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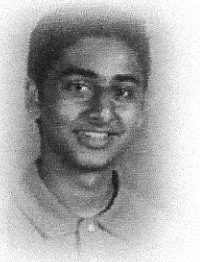

I am an Honors student at Lafayette Senior High, passionate about pursuing a career in medicine. I am highly engaged in community service and passionate about using scientific research to solve environmental issues; for which I have been recognized by multiple institutions and industries; such as NASA, American Chemical Society, Monsanto, Duke University, etc. and was awarded Associate membership to the Academy of Science, St Louis. I am a first-degree black belt in Taekwondo, an avid basketball player and enjoys playing Taiko Japanese drum.

Education

High School: Sophomore in Lafayette High School (LHS), Honors Student. **GPA: 4.2**
Middle School: Crestview Middle School
Elementary School: Wild Horse Elementary School

Selected Awards for commitment to Community Service and improving environment

Scientific Research projects related to improving environment

2016- 2017: Multiple awards for developing a novel and sustainable method of preparing a fast-biodegradable, natural polymer-cyclohexitol coat, to develop climate smart seeds that may increase water use efficiency.

- 2017 **First Place (Gold Medal) in Biochemistry** Division for INTEL-ISEF entry competitive Science project for sustainable solution.
- 2017 **Monsanto Science Award** in recognition of "outstanding achievements in application of biochemistry for ecological sustenance".
- 2017 **American Chemical Society Award** for securing second place in competitive high school innovative Chemistry project on Cyclohexitols.
- 2017 **Kalinowski Family Award** for "enquiry based learning at its best"

2015- 2016: Received multiple awards recognizing my scientific project, developed to create awareness of excess nutrient use and its deleterious impact on environment, soil and water.

- 2016: **NASA Earth System Science Award** for project "Offering great insight into earth's interconnected systems through his scientific project".
- 2016: **Monsanto Science Fellowship** for scientific excellence in science project presented at STL Science Fair.
- 2016: **Mastodon Fair Bronze Medal** for securing third place in competitive science project on sustainability

- 2015: **SunEdison Semiconductor Science Award** for innovative scientific project on nutrient use and impact on environment.

- 2014: Received a recognition from Mayor of Chesterfield for engagement in Community.

- 2013: Received **Certificate of Appreciation** for his project presentation on Reduce, Reuse and Recycle to celebrate Earth Day, by Chesterfield City, April 2013.

Academic Achievements Award

- 2017: Granted membership in: **The National Society of High School Scholars** for "academic excellence and achievement".
- 2017, 2016 and 2015: **Renaissance Honor** from Lafayette High School, for Academic Excellence.
- Selected to attend Junior Science and Engineering for Humanity Symposium (JSEHS) at Maryville University in March 2016.
- 2014 and 2012: **Amphora Award** from Crestview Middle school for high academic performance.
- 2013: **Academic Excellence Award** from Joseph Ballwin Academy, Truman State University.
- 2013: Awarded **Associate Membership of the Junior Academy of Science**, St Louis in recognition of pursuing scientific knowledge outside classroom.
- 2012: Awarded **Junior membership to the Academy of Science**, St. Louis.
- 2012: **Honor Roll Award** for academic achievement in Crestview Middle School.
- 2010 to 2015: **Duke University TIP gifted program**.

Leadership

- 2017: Nominated to represent LHS in **National Student Leadership Conference** at **Harvard Medical School.**
- 2017: Selected as a Delegate representing Lafayette High School and the State of Missouri to attend the **Congress of Future Science and Technology Leaders.**
- **Lafayette High School Student Steering Committee,** 2015 till present: serving on the governing board for the student and leadership team to encourage peers to reach their academic potential and lead student and faculty recognition program.
- **Youth Leader, Academy of Science** St. Louis, from 2013 till present, representing the student body to help promote STEM education and awareness among middle and high school students. Arranging for scientific seminars by renowned international scientists.
- Started a project in 2014 and continuing till present **to sponsor two schools** in an impoverished part of India, raised money to successfully set up drinking water supplies in one of the schools.
- **WEB Leader,** 2013, 2014 at Crestview Middle to help parents and new middle school students integrate into middle school culture.

Community Service

- Volunteered for more than 60 hours to help patients, nurses and doctors at Barnes Jewish Hospital, Orthopedics and Radiology departments.
- More than 20 hours of volunteering service helping physically handicapped children.
- Scientific Outreach and presentation to make aware of a simple sustainable seed coating method to reduce water use, to more than 200 students, teachers and growers.
- More than 40 hours of volunteering to promote STEM education across youth in St. Louis region as a Youth Leader in Academy of Science, St. Louis.
- Started a project in 2014 and continuing till present **to sponsor two schools** in an impoverished part of India, through two years of fundraising and outreach activities, raising enough to successfully set up drinking water supplies in one of the schools.
- Participated in multiple eco-projects to remove honey suckle from public parks organized by St Louis Audubon Society, and plant white oak and other native trees in public parks organized by St Louis County.

Polyol/Cyclohexitol project: March 2016 to March 2017

Agriculture is the largest consumer of water, but water is becoming scarce because of increasing demand and changing weather patterns. Agriculture must feed another 2 to 3 billion people in the next 50 years, putting additional pressure on water resources. According to the US Geological Society, the amount of ground water drawn for use in irrigation has tripled since the 1950s. Therefore, I wanted to get involved in efforts to find solutions to produce more food with less water. While growers cannot control how much it rains, can I help them best utilize every drop of water available in soil? Multiple technologies are already available to use less water to produce more food. However, many of these technologies are expensive. Therefore, I wanted to find inexpensive solutions such as use of naturally occurring osmoprotectant to increase water use efficiency. To help increase water use efficiency in seeds, **I have developed a simple, repeatable method to coat corn seeds with polymer with osmoprotectant such as polyols.** Using this method, I used an open chain and a cyclic polyol to coat seeds with organic natural polymer and found that inositol and sorbitol have significant positive and negative effect respectively on growth and water use efficiency of seeds. Agar; an easily available, plant-derived, natural, non-toxic, non-reactive, inexpensive polymer can be used as a gelling material to coat seeds to get some marginal benefit for plant growth when water is not sufficiently present in soil. Addition of Sorbitol to agar mixture is inhibitory under both well-watered as well as water stressed conditions for germination and early growth in corn. However, addition of Inositol, even at high concentration provides some real advantage to seed germination and early growth even with 20% less water. **This method of climate smart seed coating may be used to decrease water use by atleast 20%.**

Macronutrients accumulation and impact on environment: April 2015 to February 2016

The runoff of fertilizers, mostly nitrate and phosphate causes enrichment of the nutrients in waters also called eutrophication, resulting in excessive growth of phytoplankton and algae, causing depletion of oxygen which in turn largely deteriorates the water quality. I did a science project to determine nitrogen and phosphate threshold in soil and water with application of different dose of fertilizer. I determined how increasing fertilizer amount resulted in more nitrogen and phosphates retention in soil indicating the possibility of N run-off. I also found that the recommended amount of commercial fertilizer may not be applicable for all plants and even a marginal excess might be deleterious to plants, resulting in less absorption of fertilizers and consequent accumulation of nutrients in soil, especially N, which may possibly cause harm to the environment. **This project suggests revisiting and changes in commercial labelling instructions for fertilizer manufacturers.**

Your Blue Planet's GREEN Challenge
Secondary Edition – July 2013

So it was a hot summer in 2012. But just how hot was it?

- St. Louis set its all-time high June monthly temperature record on June 28th with a temperature of 108°F smashing the old record of 105°F from in June of 1936 and 1952.
- This was the hottest temperature recorded since July 18, 1954 when the temperature rose to 112°F in St. Louis. The average temperature in St. Louis in July was- 88.1°F - it was the warmest month since weather data collection in St. Louis began in 1874.
- Missouri declared an emergency because of the heat and drought.
- According to the National Weather Service, 2012 was the warmest year on record in St. Louis, with an average temperature of 61.2°F, a full 1.1°F higher than the previous high average temperature of 60.1°F set in 1921.
- Water level in the Mississippi remained 'record low' caused by the drought. Water had to be released from the upper Mississippi River in an effort to avoid closure of the river at St. Louis to barge traffic.

The "warmest first half of any year on record for the United States" led to "more than half the country experiencing drought, the largest percentage in the 12-year history"

Climate change - warmer winters – hotter summers – water restrictions - greenhouse gases - carbon footprint – green energy – green business - reduce, reuse, recycle – conservation, preservation, efficiency – sustainable growth - new ways of living – Sound familiar?

We have come a long way in understanding our Planet Earth, in preserving our natural resources, and in nurturing

ur own Blue Planet !

Ordinary people are doing extraordinary things by finding innovative solutions to everyday problems.

Young people all over the world are making a difference, showing us how to respect and replenish the Earth, leading efforts to help save our precious environment, the thin shield between life on Earth and the lifeless Universe.

Locally, St Louis County was awarded funds by the U.S. Department of Energy in July, 2009, to develop an Energy Efficiency & Conservation Strategy (EECS) to increase energy efficiency, decrease auto dependence, increase recycling, and invest in renewable energy resources. Green is good!

Busch Stadium and the City of Chesterfield installed solar thermal systems that reduce energy use. The energy produced is done at zero additional cost. Solar is sustainable !

Eco-friendly school buildings of the 21st Century are being built, such as Crossroads College Preparatory School in St. Louis. The building is LEED-certified, meaning that it has met high standards for efficient use of water and electricity, sustainable construction methods and high indoor environmental quality.

John Burroughs School in St. Louis is using kitchen grease to create biodiesel fuel to power tractors used on campus.

The New City School in St. Louis installed a green roof over its dining hall; Chesterfield's Amphitheater concession building has a "green" roof with special vegetation! Green roofs serve several purposes for a building, such as absorbing rainwater, providing insulation, creating a habitat for wildlife, and helping to lower urban air temperatures to mitigate the 'heat island effect'.

Your Blue Planet's GREEN Challenge
Secondary Edition – July 2013
Conserving Energy at Home
... don't forget to include your family members!

Carbon dioxide and other greenhouse gases warm the surface of the planet naturally by trapping solar heat in the atmosphere. This is a good thing because it keeps our planet habitable. However, burning fossil fuels such as coal, gas and oil and clearing of forests have increased the amount of carbon dioxide in the Earth's atmosphere and global temperatures are rising. The combustion of fossil fuels to generate electricity is the largest single source of CO2 emissions in the US, generating about 40% of total U.S. CO2 emissions.

Learn more : http://www.epa.gov/climatechange/ghgemissions/gases/co2.html

Good Neighbors

1. **Turn off all appliances (lights, fans, TV, etc.) and electronic devices you're not using.** Yes ☑ No ☐
   Simply turning off your television, DVD player, stereo, and computer when you're not using them will save thousands of pounds of carbon dioxide a year.

2. **Unplug electronics from the wall when you're not using them.** Yes ☐ No ☐
   Even when turned off, hairdryers, cell phone chargers and televisions use energy. The energy used to keep display clocks lit and memory chips working accounts for 5 percent of total domestic energy consumption and puts 18 million tons of carbon into the atmosphere every year!

3. **Replace a regular incandescent light bulb with a compact fluorescent light bulb (CFL).** Yes ☐ No ☐
   CFLs use 60% less energy than a regular bulb. This simple switch will save about 300 pounds of carbon dioxide a year. If every family in the U.S. made the switch, carbon dioxide would be reduced by more than 90 billion pounds! Burned out CFL light bulbs can be recycled, too!

4. **Move your thermostat down 2 degrees in winter and up 2 degrees in summer.** Yes ☑ No ☐
   Almost half of the energy we use in our homes goes to heating and cooling. About 2,000 pounds of carbon dioxide a year could be reduced with this simple adjustment.

5. **Talk to your parents about regularly cleaning or replacing filters on your furnace and air conditioner.** Yes ☑ No ☐
   Cleaning a dirty air filter can save 350 pounds of carbon dioxide a year.

6. **Talk to your parents about installing a programmable thermostat.** Yes ☑ No ☐
   Programmable thermostats will automatically lower the heat or air conditioning at night and raise them again in the morning. They can help save approximately $100 a year on the energy bill.

7. **Talk to your parents about wrapping your water heater in an insulation blanket.** Yes ☐ No ☐
   This will help to save 1,000 pounds of carbon dioxide a year with this simple action. Additional 550 pounds of carbon dioxide per year can be saved by setting the thermostat no higher than 120 degrees Fahrenheit.

8. **Use less hot water.** Yes ☑ No ☐ **List where you use less hot water** Shower, sink, dishwasher, Washing machine

   It takes a lot of energy to heat water. You can use less hot water by installing a low flow showerhead (~ 350 pounds of carbon dioxide saved per year) and washing your clothes in cold or warm water (~500 pounds saved per year).

Your Blue Planet's GREEN Challenge
Secondary Edition – July 2013
Don't forget the Kitchen

... and work with your parents to achieve the following:

Good Neighbors

1. **Run your dishwasher when full and use the energy-saving setting so as not to use the "drying cycle" and just let dishes drip dry.** Yes ☐ No ☐
2. **Keep condenser coils clean on the back of your refrigerator. Help your parents to gently wipe and vacuum them once a year.** Yes ☐ No ☐
3. **Keep the back of your fridge at least four inches from the wall.** Yes ☑ No ☐
4. **Make sure your fridge door gasket seals tight. Test it by putting a flashlight in the fridge and see whether light leaks out after closing the door.** Yes ☐ No ☐
5. **Check the temperature of your fridge and freezer by putting a thermometer in a glass of water. Put the glass of water on the center shelf in the center of the fridge. It should read 38-40 degrees Fahrenheit. The freezer should read 0-5 degrees Fahrenheit.** Yes ☐ No ☐

   What is the freezer temperature reading? _____
6. **Make sure your fridge is level to ensure the door gets closed every time you open it.** Yes ☑ No ☐
7. **Let hot food cool down a bit before you put it in the fridge.** Yes ☑ No ☐
8. **Use a microwave rather than an oven, range or toaster oven whenever possible.** Yes ☑ No ☐
9. **Use smaller appliances instead of big ones, such as a toaster oven, electric teapot, rice cooker, electric fry pan or a crockpot.** Yes ☑ No ☐
10. **Cover pots and pans when cooking to keep heat in.** Yes ☑ No ☐
11. **Bake with glass or ceramic pans that allow you to set the temperature in the oven by 25 degrees Fahrenheit lower than what the recipe calls for.** Yes ☐ No ☐
12. **Thaw food on metal such as in a stainless steel pan instead of microwave. Put in fridge for overnight thawing.** Yes ☐ No ☐

Innovators:

Do you know what a pressure cooker is? How it works? Can it save energy? Yes ☐ No ☐

Explain: _____

Leaders:

Can you share one new idea about energy savings in the kitchen? Yes ☑ No ☐

Explain: Use a graphine filter device that recycles dis washer waker for other use.

Special note: You can turn off the stove burner or oven a little before the food is completely cooked. Cooking will continue and food will be ready by the time you get everybody at the table.

Citizens Committee for the Environment – City of Chesterfield

The general guidelines and tips presented help promote conservation of native, natural and/or energy resources.

Your Blue Planet's GREEN Challenge
Secondary Edition – July 2013
Alternative Energy

Good Neighbors

1. **Have you heard about Alternative Energy?** Yes ☑ No ☐
2. **Alternative energy production generally does not create pollutants. Correct?** Yes ☐ No ☐
3. **Does Alternative Energy generally mean use of a renewable source?** Yes ☑ No ☐
4. **Does fossil fuel energy (generated by Petroleum and Natural Gas) use non-renewable sources?** Yes ☐ No ☐
5. **Can you give two examples of Alternative Energy?** Yes ☑ No ☐ • Solar • Wind
6. **Do you know of two sources of alternative energy present all around us?** Yes ☐ No ☐

   What are they? _____
7. **Do you know what Bio-diesel is?** Yes ☑ No ☐ **What is it?** biodegradable fuel from oils and fats
8. **What's Bio-diesel produced from?** Yes ☑ No ☐ oils, fats, recycled grease, etc.
9. **Do you know what is Bio-diesel used for?** Yes ☐ No ☐ _____
10. **Can Solar Energy be used for Heat and Electricity?** Yes ☐ No ☐
11. **Do "Solar cells" change sunlight directly into electricity?** Yes ☑ No ☐
12. **Can you name what alternative energy "Windmills" use?** Yes ☐ No ☐ What is it? _____

Innovators:

Do you know what form of energy, fossil energy or alternative energy (solar, geothermal, wind, water power) people have used the longest? Yes ☐ No ☐

Explain: _____

Leaders:

Put together a short presentation on sources of sustainable and renewable energy to present to your family, friends and classmates, if possible. Yes ☑ No ☐

Explain: I made a powerpoint with examples of renewable energy — Solar, wind, hydroelectric, bio-diesel — and explained each.

Special note: *In 2011, wind turbines in the United States generated about 3% of total U.S. electricity generation. It was equal to the annual electricity use of about 10 million households. The amount of electricity generated from wind has grown significantly in recent years. Generation of energy from wind in the United States increased from about 6 billion kilowatt-hours in 2000 to about 120 billion kilowatt-hours in 2011.*

Your Blue Planet's GREEN Challenge
Secondary Edition – July 2013
Environment

Good Neighbors

1. **Do you know about our region's native plants and animals?** Yes ☑ No ☐

   List some: •Primrose •Black-eyed Susan •Black Lynx rufus

2. **Do native plants and animals co-exist sustaining native ecology?** Yes ☐ No ☐
3. **Do certain species of plants depend on certain species of animals to sustain lifecycles with, for example, pollination and food sources?** Yes ☑ No ☐
4. **Do you know what a sustainable habitat garden is?** Yes ☐ No ☐

   List 3 characteristics: _____

5. **A sustainable habitat garden sustains pollinators, for example, by providing food, water, cover and a place for wildlife to raise their young, all with native plants. Correct?** Yes ☐ No ☐
6. **Do you know what pollinators are and why they are important?** Yes ☐ No ☐

   Why? _____

7. **Have you heard about Rainwater harvesting?** Yes ☑ No ☐
8. **Do you know what Rainwater can be used for?** Yes ☑ No ☐

   List 2 things: •Composting •Watering lawns, gardens, and house plants

9. **Have you seen an air filter used at your home?** Yes ☑ No ☐
10. **Do you know about 'Living' air filters in your home?** Yes ☐ No ☐

    Name one. _____

11. **Do you know Chesterfield is a Certified Community Wildlife Habitat by the National Wildlife Federation, the only one in Missouri and 9th in USA?** Yes ☐ No ☐

    You can read about on this website!
    http://www.chesterfield.mo.us/citizens-committee-for-the-environment.html

12. **Do you know what the NWF is?** Yes ☑ No ☐

    What? The Natural Wildlife Federation

Innovators:

Can you plant a native tree on your balcony/porch (in a pot), in your backyard, at school, or any other place? You can get one free at Chesterfield's Annual Earth Day Festival. Yes ☐ No ☐

Explain: _____

Leaders:

Can you e-certify your garden with the National Wildlife Federation (NWF), which will add sustainable metrics to our community certification? More information is available on the City of Chesterfield's website. Yes ☑ No ☐

Explain: I have e-certified my garden through the NWF website

Visit: https://www.nwf.org/How-to-Help/Garden-for-Wildlife/Community-Habitats.aspx

Special note:

A Community Wildlife Habitat is a community that provides habitat for wildlife throughout the community--in individual backyards, school grounds, public areas such as parks, community gardens, places of worship and businesses. It is a place where the residents make it a priority to provide habitat for wildlife by providing the four basic elements that all wildlife need: food, water, cover and places to raise young.

Citizens Committee for the Environment – City of Chesterfield

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