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Trees take on toxins

- BNL researches plants to fight pollutants
- 'Green' method not suitable for all cleanup



Brookhaven lab's research includes loblolly pines.



Sycamores are also being studied as detoxifiers.

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Inside a greenhouse at Brookhaven National Laboratory, a potential remedy for pollution from Long Island's industrial and military past grows in orderly rows.

Slender hybrid poplars planted earlier this year by Lee Newman, an associate biochemist at the lab, now stand at eye level. Bred to grow fast and thirsty, they can suck up groundwater fouled with industrial solvents and then break the toxins down inside the plant tissue.

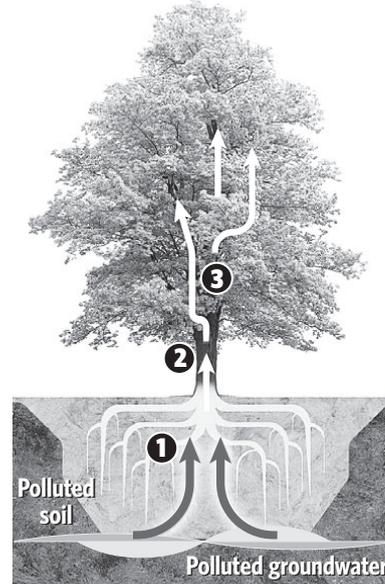
The approach is called phytoremediation: using plants to contain, remove or destroy toxins. It's been used to help clean sites tainted by dry-cleaning fluid, heavy metals and gasoline — all common pollutants across Long Island.

From trees to vegetables and even ferns, different plants are used to address different environmental pollutants. And they do it "naturally," Newman said, "without having to resort to excavation and incineration of the contaminated material."

In Suffolk, county officials are considering using plants to detoxify soil at Gabreski Airport in Westhampton Beach. Polychlorinated biphenyls, or PCBs, contaminated about an acre at the southeast corner of the property, where electrical transformers were buried decades earlier during the site's use by the military. Following manual removal of the worst "hot spots," Newman and a colleague have proposed sowing zucchini and pumpkin plants. Their roots can extract PCBs from soil and take them up into plant tissue.

"It's a green alternative," said Carrie Meek Gallagher, Suffolk commissioner for environment and energy. "I think it would be a great pilot project."

Still an emerging technology, phytoremediation has been used with



Brookhaven lab's Lee Newman examines willow trees she is growing for research on plants that suck up contamination in groundwater and soil.

How phytoremediation works

- 1 Tree roots take in groundwater fouled with pollution.
- 2 Water enters the tree or plant.
- 3 Toxins are then removed, contained or destroyed.

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some success over the past decade at dozens of military, agricultural and industrial sites across the country.

Ferns reduced arsenic levels in soil at a Washington, D.C., neighborhood built over a former chemical weapons testing site. Upstate, dense tree stands form "phytocaps" atop landfills. They take groundwater up into their roots and keep plumes from moving offsite.

Plants are not the answer for every hazardous waste headache, particularly when pollution is severe or poses an imminent risk to human health. It takes longer to remove toxins this way than by conventional methods, such as digging up soil or pumping out tainted groundwater. And plants may not remove all the pollution.

"This stuff works," said Mike Reynolds, a scientist at the U.S. Army's Cold Regions Research and Engineering Laboratory in Hanover, N.H. "But you have to know what you're doing. ... If you need something fixed overnight, it's probably not going to work for you."

In some cases, phytoremediation

can be two to three times cheaper than traditional treatments, according to data compiled by the federal Environmental Protection Agency.

That's part of the appeal for Suffolk, which has allocated \$361,000 to clean up the PCBs at Gabreski Airport. Other pluses: Phytoremediation is less invasive and helps control erosion and dust emissions.

So why isn't the practice more widespread on Long Island, where polluted plumes crisscross the aquifers that supply local drinking water?

Experts caution it's not suitable for every site. Phytoremediation takes up a lot of room, and its effectiveness varies during cold weather.

Plants have to be able to access the pollution. The water table is 50 to 100 feet below the surface in parts of Long Island — far too deep for plant roots to reach, said Jim Harrington of the state Department of Environmental Conservation.

Still, he said the DEC has not ruled out phytoremediation as a tool for future cleanups across the state. "We're still looking at it, and we will pick it when we have the right fit."