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A Superhero Scrubs the Air: The Mighty Houseplant

By GWENDOLYN BOUNDS



The humble houseplant is on the attack. Building on NASA experiments for air purification in space, scientists are pinpointing plant species—from the peace lily to the asparagus fern—that are particularly skillful at cleaning indoor air of pollutants that can cause a range of health problems.



A growing body of research suggests the humble houseplant boasts significant powers to clean the air in homes and other buildings of common toxins such as formaldehyde, ammonia & benzene. Wendy Bounds explains.

A growing body of global research is showing plants can reduce dust particles and contaminants, such as formaldehyde and benzene, that come from cigarette smoke, paint, furniture, building materials and other sources. Big growers such as Costa Farms, based in Goulds, Fla., and retailers Lowe's and Home Depot now sell plants with tags promoting their air-cleaning abilities.

"The advantage of plants is you can sometimes solve your problem with \$100 of plants or propagate your own," says Stanley J. Kays, a horticulture professor at the University of Georgia, which is spearheading plant research with scientists in South Korea. In addition to studying existing plants,

researchers there are trying to see if certain species could be bred to create super-efficient air cleaners.

Interest in plants as air purifiers—what's called "phytoremediation"—comes amid mounting concerns about the quality of indoor air. People spend more than 90% of their time inside, where levels of a dozen common organic pollutants can be two to five times higher than outside, according to the Environmental Protection Agency. Associated health problems range from headaches and asthma to respiratory diseases and cancer. The agency says it is particularly concerned about air quality in homes that have taken steps to be more energy-efficient by adding insulation and other weatherization techniques.



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That said, plants aren't yet recognized as a mainstream air-filtration tool. The EPA says "there is currently no evidence ... that a reasonable number of houseplants can remove significant quantities of pollutants in homes and offices." The U.S. Green Building Council, which certifies buildings based on environmental standards, says while "using plants to help clean air is a great strategy...we've had difficulty quantifying the results."

That could be changing. Studies conducted over the past five

At the University of Georgia in Athens, English ivy is exposed to common pollutants to test its air-cleaning abilities. This ivy, for example, can remove benzene, formaldehyde and other toxins from indoor air.

years by the University of Technology, Sydney found that small groups of the Janet Craig and Sweet Chico plants placed in offices with high airborne concentrations of volatile organic compounds consistently reduced total VOC levels by up to 75%. Reductions to negligible levels were maintained over the

course of five- to 12-week periods studied. "Potted plants can provide an efficient, self-regulating, low-cost, sustainable bioremediation system for indoor air pollution," researchers concluded.

In another study at Washington State University, dust was reduced as much as 20% when a number of plants were placed around the perimeter of computer lab and small office for one week.



Margaret Burchett, a professor who led the Sydney studies, estimates that six or more plants in a 1,200- to 1,500-square-foot house could achieve noteworthy contaminant reductions. At work, "if you have a couple of nice plants sitting on your desk, it will help purify the air you breathe," says Bill Wolverton, author of the new book "Plants: Why You Can't Live Without Them," and one of the NASA scientists who studied plants.

Indoor-air pollutants come in two primary forms: particle pollution, such as dust, pollen, animal dander and smoke, and

gaseous pollutants such as VOCs that are emitted from sources such as building materials, dry-cleaned clothing and aerosol sprays.

Plants clean the air, researchers say, primarily by absorbing pollution through small leaf pores called stomata, and via microorganisms living in the potting soil or medium that metabolize contaminants. Scientists believe plants can begin removing pollution the moment they're placed in a room and can be particularly useful in spaces where there's little outside ventilation.

Pinpointing specific air quality problems can be tricky. Do-it-yourself kits and environmental companies can conduct air-quality tests at consumers' homes. But interpretation of the results can be confusing because there's no universal national standard for acceptable levels of many VOCs, according to the EPA.

As for remedies, ventilation often works best, but not every climate is suitable for open windows and doors. Mechanical ventilation units that remove stale air from a home and provide fresh outdoor air can cost \$600 to upwards of \$2,500, not including installation. Indoor air-cleaning devices using HEPA and activated carbon or ultraviolet-light technology have some limitations and may require filter changes.

That's why researchers see opportunity for indoor plants, which are inexpensive and relatively easy to find and maintain. In 2009, UGA scientists identified five "super ornamentals"—plants that showed high rates of contaminant removal when exposed in gas-tight glass jars to common household VOCs, such as benzene (present in cigarette smoke) and toluene (emitted from paints and varnishes). They are: the purple waffle plant, English ivy, asparagus fern, purple heart plant, variegated wax plant.



UGA's Dr. Kays and his colleagues aim to broaden their findings by developing a simple test kit homeowners can use to check for VOCs, as well as an expanded list of plants and their associated pollution-fighting abilities. The university also sees a potential market for enhanced potting soil and other media.

"I envision this research helping producers enrich plants' soil with microorganisms that are optimized to metabolize, say, five bad VOCs," says Bodie Pennisi, a UGA associate professor.

Plants were sidelined as minimalist architecture prevailed in

At the University of Georgia's campus in Griffin, Ga., professors Bodie Pennisi, right, and Mussie Habteselassie, look at a microorganism in the soil of an asparagus fern that metabolizes benzene.



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Plants are studied in a lab at the university.

recent years, says Mike Lewis, president of the not-for-profit Green Plants for Green Buildings advocacy group. "Now when you talk to architects and designers, they want plants back."

When designing the new Henry Ford West Bloomfield Hospital in Michigan, the hospital's CEO Gerard van Grinsven says he placed \$150,000 of live plants in the atria of the facility. "The plants are doing what they are supposed to do—produce oxygen and filtering all these bad elements from our environment," Mr. van Grinsven says.

International plant grower Costa Farms LLC, has spent more than \$1 million in the past two years on its "O2 for You" marketing campaign touting plants' air-purifying abilities. In its Michigan store, Planterra Corp. touts plants as "low-maintenance air cleaners."

Dr. Wolverton, who continued his plant research after leaving NASA, has helped develop a \$199 planter dubbed the "Plant Air Purifier," which uses an electric fan and activated carbon in a ceramic growing medium (no soil) to filter and trap pollutants around plants' roots more efficiently so microbes can metabolize them. It goes on sale in April. A similar product, the Andrea Air Filter, was co-developed by a Harvard University professor and has sold 8,000 units since its launch two years ago.

Norman Ankers, a 54-year-old trial lawyer in Beverly Hills, Mich., says he and his wife Janet have filled their 5,000-square-foot home with plants, such as ferns and orchids. "We don't pretend to understand the complex chemistry of it all," Mr. Ankers says. "But having something that's a cleaning agent or filter is an extra benefit."

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