

Allergies caused by inconspicuous flowers

By Susan Yost, Ph.D.

Delaware State University

While watching the evening news about allergic reactions to high pollen counts, I noticed that the television screen was filled with images of beautiful flowers like daffodils and cherry blossoms. Unfortunately, these plants are insect-pollinated, and are not the culprits that cause pollen allergies.

We've seen unusually early high pollen counts, due to the remarkably warm weather early this year. January experienced a "winter heat wave"; and March had more high temperature records broken than ever before (increasing concerns about climate change). The premature warm weather has caused many flowering plants to bloom several weeks ahead of the usual time.

However, it is not the very showy flowering plants, like daffodils, tulips, forsythia and cherry trees, that produce allergy-inducing pollen. These big, beautiful, sometimes-scented, colorful flowers evolved to attract insects and other pollinators to visit the flowers and carry the pol-

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Scanned image/Susan Yost
In oak trees (*Quercus spp.*), the catkins are made up of inconspicuous male flowers that produce pollen that can cause allergic reactions.

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len to other flowers. Their pollen is relatively large, heavy, sticky, and adapted to sticking to insects, and is not usually wind-dispersed. Bees are a classic example of an insect that gets covered in pollen while collecting nectar and pollen, and pollinates many flowering plants. The name for an insect-pollinated plant is entomophilous ("insect-loving").

The pollen that causes allergies is wind-dispersed, and comes from inconspicuous flowers that are not attractive to insect pollinators. Instead, these flowers evolved to have their pollen carried by the wind, and this pollen is small, light, and dry. Unfortunately for allergy-sufferers, this pollen is also abundant and can be carried for miles by the wind. Trees like oaks (*Quercus spp.*) hickories (*Carya spp.*), ashes (*Fraxinus spp.*), birches (*Betula spp.*), willows (*Salix spp.*), and elms (*Ulmus spp.*) are flowering plants that produce catkins, which are made up of petal-less male flowers that consist mostly of pollen-producing stamens. Many of these trees are flowering right now. At one time, botanists thought that all catkin-bearing trees were related, and put them together in a taxonomic group called the "Amentiferae" (an ament is another name for a catkin).

The highest pollen counts are on hot, dry and windy days. Pollen counts are typically highest in the morning near the source plants, and then around mid-day in urban areas. People who are allergic to pollen produce histamines in reaction to the pollen (because pollen components bind to their IgE antibodies), and this causes the typical inflammatory response of runny noses, sneezing, itching, and sometimes asthma.

Grasses are another example of flowering plants that have tiny flowers without petals, and that produce lots of wind-dispersed pollen. The chemical composition of pollen is important in causing allergies; some grasses that are reported to be allergenic are timothy grass, Bermuda grass, orchard grass, and Kentucky bluegrass. The name for a wind-pollinated plant is anemophilous ("wind-loving"). The term "hay fever" apparently arose because hay was cut around the same time of the year when grasses were blooming.

A classic example of confusion about hay fever is that of ragweed and goldenrod, both of which bloom in late summer. Ragweeds (*Ambrosia artemisiifolia* and *A. trifida*) are hay fever-causing, wind-pollinated flowering plants, with very inconspicuous flowers. Often, people think that their hay fever is caused by the bright yellow flowers of goldenrods (*Solidago spp.*), which happen to

bloom at the same time as ragweed but are far more noticeable. However, goldenrods are insect-pollinated, and the pollen is not carried by the wind and does not cause hay fever. Ragweed is the culprit, and you are left wondering why the great Swedish botanist Linnaeus gave ragweed the lovely name Ambrosia ("food of the gods").

Additionally, pollen is different from spores, although both can cause allergic reactions. Pollen is produced by flowering plants (angiosperms) as discussed above, and also by the male cones of non-flowering seed plants (gymnosperms) like pines, spruces, yews, etc. Spores, in contrast, are produced by fungi (mushrooms, molds), mosses, and ferns and "fern allies" such as club-mosses and horsetails. Both are microscopic, but spores are one-celled and smaller, whereas pollen consists of several cells.

Allergies aside, pollen is fascinating. Pollen has different shapes, and can be ornamented with furrows, pores, and spiny projections. Paleobotanists use these features to identify fossil pollen and determine plant community composition in the distant past. The outer coat of pollen, or exine, is made of sporopollenin which resists decay under anaerobic conditions.

Pollen can also be important in forensic work. And pollen, from both anemophilous and entomophilous plants, is essential for the reproduction of many plants that are useful to us for food, fiber, lumber, paper, and medicine.

On the campus of Delaware State University, the Claude E. Phillips Herbarium is Delaware's center for research, education, and outreach about plant identifications, locations, and uses. Call 857-6452 (Dr. Susan Yost, Herbarium Educator) to arrange a tour of the herbarium, or for more information about this article.

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