"HOW CAN PLANTING VEGETATION ENHANCE THE QUALITY OF AIR, WATER, AND SOIL IN FORT VALLEY, GA TO COMBAT ENVIRONMENTAL JUSTICE ISSUES DUE TO BLUE BIRD COMPANY?"

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FORT VALLEY WAS FOUNDED IN THE 1820S AS A NATIVE AMERICAN TRADING POST AT THE INTERSECTION OF TWO EARLY INDIAN TRAILS.

FOUNDER JAMES EVERETT, WAS A WEALTHY AND INFLUENTIAL PLANTATION OWNER WAS DETERMINED TO HAVE THE TRAIN ROUTE IN HIS NEW TOWN.

ON MARCH 23, 1856, FORT VALLEY WAS CHARTED BY A LEGISLATIVE ACT.

BLUE BIRD CORPORATION (ORIGINALLY KNOWN AS THE BLUE BIRD BODY COMPANY) IS AN AMERICAN BUS MANUFACTURER FOUNDED IN 1932 IN FORT VALLEY, GA .

BLUE BIRD CORPORATION WAS A GLOBAL WORLD LEADER IN SCHOOL BUS PRODUCTION IN THE EARLY AND MID 1900'S.

BLUE BIRD CORPORATION WAS A FAMILY-OWNED BUSINESS UNTIL 1992.

OVER THE PERIOD FROM 1987-1999, BLUE BIRD'S OPERATION IN FORT VALLEY REPORTED TO EPA THE RELEASE OF THOUSANDS OF POUNDS OF TOXIC AND DANGEROUS CHEMICALS INTO THE AIR ON AN ANNUAL BASE.

BLUE BIRD'S OPERATION DOES EMIT FUGITIVE AND STACK AIR EMISSIONS AND GROUNDWATER EMISSIONS (IN THE FORM OF CONTAMINATION).

THERE ARE ALSO OFFSITE SHIPMENTS OF TOXIC WASTE THAT PASS THROUGH THE COMMUNITY.

http://www.movementech.org/gis/pdf/fortvalleyrpt.pdf

Fort Valley was placed on the National Priorities List (NPL) in 1990 because of contaminated ground water and soils resulting from facility operations. EPA identified Blue Bird as a site PRPs; however, they were not required to conduct any cleanup.

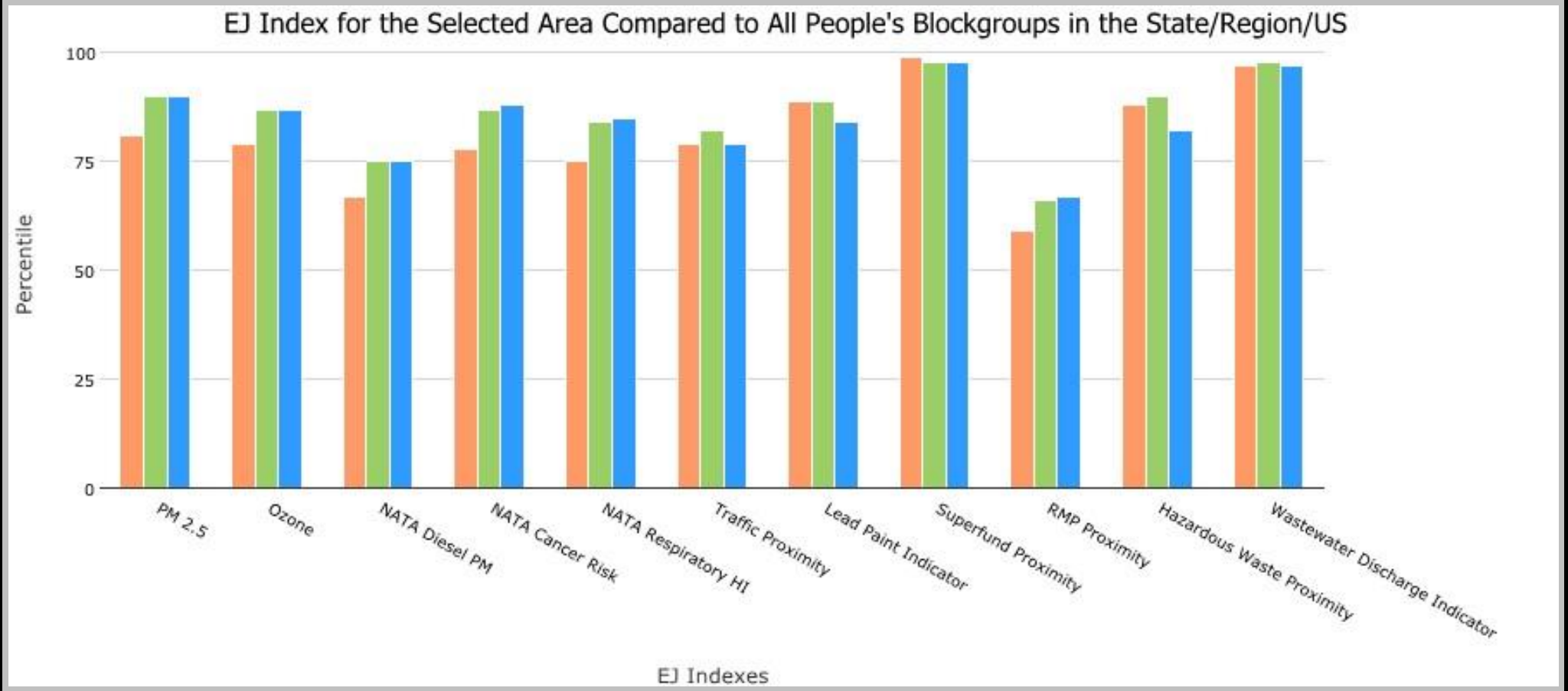
Index	Fort Valley	Georgia	National
Air quality index	38	41	50
Pollution index	760,415	3,237,553	5,066,862

Fort Valley Air Quality Index & Pollution Index

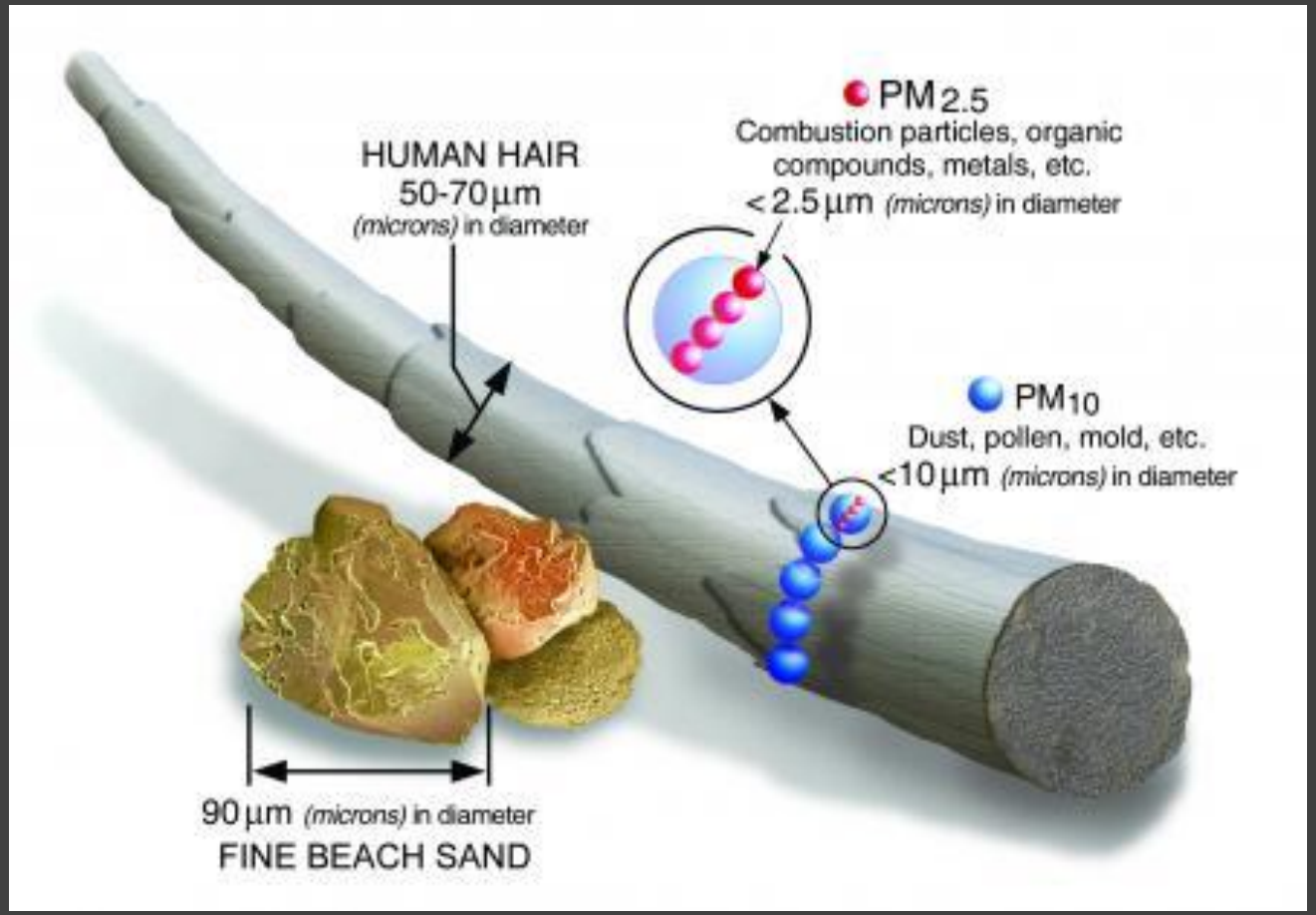
https://www.areavibes.com/fort+valley-ga/weather/

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	81	90	90
EJ Index for Ozone	79	87	87
EJ Index for NATA* Diesel PM	67	75	75
EJ Index for NATA* Air Toxics Cancer Risk	78	87	88
EJ Index for NATA* Respiratory Hazard Index	75	84	85
EJ Index for Traffic Proximity and Volume	79	82	79
EJ Index for Lead Paint Indicator	89	89	84
EJ Index for Superfund Proximity	99	98	98
EJ Index for RMP Proximity	59	66	67
EJ Index for Hazardous Waste Proximity	88	90	82
EJ Index for Wastewater Discharge Indicator	97	98	97

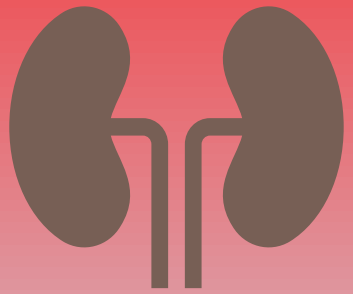
EJSCREEN REPORT (VERSION 2018)
1 MILE RING CENTERED AT 32.558149,-83.883457, GEORGIA, EPA REGION 4
APPROXIMATE POPULATION: 3,772 INPUT AREA (SQ. MILES): 3.14


EJ Index for the Selected Area Compared to All People's Blockgroups in the State/Region/US
100
75
50
25
0
Percentile
PM 2.5
Ozone
NATA Diesel PM
NATA Cancer Risk
NATA Respiratory HI
Traffic Proximity
Lead Paint Indicator
Superfund Proximity
RMP Proximity
Hazardous Waste Proximity
Wastewater Discharge Indicator
EJ Indexes
State Percentile
Regional Percentile
USA Percentile

PARTICULATE MATTER (PM)



The Dangers of PM's



PM's contains microscopic solids or liquid droplets that are so small that they can be inhaled and cause serious health problems.

Some particles less than 10 micrometers pose the greatest risk to health getting deep into the lungs and some potentially getting into the bloodstream.

https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm


"We need actions to stop the release of toxins, not just studies, to protect air quality."
Mike Schreiner
Leader, Green Party of Ontario
green

PLANTING VEGETATION STANDS TO BE A LOW-COST ALTERNATIVE TO CLEAN THE AIR, WATER, AND SOIL.

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Phytoremediation

Phytoremediation basically refers to the use of plants and associated soil microbes to reduce the concentrations or toxic effects of contaminants in the environment.

Phytoremediation is widely accepted as a cost-effective environmental restoration technology.

Phytoremediation is an alternative to engineering procedures that are usually more destructive to the soil.

https://www.nature.com/scitable/knowledge/library/phytoremediation-17359669/

Pro's of Phytoremediation

i. different types of contaminants can be removed with the same plant;
ii. cost-effective when compared to other more conventional methods;
iii. hyperaccumulators of contaminants actually mean a much smaller volume of toxic waste;
iv. reduces soil erosion;
v. reduces the potential for transport of contaminants by the wind;
vi. minimal land disturbance and low maintenance;
vii. aesthetically pleasing;
viii. the "nature" method.

https://healthguidenet.com/foods/plants-used-in-phytoremediation/

Mechanisms of Phytoremediation

1. *Rhizosphere biodegradation.* In this process, the plant releases natural substances through its roots, supplying nutrients to microorganisms in the soil. The microorganisms enhance biological degradation.

2. *Phyto-stabilization.* In this process, chemical compounds produced by the plant immobilize contaminants, rather than degrade them.

http://www.cpeo.org/techtree/ttdescript/phytrem.htm#:~:text=Phytoremediation%20is%20a%20bioremediation%20process,Rhizosphere%20biodegradation.

Mechanisms of Phytoremediation

3. *Phyto-accumulation (also called phyto-extraction).* In this process, plant roots sorb the contaminants along with other nutrients and water. The contaminant mass is not destroyed but ends up in the plant shoots and leaves. This method is used primarily for wastes containing metals. The metals are stored in the plantÍs aerial shoots, which are harvested and either smelted for potential metal recycling/recovery or are disposed of as a hazardous waste. As a general rule, readily bioavailable metals for plant uptake include cadmium, nickel, zinc, arsenic, selenium, and copper. Moderately bioavailable metals are cobalt, manganese, and iron. Lead, chromium, and uranium are not very bioavailable. Lead can be made much more bioavailable by the addition of chelating agents to soils. Similarly, the availability of uranium and radio-cesium 137 can be enhanced using citric acid and ammonium nitrate, respectively.

4. *(Rhizofiltration).* Rhizofiltration is similar to phyto-accumulation, but the plants used for cleanup are raised in greenhouses with their roots in water. This system can be used for *ex-situ* groundwater treatment. That is, groundwater is pumped to the surface to irrigate these plants. Typically hydroponic systems utilize an artificial soil medium, such as sand mixed with perlite or vermiculite. As the roots become saturated with contaminants, they are harvested and disposed of.

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http://www.cpeo.org/techtree/ttdescript/phytrem.htm#:~:text=Phytoremediation%20is%20a%20bioremediation%20process,Rhizosphere%20biodegradation.

Mechanisms of Phytoremediation

5. *Phyto-volatilization.* In this process, plants take up water containing organic contaminants and release the contaminants into the air through their leaves.
6. *Phyto-degradation.* In this process, plants actually metabolize and destroy contaminants within plant tissues.
7. *Hydraulic Control.* In this process, trees indirectly remediate by controlling groundwater movement

http://www.cpeo.org/techtree/ttdescript/phytrem.htm#:~:text=Phytoremediation%20is%20a%20bioremediation%20process,Rhizosphere%20biodegradation.

Phytoremediation Technologies

- Phytostabilization, where contaminants are retained in the soil.
- Phytodegradation, where organic contaminants are converted to less harmful substances.
- Phytovolatilization, where contaminants are converted inside plants to a gaseous state and released into the atmosphere via the evapotranspiration process.
- (Phytoextraction, where plants are used to accumulate contaminants in the aboveground, harvestable biomass

https://www.nature.com/scitable/knowledge/library/phytoremediation-17359669/

How Long Will It Take?

Phytoremediation may take several years to clean up a site. The cleanup time will depend on several factors such as:

*Contaminant concentrations levels.
*The depth of the contaminated area.
*Plants rooting system.
*The growing season of the plant.

https://semspub.epa.gov/work/HQ/189975.pdf

BEST PHYTOREMEDIATION PLANTS

Indian Mustard
White Willow
Indian grass
Sunflowers
Poplar Trees

Japan has used sunflowers as apart of their nuclear clean up from the infamous Hiroshima bombings of 1945, and the nuclear disaster that unfolded in Fukushima Daiichi in 2011.

The Serakogen Farm, located in Hiroshima, is now hosting over a million sunflowers.

It is expected to take around 40 years to complete the clean-up process.

https://www.thesized.com/sunflowers-chernobyl-growth-hope/

Indian Grass is has the ability to detoxify common agrochemical residues such as pesticides and herbicides. When planted on farmland, the reduction of pesticides and herbicides is significant.

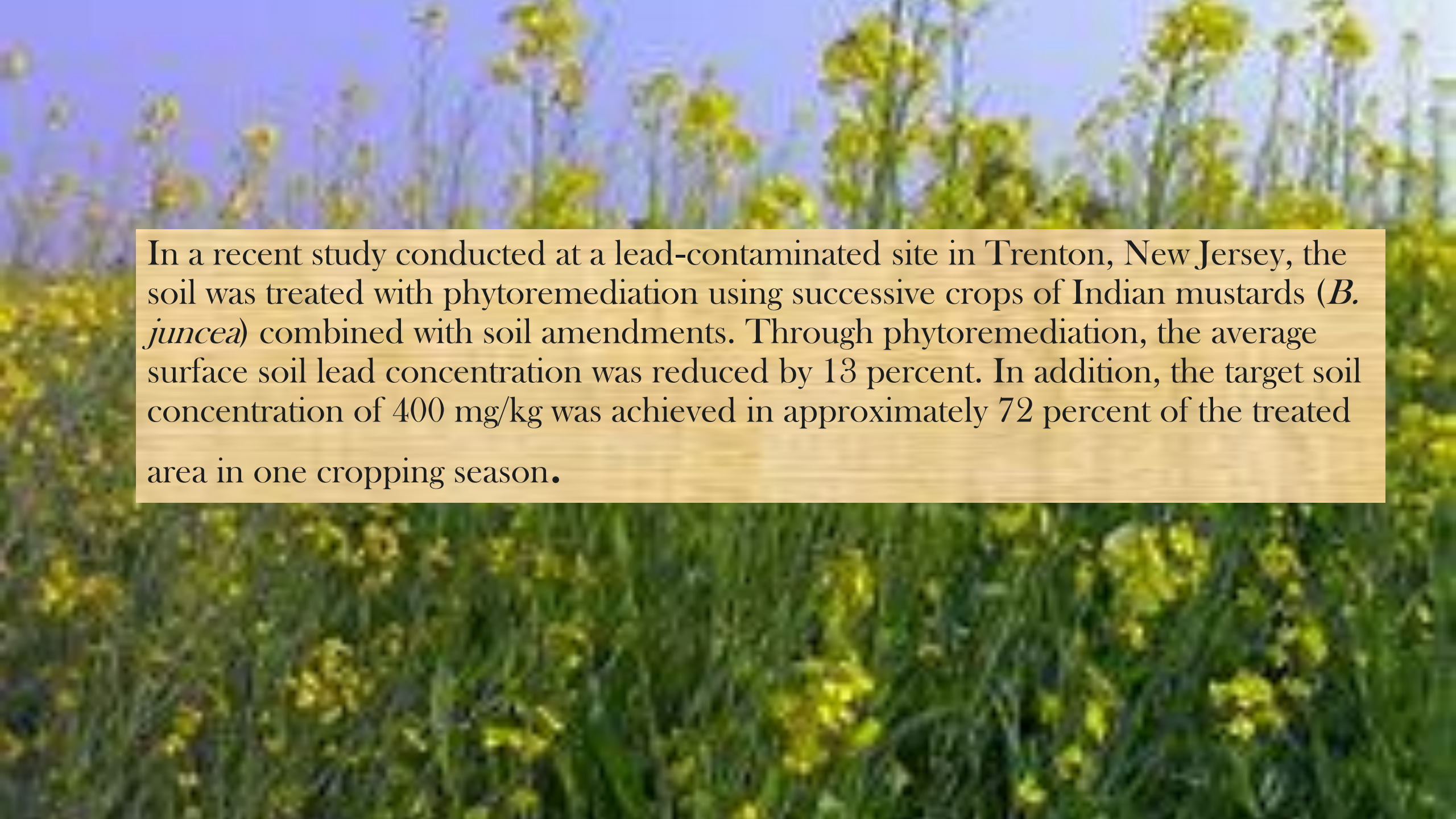
https://iamcountryside.com/growing/phytoremediation-plants-clean-contaminated-soil/#:~:text=A%20native%20phytoremediation%20plant%20for,that%20assist%20in%20phytoremediation%20plants.

Willows and poplars are fast growing trees. This makes them ideal for phytoremediation because they grow quickly and have deep and extensive root systems.

They have the potential to take up a lot of waste water at water-rich sites, but they can also work without a lot of water on water-limited sites.

The faster and bigger a tree grows, the harder it works to take up pollutants from soil and nearby water sources such as surface streams and belowground aquifers.

https://www.usda.gov/media/blog/2019/08/30/trees-can-do-dirty-work-waste-cleanup



In a recent study conducted at a lead-contaminated site in Trenton, New Jersey, the soil was treated with phytoremediation using successive crops of Indian mustards (*B. juncea*) combined with soil amendments. Through phytoremediation, the average surface soil lead concentration was reduced by 13 percent. In addition, the target soil concentration of 400 mg/kg was achieved in approximately 72 percent of the treated area in one cropping season.

LIMITATIONS AND CONCERNS

- ✓ The toxicity and bioavailability of biodegradation products is not always known.
- ✓ Additional research is needed to determine the fate of various compounds in the plant metabolic cycle to ensure that plant droppings and products do not contribute toxic or harmful chemicals into the food chain.
- ✓ Scientists need to establish whether contaminants that collect in the leaves and wood of trees are released when the leaves fall in the autumn or when firewood or mulch from the trees is used.

http://www.cpeo.org/techtree/ttdescript/phytrem.htm#:~:text=Phytoremediation%20is%20a%20bioremediation%20process,Rhizosphere%20biodegradation.

Disposal of harvested plants can be a problem if they contain high levels of heavy metals.

Generally, the use of phytoremediation is limited to sites with lower contaminant concentrations and contamination in shallow soils, streams, and groundwater. However, researchers are finding that the use of trees (rather than smaller plants) allows them to treat deeper contamination because tree roots penetrate more deeply into the ground.

http://www.cpeo.org/techtree/ttdescript/phytrem.htm#:~:text=Phytoremediation%20is%20a%20bioremediation%20process,Rhizosphere%20biodegradation.

The depth of the contaminant's limits treatment.

The treatment zone is determined by plant root depth. In most cases, it is limited to shallow soils, streams, and groundwater.

http://www.cpeo.org/techtree/ttdescript/phytrem.htm#:~:text=Phytoremediation%20is%20a%20bioremediation%20process,Rhizosphere%20biodegradation.

The success of phytoremediation may be seasonal, depending on location. Other climatic factors will also influence its effectiveness.

Additionally, the establishment of the plants may require several seasons of irrigation.
If contaminant concentrations are too high, plants may die.

Some phytoremediation transfers contamination across media, (e.g., from soil to air).
Phytoremediation is not effective for strongly absorbed contaminants such as polychlorinated biphenyls (PCBs).

http://www.cpeo.org/techtree/ttdescript/phytrem.htm#:~:text=Phytoremediation%20is%20a%20bioremediation%20process,Rhizosphere%20biodegradation.

IN CLOSE

The time is now that we find organic and cost feasible ways to treat our air, soil, and water for sustainability of our future in Fort Valley.

THE END

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