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Study focuses on unwelcome seasonal visitor

Hopkins grad students delve into allergy-causing ragweed

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Sun Reporter

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In this season of sniffles, sneezes and itchy eyes, researchers are hoping that wind and weather patterns they recorded in a vacant, weed-choked field in Prince George's County will provide clues to fighting an airborne particle that sickens millions every year.

It's called ragweed. And while its effects are well-known, scientists say there is still much to learn about how the hardy, ubiquitous plant spreads its misery.

"We know ragweed produces pollen, but one of the things we want to understand is where and how does that pollen travel," said Lewis Ziska, a ragweed expert at the U.S. Department of Agriculture's research laboratory in Beltsville.

This is the time to learn about it. Ragweed reproduces in the late summer and early fall, when male flowers release pollen that fertilizes seeds released from female portions of the plant.

In Maryland, the season usually begins in late August or early September, peaks about two weeks later and runs for about six weeks altogether. That means it still has about two weeks to run.

At the Johns Hopkins University, researchers Michael Martin and Marcelo Chamecki are analyzing weather and pollen data they collected over six weeks of daily visits to an unplanted tract of farmland in Upper Marlboro.

Martin, 24, is looking at ragweed's genetic profile to see how plant and pollen have evolved since prehistoric times - and how the plant survived over the years. Chamecki, 29, is developing computer models to predict how wind patterns, humidity and other factors spread pollen and other airborne particles. Both are doctoral candidates in Hopkins' department of geography and environmental engineering.

"If we can find out how the plant evolved and the mechanisms of how pollen is spread, we may be better able to predict things like what time of day the plant releases it and the conditions that encourage pollen production," Martin said.

Better information about the role of sunlight, wind speeds and other weather patterns in pollen production could lead to improved treatments for many of the estimated 36 million Americans who suffer seasonal allergies, doctors say.

"I think there's a lot to be learned that would be useful," said Dr. David Matz, an allergist who, with his partner, keeps a pollen counter outside his Owings Mills office and provides daily counts to The Sun.

The number of patients seeking treatment in this year's season has been about average, Matz said.

Researchers said they believe ragweed pollen can travel for miles - and that a single plant can generate up to a billion grains of pollen in a single season. The taller the plant, the farther its pollen will travel.

Sunlight is also important. Plants usually start releasing pollen an hour or two after sunrise. The release peaks a few hours later and decreases throughout the afternoon, according to Estelle Levetin, a pollen researcher at the University of Tulsa in Oklahoma.

The pollen's potency - and potential misery for folks allergic to it - depends on the quantity of proteins in the pollen. And that is determined by the amount of rainfall, sunlight and humidity in the environment, experts say.

But there are dozens of ragweed questions still unanswered, such as the specific mix of rainfall, sunlight and humidity that determines the pollen's release schedule and potency, the weather's effect on growth rates and the plant's overall health.

"There's a lot of basic biology of pollen that we still don't understand, in terms of how it interacts with things like wind speeds and humidity," Levetin said. "You need people out there doing what these students are doing, looking at pollen with a close-up lens."

The researchers started to look for a field of ragweed last spring and found a privately owned tract that a farmer had used to grow corn and other crops.

When the researchers discovered it the tract, which has since been mowed, had been left fallow for about two years - conditions that produced a bumper crop of ragweed. "It was absolutely perfect. There was only ragweed - and the density of the ragweed was absurd," Martin said.

The researchers mounted six samplers at different heights to count pollen levels, installed a sonic anemometer to measure wind turbulence and assembled a 15-foot tower of meteorological equipment to record air temperatures, humidity levels, wind speeds, wind direction and the amount of sunlight.

They also aimed a video camera with a high-resolution lens at the ragweed plants to capture images of pollen being released.

They returned to the lab after six weeks and have since been counting pollen grains, analyzing their content and crunching gigabytes of computer data that detail daily weather patterns, as well as growth and pollen dispersal information.

The lot was ragweed's version of heaven: Measurements showed an average of 90 ragweed plants per square meter, while the air contained 10,000 grains of pollen per cubic meter.

That's a lot of ragweed. As few as 10 grains to 15 grains per cubic meter can produce a reaction in people who are sensitive to it. "If we had allergies, it would be a real problem," Chamecki said.

The researchers said they hope to publish findings in a scientific journal in the next few months, filling a void in scientific research to determine exactly how ragweed pollen travels.

"Apparently, no one has looked at it, and that surprised me, too," Ziska said.

One of the few detailed ragweed dispersal studies was conducted in the 1960s at Brookhaven National Laboratory in Upton, N.Y., where researchers used ragweed pollen to simulate the distance radioactive particles might travel if someone set off a nuclear explosion.

Botanists said they believe the plant was already in North America when Columbus arrived, but it spread far and wide when European settlers cleared forests and began plowing the land to raise crops.

Ragweed quickly colonizes and flourishes in disturbed soil - making frequent appearances on farms, in gardens, at the edge of highway median strips and in other hospitable areas. "You walk around town and look at any construction site, and you'll find ragweed," Martin said.

Two species grow in Maryland, *Ambrosia artemisiifolia* and *Ambrosia trifida*. Both can produce allergic reactions.

In the 1960s, health officials in New York City tried to eradicate ragweed by spraying pesticide throughout the city, but the weed reappeared within a year or two - new pollen just blew in from surrounding areas to help replace the old plants, Matz said.

Ragweed has also developed enough genetic diversity since Europeans settled North America to make it particularly hardy, Martin said. There is evidence of that hardiness on a lot near Martin's house in Lauraville, off Harford Road. On a recent visit, there were two stands of ragweed, with stalks reaching 8 feet high alongside a newly paved portion of the 4500 block of Elsrode Ave.

"And right now, these plants are dropping a lot of pollen," Martin said.

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