



Bringing the 4R's to Life in the Classroom!

INTRODUCTION: NUTRIENTS TAKEN FROM THE GROUND

SET-UP:

Cup with liquid in it; lines drawn on the cup and a straw placed in the cup

MATERIALS:

Cup (clear with lines marked on it)

Drinkable Liquid

Straw

EXPLANATION:

To help students understand and visualize the plant growth process, demonstrate/narrate the following:

- Seeds are planted in a field. After receiving moisture, they germinate and use the food energy stored in the seed to begin to grow.
- As the plants continue to grow, they need additional nutrients because the nutrients in the seed become depleted. (Instruct the student volunteer to drink the water until the level drops to the level 3 mark.)
- As the plants mature and begin to produce flowers, followed by fruits or seeds (such as corn, soybeans, vegetables, etc.), they need additional nutrients. (Instruct the student to drink two more units, leaving the water at the level 1 mark.)
- When the plants are harvested, the field rests until the next season. (The water level should remain at the level 1 mark.)
- The following season the field is planted again. Ask students, "Do we have more or less nutrients to begin season two with?" (*less*)
- The seeds germinate and begin to grow, once again requiring nutrients. (Drink the last unit of water.)
- As the plants continue to grow, more nutrients are needed. (Instruct student to drink one unit even though there is no water left). Remind the class that the plants are still hungry for nutrients so they keep trying to get them. As the volunteer student keeps sucking on the straw, explain that without proper nutrients the plants' health will suffer: the plants will grow slow, they may turn yellow, they may be more susceptible to diseases and insects, and/or the size of the harvest they produce may decrease.
- Ask the students if there is a way the farmer can add nutrients to the soil. (*Yes, they can add nutrients in a variety of ways, including mineral fertilizer, manure (from livestock), composted organic matter or by growing green crops (cover crops like alfalfa and clover).*) Pour more water in the glass, representing the farmer applying nutrients to their field. Ask the student to drink another unit of water in order to have sufficient nutrients to finish the season and provide a harvest.

- We know that crops need nutrients to grow, and farmers must replace soil nutrients. Could farmers add too many nutrients of any type (manure, fertilizer, compost) to their fields? *(Yes. If they add too much it costs them money, and there is a risk the nutrients will run off the land into bodies of water).*
- Could farmers also not add enough nutrients? *(Yes. If crops don't receive enough nutrients they will be weaker, more susceptible to disease, produce less yield (which means less food), the crop will be less profitable and the soil won't be as healthy.)*
- If growing plants deplete soil nutrients, why should farmers continue to grow crops? *(To produce our food so we can eat! Without farmers ensuring we have nutrient-rich soil we would not have a stable food supply.)*

Tie into 4R strategy and introduce activity.

ACTIVITY: 4R VISUAL

SET-UP:

Bucket in the front of the room with a dry paper towel in it.

One Bucket in another part of the room.

4 volunteers – each holding a sign with a “4R” on it

MATERIALS:

4R signs

6 cups

Water

Ice

Washcloth

Straw

INTRODUCTION:

- Goal is to soak the washcloth with the water in your cup. If you do this successfully, you will earn _____. The only catch is you have to play by my rules. Sound good?
- In order to get the water to fill your cup, you must give me something...hair tie, paper clip, etc.

RIGHT SOURCE

- First person steps forward. You give them the sign that says “right source”.
- Explain: Remember, the goal is for you to take the water I am about to give you and soak the washcloth.
- Give the volunteer their cup of water – in the form of ice. Have them dump into the bucket and then discuss how it didn't accomplish it's purpose because it wasn't the right source of water that we needed for our goal.
- Draw an “X” through their sign.

RIGHT RATE

- Next volunteer steps forward and you give them a sign that says “right rate”
- Explain: Ok, good news is I am not going to give you something completely unusable – like ice. You’re going to be able to use nice, refreshing water. Oh, but you can only use the water that you can hold in this straw for one trip.
- Discuss that this wasn’t effective because it wasn’t the right rate – we needed much more water to accomplish our goal.

RIGHT TIME

- Before the next volunteer comes up, discretely take the washcloth out of the bucket in front.
- Next volunteer with get a sign that says “right time”
- Explain: Good news...you’re going to get to use your liquid water and you can use the whole cup of it. Go ahead and pour your water into the bucket.
- Oh...I forgot – I hadn’t put the washcloth into the bucket yet. Since your timing was off and you poured your water before the cloth was in there, you didn’t accomplish the goal either.

RIGHT PLACE

- Give the last volunteer a sign that says “right place”
- I’m sure you get the hang of this by now, but you get to use your whole cup of liquid water, the washcloth is already in the bucket, so you’re good to go. Oh, except...you have to dump your water into this bucket in the back of the room.
- Discuss: clearly this didn’t accomplish our goal because you dumped your water in the wrong place.

SUMMARY

- Now, each of the volunteers gave me something of value for their cup of water, but then they were given restrictions that prevented them from accomplishing their goal and ultimately winning _____. How would that make you feel if you were the volunteers?
- Now let’s replicate this lesson and this line of thinking to farming. Farmers invest LOTS of money into their crops, between materials, plants, labor and all other input costs - so they are going to do everything in their power to make smart decisions to accomplish their goal and get their investment back. The 4R strategy is a “Best Management Practice” and it is labeled this way because not only does it help the farm get their financial investment back, but it is also best for the environment. It’s really a win-win for the farmer. Re-coop their investment, additional income potential, and ensure the productivity of the land and sustainability of the environment so they can keep farming for years to come.
- That’s why the 4R’s are so important to our industry and why it is crucial that we as consumers and our producers understand this.
- Hopefully this visual will help your students remember all of the things farmers consider when applying nutrients to their crops to make sure they are being excellent stewards of their resources. Too little or too much nutrients has a negative outcome for the farmer, so the goal is to hit the perfect level using the 4R approach.