at facilities where this feature was rated as average.



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