



NUTRIENTS FOR LIFE

FALL
2016



Soil Scientist

{FOR A DAY}

Let it Grow
Contest *Winners*

{ from our leadership }



As a twenty-year educator of middle school students in a small school of 900 in rural Iowa, I find many of my students' perception of agriculture is no different than if they lived in New York City. Growing up on a diverse Iowa farm and marrying an FFA advisor, I lived life under the assumption that Iowa kids understood the impact of agriculture on their daily lives.

When I began my career, my assumption was flawless. Today, my assumptions could not be further from the truth. Not only have students lost their hands-on connection to agriculture, they have lost the 'common' sense ideas regarding dietary nutrient sources. Meat and dairy products

provides ready sources of iron, zinc, phosphorus and nitrogen-packing protein. Tomatoes, cantaloupe and winter squash are great sources of potassium. Rather than the nutrients being heralded for the inherent value, many of these nutrients are 'blacklisted' as environmental threat.

The lack of understanding regarding the care farmers and the nutrient industry put into practicing good stewardship astounded me. I sought out relevant tools to support educating my students about the necessity to manage nutrients in a sustainable way, yet meet the food, fuel, and fiber needs of our local community and beyond. I was ecstatic to discover such a wealth of information...clear back in 2008 as we celebrated our beloved Iowan and World Food Prize Leader, Norman Borlaug. The materials, at the time, provided a relevant real world local connection to the hunger fighting cause. The Iowa hero's story gave credence to the plea for students to dig deeper into the nutrient solution to hunger.

The curriculum, *Nourishing the Planet in the 21st Century*, became the core curriculum for my earth science soils unit. As I became more aware of all the wonderful materials available through the Nutrients for Life Foundation (NFLF), I could not acquire them fast enough. From the readers, to the posters, to the nutrient magnets, to the online curricular offerings; I have used them all and continue to as my curriculum moves to the Next Generation Science Standards. I was blessed to be awarded a teacher grant for my submissions to the teacher and garden blogs on the NFLF website. The grants allowed me to acquire soil test kits, which allow students to experience soil science first hand as they evaluated our school site soils to properly establish and manage an FFA test plot, a three acre prairie, kitchen garden, and pollinator garden. Working with the FFA, the students evaluated soils to plan and manage a rotational corn and soybean test plot.

My enthusiasm flowed beyond our school as I was asked by Nutrients for Life to review curriculum and present a 90-minute hands on workshop at the National Science Teacher Association annual conference. We had a packed house with teachers gobbling up the free materials and tested ideas to implement the curriculum in a real world hands-on setting. I was struck by the positive responses when a teacher asked so what about the 'dead zones'. Once we discussed the reality of agriculture's positive, proactive approaches to nutrient management, including the 4R Nutrient Stewardship program, the questions seem to fade to words of appreciation and willingness to learn and discuss. As an educator using the material for eight years, 1,000 students have directly heard the message and walked from my room saying 'soil' not 'dirt'. That simple change in vernacular has perpetuated to the high school as the students teach other students and teachers the difference. Soil is living and lives because it provides the piece of the puzzle the sun and water cannot...mineral nutrients.

Sue Meggers
Interstate 35 CSD Truro, Iowa



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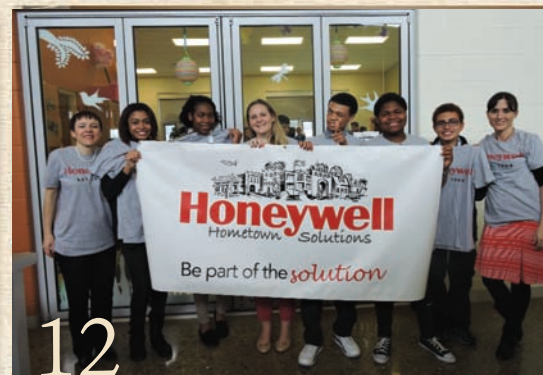
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{ contents }

FALL
2016



in every issue

FROM OUR LEADERSHIP	2
FROM THE EDITOR.....	4
TEACHERS	14
INDUSTRY.....	17
NFL RESOURCES AVAILABLE	18

features

LET IT GROW CONTEST	5
CAREER CONNECTION	8
SOIL SCIENTIST FOR A DAY.....	12



{from the editor}

The March to Digital Independence

Plant nutrients are extraordinary when you think about them. They are responsible for keeping the grass healthy and strong on football fields from those used by pee-wee players to fields used by professional athletes such as the stadiums like Heinz Field and others. Fertilizers impact the quality and taste of strawberries and other fruits and vegetables. Ultimately, these 17 essential plant nutrients help people live.

For nearly twelve years, the Nutrients for Life Foundation has worked to provide science-based resources on plant nutrients to educators all across the United States. We have teachers in every state in our network using our soil readers in elementary schools up to our AP environmental science supplement in high schools. With over 60 resources available, there is something relevant for everyone.

While these resources are valued in schools nationwide, the cost of them is significant. As an organization, we have reduced our costs by moving more of our resources online to a digital platform. We began this effort in earnest in 2013 with our partnership with Discovery Education. Through our all-digital platform at www.thescienceofsoil.com, this partnership has paved the way for our other efforts to go digital! One of those digital efforts, is the Let It Grow Contest.

Building off of a successful inaugural year for the Let It Grow Contest, Nutrients for Life is offering its second annual nationwide contest on thescienceofsoil.com, inspiring communities to rally for their school for the chance to win an agricultural grant to build a school garden, as well as other great prizes. The contest runs from September 25 through March 14. The winning school will receive a \$5,000 agricultural grant. Schools have a great opportunity to win funds to get hands-on with growing plants and food.

For the past eight years, we have taken pride in publishing this magazine for educators, agricultural professionals and the general public nationwide. I hope you have gathered nuggets of knowledge over the years that you have been able to use. As we continue our march towards digital independence, this will be the last issue of this magazine published. Thanks for the chance to sit in the teachers' lounge, on your desk and on the coffee table. You will continue to find relevant information on our e-newsletters and social media. Stay connected via Facebook, Twitter, e-newsletter and our website.

Harriet E. Wegmeyer

Harriet Wegmeyer
Executive Director, Nutrients for Life Foundation





LET IT GROW

CONTEST WINNERS

Through our partnership with Discovery Education, Nutrients for Life launched the Let It Grow Contest this spring. This first-annual contest awards more than \$10,000 in prizes to six middle schools nationwide as part of *From the Ground Up: The Science of Soil*, an education initiative that offers middle school students a deeper understanding of the importance of soil science. Educators, parents, and community members were invited to enter the *Let It Grow Contest* by answering soil-related questions and voting daily for a middle school of their choice.



Download at
www.nutrientsforlife.org



LET IT GROW

Out of more than 30,000 entries nationwide, Onion Creek Elementary of Onion Creek School District #30 in Colville, Washington received the votes needed to take home the 2016 grand prize. The district is made up of one school with 50 students, and uses its rural environment as a hands-on learning lab. On May 5, Discovery Education and the Nutrients for Life Foundation hosted the *Let It Grow Contest* grand prize winner assembly at Onion Creek School! It featured interactive science activities for students, educators, and community members to learn about soil science. At the conclusion of the assembly, the school was presented with a \$5,000 check. Additionally, Onion Creek School will receive a half-day of professional development with a Nutrients for Life Foundation Regional Representative, an introduction to a local agronomist, and a Nutrients for Life Foundation prize pack.

In addition to Onion Creek Elementary, five runner-up schools received \$1,000 agricultural grants and Nutrients for Life Foundation prize packs. These schools include:

Addlestone Hebrew Academy, Charleston, South Carolina

Allendale Elementary School of Allendale Community Consolidated School District #17, Allendale, Illinois

Hope Special Education Center of Anaheim Union High School District, Buena Park, California

Oakhurst Seventh-day Adventist Christian School, Oakhurst, California

Riverside Middle School of Anderson School District 4, Pendleton, South Carolina 🌱

FERTILIZER GURU

JENNIFER HODGES LYTCH

*Marketing Representative and Customer Service Manager
Company, Anderson Inc. Plant Nutrient Group*

Jennifer Hodges isn't a teacher in a traditional classroom, but she's committed to educating the community on using best practices in agriculture. As the Marketing Representative and Customer Service Manager for the Anderson Inc. Plant Nutrient Group, Jennifer promotes agricultural products made by her company to American farmers. Jennifer believes that being environmentally responsible is everyone's job. She feels the corporate farmer and your neighbor next door should know how to properly use fertilizer.



FERTILIZER GURU

While Anderson Inc. Plant Nutrient Group has several divisions including a grain division, plant nutrient group, and retail division, Jennifer's focus is the plant nutrient group. This division develops agricultural chemicals to help plants grow. Jennifer's main role is to promote who the Andersons are and what they do as well as their products and services. She promotes their brand to the agriculture industry.

But Jennifer isn't just in sales. She is more like a fertilizer guru. She knows that fertilizer helps to feed the world. According to Jennifer, the world population will increase by two billion people by 2050. That is an extremely large

increase of food requirements. Plant nutrients will be a vital part of being able to meet the needs of feeding the population. Farmers rely on fertilizers to keep soil productive. Soil combined with fertilizer produces more crops than soil alone. In this way, the fertilizer industry helps nourish soils that in turn, nourish people. Jennifer says, "We feed the plants that feed you."

In Jennifer's role as Marketing Representative and Customer Service Manager, she works diligently to promote the "4Rs", a nutrient stewardship program. The 4Rs provides guidelines to follow when applying fertilizer. They are utilizing the right source, at the right rate, at the right time and right place when applying fertilizer.

In Jennifer's day to day life as a marketing "rep", she spends quite a bit of time on the road. She promotes Anderson's products at trade shows, meetings and conventions. Although she is not assigned to a particular region of the country, she focuses primarily on the southeast area of the United States. She meets with potential clients (farmers) and goes over an in depth explanation of the 4Rs. She sends out customer satisfaction surveys. She wants to make sure she is serving the customers, who are large farmers.

Jennifer had a head start in the agriculture industry. That's because her family has been involved in the plant nutrient business since before her childhood. Then, in middle school Jennifer had a science teacher that brought learning to life. Her teacher facilitated





participation in numerous hands on science projects. In high school, Jennifer joined the FFA (Future Farmers of America). She participated in programs revolving around horticulture. She participated in local fairs and learned about agriculture.

Her participation in FFA gave her a foundation in agriculture as well as great leadership skills. Her family gave her the passion and initial interest. Members of FFA and friends in the industry (friends of her parents who owned a nursery, for example) helped to mentor Jennifer. She feels she received so much that she wants to mentor others and give back too. She participates in AG In The Classroom, an organization which promotes careers in agriculture to young children. She participated in AG Literacy Day where she was invited to read a book about agriculture to second graders.

While Jennifer loves her job, it is not without its challenges. Jennifer says that pressure to limit the use of fertilizers is increasing. Legislative, regulatory and non-government organization activities, including legal action pertaining to nutrients in the environment, are taking place on national, regional, state and local levels. Another challenge is time management. Prioritizing your time is essential for a successful career. Time management helps keep you on track, keep things in context and helps you focus on quality work.

While Jennifer was required to have either a degree in marketing or business for her role at Anderson Inc., she also cites a passion for agriculture as a requirement for her work. Jennifer believes agriculture is a great industry to work in and would like to promote working in the plant nutrient business. She says she is

Jennifer says she is helping to feed the plants that feed us. She encourages young people interested in this field to join the FFA chapter early. "It's never too early to reach out to have a mentor in that particular field."

helping to feed the plants that feed us. She encourages young people interested in this field to join the FFA chapter early. "It's never too early to reach out to have a mentor in that particular field."

Jennifer says that agriculture is her passion. She gets to say, "I feed the world." She also loves the people in her job and in her industry. She feels like she is working with a family. She is passionate about her career because this is an important industry for the world. 🌱

**According to our interviewee, we are expecting a population of 9-10 billion people by 2050.*



Soil SCIENCE

Soil Science School Tour in Columbus, Ohio

There's something so rewarding about working in an industry that provides food to the world's population! Who knew agriculture could be full of endless opportunities to learn, to grow, and to be an important contributor to the world's food supply?

You don't have to be a farmer or even live on a farm to be involved in agriculture. Ask any of the more than 450 students who participate in the first Career & Soil Science Education tour!

The Nutrients for Life Foundation teamed up with Honeywell to host a four-school tour that taught students how plant and crop nutrients nourishes our world and walked them through the wide variety of career opportunities available in the agriculture industry.





TIST for a Day



Students got to hear from an agronomist and learn about the essential macronutrients: Nitrogen (N), Phosphorous (P), and Potassium (K) and the important role fertilizer plays in helping to sustain our world's growing population.

Using an activity from Nutrients for Life's Nourishing the Planet in the 21st Century curriculum, students also were able to imagine they were soil scientists for the day and investigate the various components of soil and understand how the composition of soil can affect the growth and development of plants.

Interested in learning how your school can be the next stop on the educational tour? Let us know by emailing info@nutrientsforlife.org with the subject "School Tour Interest!" 🌱

{teachers}

4th Graders and the 4Rs

The Nutrients for Life Foundation (NFLF) and 4R Nutrient Stewardship are excited to partner on new 4R focused education resources. Students and teachers alike are eager to learn about nutrient stewardship and soil science! This week, NFLF released the 4R reader for 3rd and 4th grade elementary school students. The activity booklet introduces the 4Rs in a way that relates to the students' lives: health and eating.

Through colorful comic strips and a class science experiment, students learn that eating the 'right rate' of a few peaches is healthy eating; however, two full plates of peaches is the wrong rate and is unhealthy. Students learn more about right source, rate, time and place through an analogy with eyesight and eyeglasses. Then, the booklet introduces soil nutrition. After reading about fertilizer and the 4Rs, students can perform a class experiment with the right and wrong nutrient sources, rates, time and place on grass. Finally, the booklet features badges that students can wear proudly proclaiming, "I know the 4Rs. Do you?"

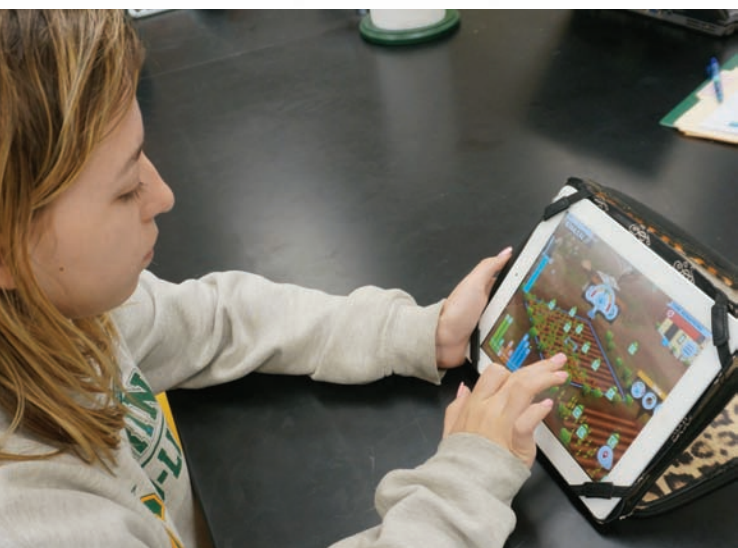
NFLF has also featured 4R Nutrient Stewardship in their recent Feeding the World & Protecting the Environment piece. In this supplementary resource for advanced placement classes, future voters learn about essential plant nutrients, the 4Rs and study the fertilizer-manufacturing processes. Additionally, students consider various federal regulations, such as the Clean Water Act, in relation to fertilizer manufacturing. Finally, the resource provides labs, reading excerpts, and classroom activities relating to the advanced content.

The Nutrients for Life Foundation educates about the importance of responsible fertilizer use in growing healthy crops, increasing food production, and feeding a growing population. NFLF is proud to collaborate with initiatives such as 4R Nutrient Stewardship to reach a broader audience and provide science-based information on crop nutrition.

Download both resources from our website,
www.nutrientsforlife.org



Great job learning about the 4Rs!
Cut out your favorite badge and wear it with pride.



Journey 2050™

Travel to Kenya, India, and Canada with Journey 2050 and learn about the many decisions farmers must make in order to maintain a sustainable farm. Through playing Journey 2050, students get an authentic sneak peek at the world of agriculture by experiencing how farming differs from country to country and the many complexities behind running a farm.

Students begin by becoming farmers themselves, deciding which crops to plant, whether to apply nutrients, and collecting their harvest. Meanwhile, they are presented with investment opportunities that force them to consider the best ways to manage their limited money supply. As the game continues, they to make more decisions as the issues of limited water supply, deciding when to invest in various development opportunities, and choosing from a larger array of possible crops.

Students are able to see the role individual farms play in the world of agriculture through the sustainability store where students can see their contribution to growth in profit, jobs, market access, food production, health care, education, soil health, habitats, and water supply.

Here at Nutrients for Life, we are excited to have this wonderful resource available for us to share with students across the states. Over the past few months, Nutrients for Life regional representatives have been facilitating Journey 2050 in their respective states with great responses. If you'd like to bring Journey 2050 to your school, requests a visit by contacting your state's regional representative.

PLANT NUTRIENTS ON THE FARM STATION

STEM-BASED
Education
Station

To request your station, contact
Debra Kearney, (641) 891-4182
or dkearney@nutrientsforlife.org.



THE KIT INCLUDES:

- First grade script
- Third grade script
- Large magnetized board
- Corresponding magnets
- 3 Child-sized hat props

Price...\$750

"Approximately 600 students visited our farm on field trips last fall and learned about plant nutrients with the Nutrients for Life farm board. The board helped me explain what plants need to grow in a way the children could understand and they loved the interactive aspect. The Nutrients for Life farm board simplifies the process so that even the youngest children, the ones who haven't even learned about plant growth yet, can enjoy and understand the process! I can certainly attest to the positive feedback we have received from visiting school groups. The Nutrients for Life farm board was an integral part of our tour. We can't wait to use it again for the upcoming season!"

– Mandy McCary, Mercier Orchards, Blue Ridge, GA

Educate students visiting your farm with STEM and a science-based activity!

Sign-up today and receive the "Plant Nutrients on the Farm" interactive station and become a member of the Nutrients for Life Foundation. During the station activity, elementary students learn about plant nutrients' important role in growing healthy crops. Teachers will appreciate that the standards-based station is a STEM activity emphasizing agriculture science!

Script Sample:

- Plants need nitrogen to be green and healthy. Without nitrogen, plant leaves will be weak and yellow. Who can spot a pumpkin plant that needs Mr. N to come to the rescue? *(Find the yellow leaf.)*
- Does anyone have Mr. N? *(Have a student add Mr. N near the yellow leaves. Let one of the students wear the N hat.)*
- Now that we have added Mr. N, let us fix this plant. Who has a better-looking leaf? Please hold it up in the air. *(Green leaves - Have the students with the green leaves cover the yellow, sickly leaves.)*



{ industry }

GATX Tanker Tour



NUTRIENTS FOR LIFE

17



This Spring, members of the NFLF team had the opportunity to tour GATX Corporation's TankTrainer™ and Classroom Boxcar at Union Station in Washington, DC. GATX's TankTrainer™ is a 33,500 gallon tank car outfitted with a variety of fittings, coatings, and configurations that provides safety trainees with the opportunity to access both the interior and exterior of a railcar for hands-on experience. Since 1993, the safety training program has provided a unique learning experience to more than 21,000 first responders, customers, rail industry participants, and employees. GATX Corporation is a loyal supporter of NFLF and has provided funding for over 10 years.

Above: GATX Corporation, in partnership with Amtrak and the Metropolitan Washington Council of Governments, hosted railcar safety training sessions using its TankTrainer™ and Classroom Boxcar in Washington D.C., in April. During the event, GATX provided tank car training to more than 100 first responders and Amtrak employees. Left: NFLF President Chris Jahn and GATX Vice President & Group Executive Robert Zmudka discuss GATX's commitment to safety and environmental responsibility through the hands-on training sessions.

Available Resources



To request the complementary items featured, please visit the Nutrients for Life Foundation website's teacher section:

www.nutrientsforlife.org/for-teachers

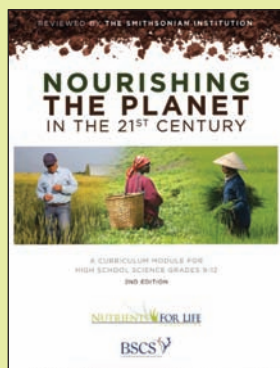


1 From the Ground Up: The Science of Soil Website

AUDIENCE: MIDDLE SCHOOL

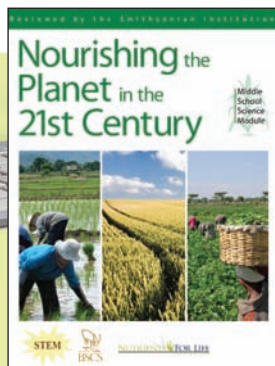
Through a partnership with Discovery Education, this microsite provides a collection of digital resources about soil science, including career spotlights, interactive lessons, digital exploration, and family activities.

Visit **www.thescienceofsoil.com**.



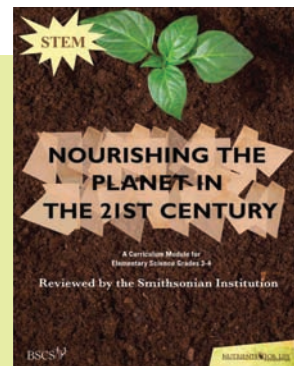
2 Nourishing the Planet in the 21st Century High School Curriculum

Now in the second edition, the supplement offers six lesson plans designed to teach students about soil science and crop nutrients' role in feeding a growing world.



3 Nourishing the Planet in the 21st Century Middle School Curriculum

A middle school supplemental curriculum with six science-based lessons about soil science. All three levels of curriculum were favorably reviewed by the Smithsonian Institution.



4 Nourishing the Planet in the 21st Century Elementary Curriculum

Smithsonian-approved, these five STEM-based, supplemental lessons teach plant and soil science, while using gardening to make the lessons fun, interactive, and educational.



AUDIENCE: GENERAL



Creative Commons
Attribution-ShareAlike

AUDIENCE: 5TH TO HIGH SCHOOL

agriculture	future	current	elements	that	plant	agriculture
farmers	help	what	the	land	generally	increase
land	food	you	require	having	improve	well
growing	an	vegetables	another	way	the	amount
it	product	your	life	less	time	production
is	an	irreversible				climate
change	a	cycle				to
wheat	through					extract
completes	are					relationship
use	more	possible	category	farmers	vegetables	organic
land	in	phosphorus	production	generally	higher	farmer
light	more	are	planted	growing	an	population
dominate	primary	are				are
farmers	plant	rate	water	hours	most	an



AUDIENCE: MIDDLE/HIGH SCHOOL

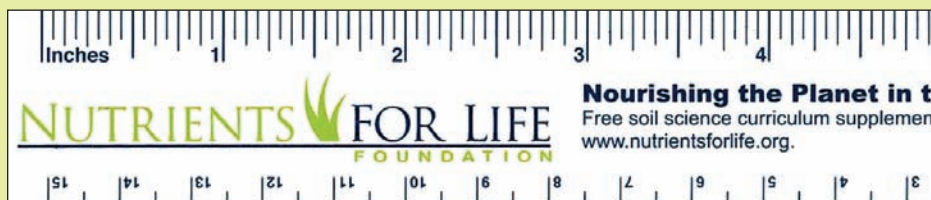


The wallet-sized card concisely states five of the top truths about fertilizers.



AUDIENCE: MIDDLE/HIGH SCHOOL

This lively video shows students the amazing process of mining phosphate and its relevance in global food security. Available to stream online!



10

Ruler

Six-inch

Six-inch ruler that publicizes the *Nourishing the Planet in the 21st Century* curriculum.

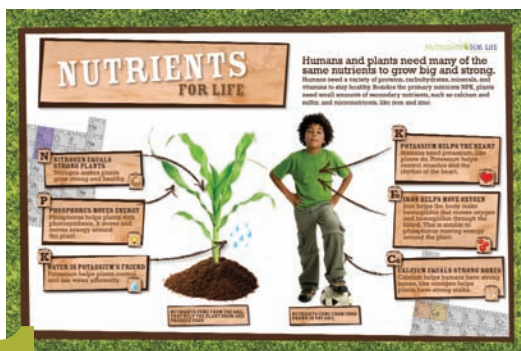
More Available Resources



11

NPK Soccer Poster

AUDIENCE: ELEMENTARY/MIDDLE SCHOOL
Plants, like humans, need nutrients. This resource poster is a great addition to your classroom showing the basics of primary nutrients. *(Also available in Spanish)*



12

Curriculum and Virtual Classroom Videos USB Flash Drive

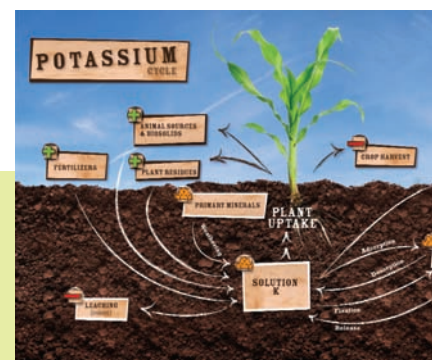
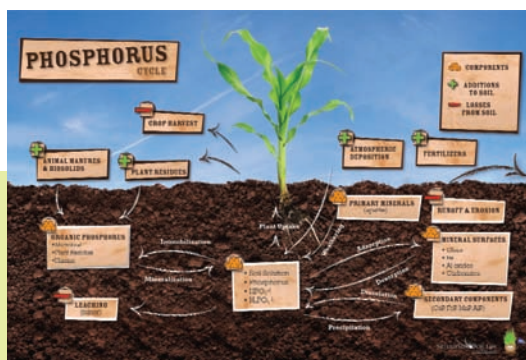
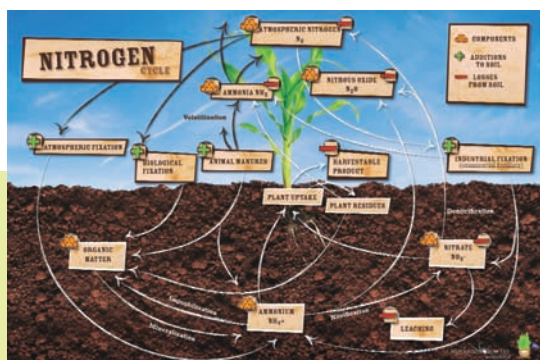
AUDIENCE: ELEMENTARY/MIDDLE/HIGH SCHOOL
Includes all three levels of curriculum, the virtual classroom videos, and pre- and post-test assessments. Introduce lessons from the *Nourishing the Planet in the 21st Century* curriculum with the short, interest grabbing Virtual Classroom videos, featuring spokesperson Dee McKenna. Also available via download online.



13

Feeding the World & Protecting the Environment

AUDIENCE: HIGH SCHOOL
This supplemental resource was developed to provide content and labs about fertilizer's role in federal regulations, such as the Clean Water Act. Additionally the supplement provides an overview of sustainability and 4R Nutrient Stewardship. Available as a downloadable PDF.



14

Nitrogen Cycle Poster

AUDIENCE: HIGH SCHOOL
So many of our planet's systems are cyclical, including one of the most recognizable cycles: nitrogen. Use this colorful visual to help teach about nitrogen's role in plant growth.

15

Phosphorous Cycle Poster

AUDIENCE: HIGH SCHOOL
Perfect for the science classroom, this poster focuses on the movement of phosphorus.

16

Potash Poster

AUDIENCE: HIGH SCHOOL
Enforce biogeochemical cycle concepts with this poster about the potassium cycle. A great visual aid for the high school classroom.

19

Apple, Air and Ocean Postcards

AUDIENCE: GENERAL

A series of three postcards highlighting the origins of nitrogen, potash, and phosphate.

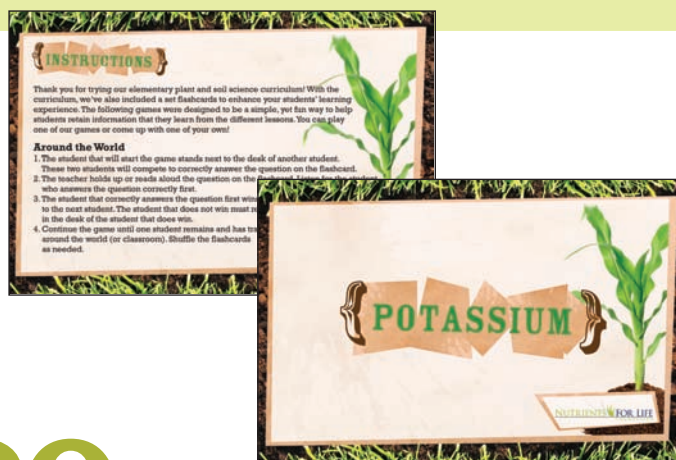


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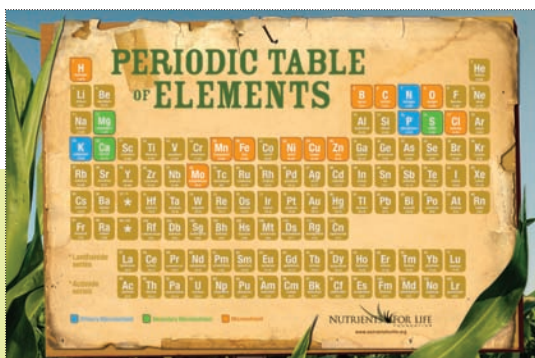
Flashcards

AUDIENCE: MIDDLE/HIGH SCHOOL

Play fun games (Around the World, Beat the Clock, or Circle Up) and test your students' plant and soil science knowledge. Or use the set to review concepts from the middle and high school curriculum, *Nourishing the Planet in the 21st Century*.



To request the complementary items featured, please visit the Nutrients for Life Foundation website's teacher section: **www.nutrientsforlife.org/for-teachers**.



17

Periodic Table of Elements Poster

AUDIENCE: MIDDLE/HIGH SCHOOL

Connect biology to chemistry with this colorful periodic table of elements poster. This piece highlights the primary macronutrients, secondary macronutrients, and micronutrients; all of which are essential for plants.



18

Apple Poster

AUDIENCE: MIDDLE/HIGH SCHOOL

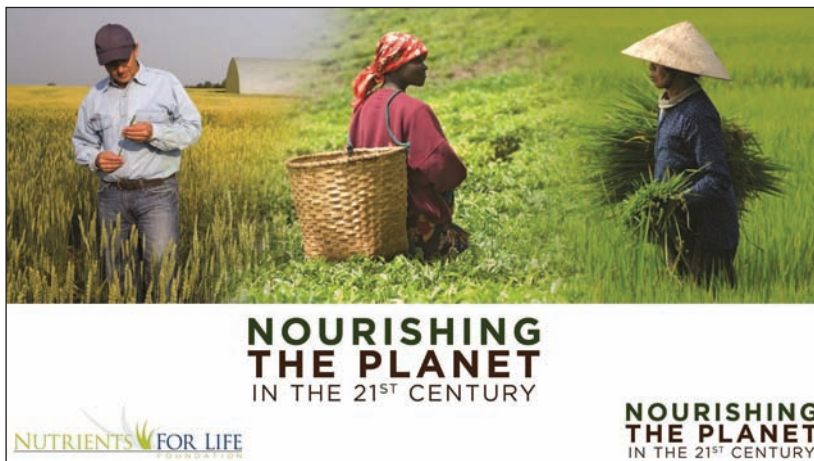
Can a single apple slice feed the world? This resource poster for teachers provides a visual aid as they address the challenges of feeding a growing population. (Also available in Spanish.)

More Available Resources

21

Interactive Lesson Plans

AUDIENCE: 3rd & 4th, 7th & 8th, 9-12th
Download ready-to-go PowerPoint slides that correspond with *Nourishing the Planet in the 21st Century* curriculum. Access the middle school slide deck on www.thescienceofsoil.com and download the elementary and high school slide decks on the teacher's section www.nutrientsforlife.org.



22

FALL 2016



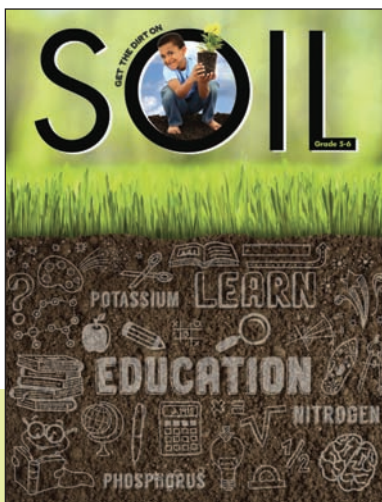
22

Under Your Feet Reader

AUDIENCE: 1ST & 2ND
This activity reader introduces soil and its role in producing food. Written for grades 1 & 2.



Download from the teacher's section at www.nutrientsforlife.org.



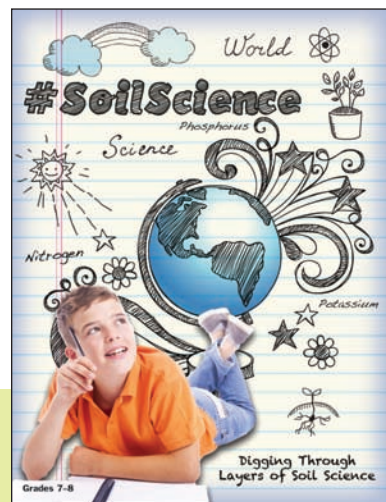
23

SOIL Reader

AUDIENCE: 5TH & 6TH
This 18 page booklet contains articles, like "Properties of Soil" and "Soil Testing Your Yard," and activities about soil science written specifically for grades 5 & 6.



Download from the teacher's section at www.nutrientsforlife.org.



24

#SoilScience Reader

AUDIENCE: 7TH & 8TH
Introduce soil formation, the nitrogen cycle, and fertilizer basics with the activity booklet designed for grades 7 & 8.



Download from the teacher's section at www.nutrientsforlife.org.



To request the complementary items featured, please visit the Nutrients for Life Foundation website's teacher section: **www.nutrientsforlife.org/for-teachers**.

Help us continue our mission, donate today!

More than ever, it is essential that the Nutrients for Life Foundation continues to develop and distribute science-based materials to improve plant nutrient literacy, soil health knowledge and promote fertilizer's role in sustaining a growing population. The resources provided to teachers and students at no cost address common misconceptions among consumers and educate the industry workforce to better understand how their work helps feed the world.

NFL has demonstrated remarkable progress since its inception. In just the past three years, over 24 million people have been impacted.



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NFL's continued success and ability to provide free resources to our nation's educators relies on your support.

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parting shot

Melissa Buehler, Nebraska Regional Representative, congratulates winners from the *Helping Communities Grow* Program. 100 total participating FFA chapters, from 17 states reached over 600,000 community members.