PLACEVIEWS

PlaceWorks | May 2015 / Issue No.01

ALLERGENIC PLANTS, ASTHMA & ABSENTEEISM

Hidden Asthma Triggers in the Schoolyard

Almost 10 percent of American children have asthma. It is the most common chronic condition among children under 18 and the third most common cause of hospitalization in children under 15. The California Department of Public Health estimates that from 2006 to 2008, asthma accounted for 1.2 million absences per year from school and daycare across the state.[1] The rapid increase in asthma has made it so prevalent that many school districts have gone on the offensive. They target known asthma triggers, such as mold, tobacco smoke, and pest residue, but they may be missing something literally under their noses: pollen from highly allergenic landscape plants.

THE RISE OF ASTHMA

No one knows why asthma rates have steadily risen since the 1960s or why that rise accelerated in 1980, partly because no one knows what causes asthma in the first place. We know that many factors contribute, including genetics and environment, but we don't know what turns the disease on in the body. In fact, we don't even know if asthma is one disease. It wasn't until 1999 that a review of asthma studies concluded that about half of asthma cases are not related to allergies (called nonallergic asthma). Even when asthma attacks are triggered by allergic reactions, the connection between allergies and asthma is not clear cut. Some people have allergies but not asthma, some have asthma but not allergies, and some have both, but no one knows why. One theory that caused some excitement, the "hygiene hypothesis," posits that Western hygiene, by reducing exposure to infections, prevents the immune system from programming itself to differentiate between harmful and harmless particles. Subsequent data showed that this is true of allergies to some extent, but not asthma.[2] Asthma *is* rarer in undeveloped countries and rural areas, but if hygiene plays a role, so do many other factors.

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SCHOOL ASTHMA MANAGEMENT

School districts are required to accommodate asthma sufferers under the Americans with Disabilities Act, and most schools have "asthma action plans"—individual plans from students' doctors to help manage asthma and prevent asthma attacks—and/or schoolwide "asthma management plans." Schoolwide plans usually address indoor air quality, with guidelines for pest control, chemical cleaners, fragrances, etc. Since children spend most of the day indoors, indoor air quality is crucial. Nevertheless, unless classrooms are climate controlled with all the doors and windows closed, children could be exposed to pollen throughout the school day, and pollen is one of the most common allergens and asthma triggers. Pollen counts have risen steadily since the 1960s and 1970s and are expected to double in the next 25 years. Some of this rise is an anticipated result of climate change, but a great deal of the past and potential rise in pollen counts may be caused by a phenomenon that is little known and surprisingly widespread.

SEXIST LANDSCAPING?

It started with the American elm tree. Cities and towns across the country planted huge monocultures of elms (monocultures are mass groupings of the same type of plant). The pandemic of Dutch elm disease that began in the 1930s eventually killed about 77 million elm trees. It was not unusual for 75 to 100 percent of a town's trees to die, and many cities had to replace a lot of trees very quickly. Though elms are by no means nonallergenic, they were replaced by trees that are highly allergenic simply because

they are male. Male trees emit pollen, which usually makes them much more allergenic than females of the same species. Female trees capture pollen to produce fruit and seeds, which fall on sidewalks and streets. Until the 1950s, dioecious species (separately sexed) were about equal parts male and female, as they are in nature. Then nurseries began selling cloned male trees and plants as "low maintenance" (i.e., less mess). Municipalities were happy to reduce their maintenance costs, but the exclusive use of male plants inflated urban pollen counts twice over—once because more male plants emitted pollen, and again because fewer females attracted it. Urban forests nowadays are 90 to 95 percent male and less than 10 percent female.

Another factor in our increasingly allergenic urban landscapes is the use of monocultures, which cities and towns continue to plant despite the fate of the elm. These mass plantings increase the rate and severity of allergies and allergy-related asthma. The sheer volume of one type of pollen and the frequent, often daily, exposures can exacerbate allergic reactions from mild to pure misery and increase the frequency and seriousness of asthma attacks. A monoculture can trigger an allergic reaction or asthma in someone who never had them before.

OPALS

One of the first to make the connection between landscaping practices and the rise in allergy rates was horticulturist Tom Ogren, who wondered what made plants allergenic. He formulated two basic questions: "What do plants that are known to cause very little or no allergy have in common?" and "What do plants that are known to cause allergies have in common?"[3] Ogren evaluated plants by more than 120 criteria, such as:

- Amount of pollen produced, if any
- Potency of the individual pollen grains
- Amount of time during a year that the plant is in bloom
- Size, density, shape, and weight of the pollen grains
- Dryness or stickiness of the grains
- Perfect flowered, monoecious, dioecious, or polygamous
- Sex of plant, if dioecious
- Position on the plant of pollen flowers
- Average rankings in actual skin scratch, patch, and sniff tests
- Cross-reactivity to food allergies[4]

He compiled his findings to rank plants on a 10-point scale called the Ogren Plant Allergy Scale, or OPALS. OPALS lists more than 5,000 plants and is the benchmark for reviewing plant allergens.

FIGHTING BACK

School landscaping often has the same drawbacks as its municipal counterpart—male trees and monocultures—but some school districts are fully aware of the connections between landscaping and allergies or asthma. Veteran school facilities planner John Eclevia noticed early in his career that many maintenance problems could be traced back to tree damage of some kind. Eventually he set out to determine which trees would be the least likely to result in student absences, whether from asthma or allergies, student injuries, or building damage. He started with a list of about 160 trees compiled from recommendations by local jurisdictions and various landscape architects, then he and his grounds staff produced a list of about 25 criteria for determining suitable trees. Besides OPALS rating and sex, they determined water and soil needs, branch strength, root damage potential, etc.[5] Only 38 trees from the original list met enough criteria to be suitable for school grounds, though others were suitable under certain conditions. "When you consider that a tree is going to live 50 to 75 years," says Eclevia, "you have to be extremely careful what you plant. Not only are trees expensive, but the community seriously resists removing

NO SIMPLE SOLUTION

Author and landscape architect Sarah Sutton has first-hand knowledge of how onerous allergies can be. A few years ago, she suffered a bad allergic reaction after a trip to a field of wild grasses. It was so severe she had to take steroids, but the symptoms returned. When she learned that food allergies can exacerbate a person's reactions to pollen, she changed her diet, but the underlying problem turned out to be the mold in her house. "Combined with allergic reactions to pollen and food, my system was overloaded," she says. "Our bodies can only take so much."

Three remedies all but eliminated Sutton's hay fever and asthma—lifestyle changes, a HEPA air filter, and a new place to live. The experience heightened her awareness of how complex and intractable allergies can be, and one outcome was the incorporation of the OPALS scale into her professional practice, especially for projects near schools or in residential neighborhoods.

Sutton is a principal at PlaceWorks and practice leader for landscape architecture. Her award-winning book, The New American Front Yard: The Complete Guide for Creating a Beautiful, Eco-friendly, Water-wise, Low Maintenance Front Yard*, was published in 2013.*

mature trees unless you can show a clear safety issue."[6]

Some school districts install allergy-friendly landscaping at new schools, but they have the advantage of starting from scratch. Few existing schools can afford to replace their landscaping, and the allergy/asthma issue is not the only one they must consider. In dry areas like the Southwest, landscaping must also suit the climate and often limited water resources. Another issue is the virtual disappearance of native trees in the built environment, which disrupts the food chain, unbalances the ecosystem, and is particularly hard on bird populations.[7] But in California, some of the best native trees, like native oaks, have a high OPALS rating. A third issue is that school districts have few resources for maintenance—that's why they planted male trees in the first place.

Peter Prakke, a Canadian horticulturist and award-winning educator, started "The Healthy Schoolyard" program, which outlines seven actions schools can take to cut down on student exposure to pollen, from replacing allergenic plants to educating children about which plants are allergenic. Prakke suggests developing a plan to replace trees and shrubs systematically, the most allergenic first, at a pace that is feasible for the individual district.[8] Another resource, the nonprofit Society for Allergy Friendly Environmental (SAFE) Gardening, has a project to provide advice and help with replacing allergenic plants at schools. They work in low-income areas by preference, but not exclusively, and are a great source of knowledge.[9]

Landscape architect Sarah Sutton (see sidebar) recommends a zone-based approach: Place trees and shrubs that produce the least pollen near classroom windows and gathering areas, and emphasize natives that may have higher pollen counts at the perimeters and along buffers. Use a diversity of species, and group


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males and females of the same species. To save on maintenance, plant female varieties in areas where fruit and/or seed pods can fall on groundcover or shrubs and become part of the natural mulch.

Other options are to judiciously prune at certain times of year to prevent pollen, or graft female branches to a male tree—essentially a sex change, though any branches that sprout below the grafts will be male. However, a district would need a professional horticulturist to both determine the feasibility of these actions and undertake them. Another starting place might be replacing highly allergenic shrubs—this is easier and less expensive than replacing trees, but it still reduces pollen.

In the meantime, school districts continue to rack up absences due to asthma. Though its growth has slowed in the past few years, asthma is still on the rise in California. If 1.2 million absences per year are due to asthma statewide, a district of 50,000 students could experience 6,455 absences.[10] How many of those are triggered by highly allergenic plants on the campus? Landscaping, especially with trees, is a long-term investment—to fully reverse past and present practices may take years. Nevertheless, whenever we reduce pollen at our schools, we invest in the health of both present and future generations.

Endnotes

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MAY 2015 / ISSUE NO.01

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Thanks to Gina Froelich, editor, Sarah Sutton and Melissa Erickson, landscape architects, and Alice Houseworth, master gardener, for assistance in writing this PLACE**VIEWS**.

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5. Other sources included CalPoly SelecTree Finder, South Coast Air Quality Management District, California Department of Water Resources, California Department of Forestry and Fire Protection, and Catalina Island Conservancy.
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