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Abstract: The article looks at how scientists are discovering that global climate change may soon produce plagues of poison ivy, heightened hay fever, large numbers of disease-carrying insects, and other challenges. According to William Schlesinger, dean of the Nicholas School of the Environment and Earth Sciences at Duke University, shorter, warmer winters resulting from global warming could lead to more insects, including disease-carrying mosquitoes and ticks. The article discusses studies which show that faster plant growth produces a decline in plant nutritional value, the effect of global warming on crops and gardens, the bean leaf beetle, and the corn earworm. INSETS: PREVENTING POLLEN IMPACT;THE GOOD NEWS.

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GLOBAL WARMING: COMING TO YOUR BACKYARD?**Scientists are discovering that climate change may soon produce plagues of poison ivy, heightened hay fever and other challenges**

If you're accustomed to thinking of global warming as something happening out there--say, in the Arctic or the Antarctic or high in the atmosphere--you may be in for a shock. Recent scientific studies indicate that global warming is likely soon to sneak into your backyard in the guise of burgeoning numbers of disease-carrying insects, escalating amounts of hay-fever-inducing pollen and faster growing and more toxic poison ivy. And it's not just your backyard that will be affected. You're likely to find that your dinner table feels the heat, too.

Global warming is caused by a buildup of atmospheric gases increasingly emitted by human activities--mostly the burning of fossil fuels. Most prominent among these gases is carbon dioxide (CO₂), used by plants in photosynthesis, the process by which they turn sunlight into vegetable energy. Given the critical link between plants and CO₂, it makes sense that scientists would study how higher levels of the gas will affect plants. What they are finding is a warning to us all.

Consider woody vines, such as Japanese honeysuckle, kudzu, English ivy and other invasive plants that climb backyard fences and trees throughout the nation. In a recent study done in North Carolina, Duke University biologists used pipes to pump carbon dioxide into circular areas of forest, each about 100 feet in diameter. The biologists raised the CO₂ in the air to the level anticipated for our atmosphere by 2050 if CO₂ emissions continue unchanged--about 585 parts per million, "a level never before reached in all of human history," says William Schlesinger, dean of the Nicholas School of the Environment and Earth Sciences at Duke University. Presently, atmospheric CO₂ is at about 372 parts per million, the highest concentration in at least 420,000 years, as indicated by studies of gases trapped in ancient ice.

After five years of experimenting, biologists found that one woody vine--poison ivy--under increased CO₂ grew at two and a half times its normal rate. More ominously, the ivy produced a more powerful version of urushiol, the chemical that causes a rash in some 80 percent of people who come in contact with the plant, producing more than 350,000 reported U.S. cases of blistered skin yearly.

The researchers also concluded that other woody vines would enjoy the same rampant growth. Consequently, climbing vines such as honeysuckle may strangle and even topple trees, changing the face of the nation's forests and woody backyards, Schlesinger says.

Increased plant growth suggests increased pollen production, unwelcome news to hay fever victims, because that pollen will lead to an "appreciable increase in hay fever and asthma, which should alarm us all," Schlesinger says. A Harvard study released last year found that ragweed pollen production increased 55 percent under increased levels of CO₂. Another study, conducted by the University of Oklahoma between 1999 and 2001, found that in tall-grass prairie plots in which temperature was artificially raised, ragweed pollen production grew 84 percent. Considering that a single ragweed plant under current conditions can release up to a billion pollen grains in one season, for a nationwide annual ragweed pollen production of an estimated 100 million tons, these increases are formidable. In the Duke CO₂ studies, Schlesinger says, pines increased pollen production up to threefold, another escalating threat to hay fever victims.

Insects, too, are likely to be invigorated by warmer climates. "Long, cold winters have the potential to smack back insect populations," Schlesinger says. The shorter, warmer winters resulting from global warming could lead to more insects, he says, including disease-carrying mosquitoes. A warmer world is also likely to produce more robust tick populations, compounding the threat ticks pose as carriers of Lyme disease.

The Union of Concerned Scientists, on its website, reports that insects typical of southern parts of the United States are likely to shift north as climate warms. One insect that already appears to be moving north is the bean leaf beetle, which feeds on soybeans and carries a virus that causes disease in soybeans. Another likely to make the shift is the corn earworm, one of the most destructive crop pests in North America, a threat to a wide variety of crops, from corn to cabbage to eggplants and tomatoes. Presently, it cannot survive most winters north of Kansas and Virginia. It does reach as far north as Canada in summer, but generally too late to cause extensive damage. If warmer winters allow it to live year-round in more northerly areas, it will pose a greater threat to crops. To combat such pests, farmers are likely to use more pesticides, further jeopardizing the health of rivers and streams.

Bruce Hungate, a climate ecologist and professor of biological sciences at Northern Arizona University, notes a more subtle effect of global warming: Studies in Florida show that faster

plant growth produces a decline in plant nutritional value. As a result, insects have to eat more plant matter to get the same amount of nutrients. Gardeners thus may find themselves fighting an escalating war against increased numbers of backyard insect pests, each seeking a greater amount of plant food. Crop plants also lose nutrient value as atmospheric CO₂ increases, Hungate says. He points, for example, to a study in Japan which found that the nutritional value of rice declined with more atmospheric CO₂.

In addition, the regions in which crops grow may change. In a study published recently in the Proceedings of the National Academy of Sciences, scientists predict an 80 percent drop in U.S. production of high-quality wine grapes because of a higher frequency of extremely hot days. "In a nutshell, extreme heat could wipe out many areas of high-quality wine production in the U.S.," Hungate says.

Global warming researchers have predicted for years that the interior regions of continents will become drier as temperature rises. This change could make the American Midwest less suitable for corn and wheat, while Canada may become more productive. "If I were a farmer in Saskatchewan or Manitoba, I'd be thinking this global warming might not be all bad," Schlesinger says. "If I were a farmer in Iowa, I'd be thinking about a change in life."

Under the effects of global warming, U.S. corn crop yields could drop by as much as 42 percent, according to figures from the Environmental Protection Agency (EPA). The news isn't all bad: Soybean crops could actually increase by up to 15 percent, depending on the specific effects of global warming on precipitation and other factors. On the other hand, soybeans also could decline by as much as 46 percent, according to EPA warnings.

Such shifts in regions of crop production, with increases in transportation costs, could change the price of foods ranging from breakfast cereals to donuts to bread.

PHOTO (COLOR): A RECENT, Harvard study indicates that production of pollen in ragweed (below)-the bane of hay fever victims-might increase as much as 55 percent thanks to global warming. Poison ivy (above) is also likely to be more robust and more toxic.

PHOTO (COLOR): A RAGWEED, plant releases its pollen. Currently, U.S. ragweeds produce about 100 million tons of pollen yearly. If global warming increases pollen production, the nation would likely see a jump in the occurrence of hay fever and even asthma.

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By Roger Di Silvestro

Senior Editor ROGER DI SILVESTRO suggests that you visit [www.nwf.org/globalwarming](http://www.nwf.org/globalwarming) for information on how you personally can fight global warming.

#### PREVENTING POLLEN IMPACT

- Hay fever got you down? Here are some easy methods for eluding problems with pollen, as recommended by the American Academy of Allergy, Asthma & Immunology:
- Avoid the outdoors during the early morning and late afternoon hours, when pollen levels peak.
- Keep car and house windows closed and use the air conditioner to help keep out pollen.

- For laundry, use a clothes dryer, which will filter out pollen trapped on clothing.
- Consider vacationing in areas low in pollen, such as the beach.
- Reduce the amount of pollen you bring indoors by taking off shoes and outer clothing before you go inside.
- Before going to bed, wash your hair to reduce the amount of pollen you might inhale while sleeping.

### THE GOOD NEWS

#### GLOBAL WARMING

"It's not too late to make changes that could reduce global warming," says Jeremy Symons, director of the NWF global warming campaign. To initiate these changes, NWF recommends that the nation enact the Climate Stewardship Act to reduce U.S. global warming pollution, raise fuel economy standards for cars and SUVs, invest in clean and efficient energy technologies while phasing out coal and oil subsidies, enact new standards for renewable power and reduce mercury pollution by 90 percent from U.S. power plants. "The elections last fall suggest we may finally see strong legislative action that will help keep global warming out of our backyards," Symons contends. "Our new leadership offers the promise of breaking the conspiracy of silence and denial that has surrounded this critical environmental issue."

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