

National Agriculture in the Classroom

Louisville, KY

From Soil to Plate
June 18, 2015 (Wednesday)
3:30 - 4:45 p.m.

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Poll: How many?

- A. Elementary teachers
- B. Middle school teachers
- C. High school teachers
- D. College professors
- E. Farm Bureau
- F. Work related with agriculture

Agenda



- Why I introduce agriculture to my students (pre-service elementary teachers)
- Partnership with Maine Agriculture in the Classroom
- Activities done

10 mins

- Today: Hands-on activities
 - Food Test
 - Soil Test

40 mins

- Wrap up
- Questions and Answers

10 mins

LOGIC MODEL for AGRICULTURAL LITERACY PROGRAMS

National Research Agenda for Agricultural Education - Priority 1 (Doerfert, 2011)

- Increases understanding
- Demonstrates impacts
- Determines the potential of emerging technologies for communication

Situation: By 2050 the world's population is projected to reach nine billion people requiring agricultural production to double—with less land and water—while sustaining our planet. This increase in population will require more food to be produced in the next 50 years than the past 10,000 years combined (Borlaug, 2000).

National Agricultural Literacy Outcomes (Spielmaker, 2014)

- K-20 Assessment
- Program Evaluation

Long-term Result

An agriculturally literate society that understands and can communicate the source and value of agriculture as it affects our quality of life.

Specifically, a society that:

- values agriculture
- makes informed decisions and advocates for agriculture
- supports rational and practical agricultural policies resulting in a food-secure nation
- encourages the preparation of an agricultural workforce
- works to ensure that farmers can provide a healthy, safe, and adequate food supply

Knowledge Attitudes Skills Behaviors Practices

Outcomes: Changes in...

Educators of PK-Adult Training K-20 Students/Youth Activities Policymaker Information Consumer-based Information

Outputs

Program Resources Human Resources
Financial Resources Collaboration Partners

Inputs

From the Ground Up

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References

Borlaug, N. (2000). Taking the GM food aid debate to Africa: Are we going mad? Retrieved from <http://artsci.wustl.edu/~anthro/bnc/readings/Borlaug%202000%20Going%20Mad.htm>

Doerfert, D. L. (2011). National research agenda: American Association for Agricultural Education's research priority areas for 2011-2015. Lubbock, TX: Texas Tech University, Department of Agricultural Education and Communications.

Spielmaker, D. M. (2013). National agricultural literacy outcomes. Retrieved from <http://agclassroom.org/teacher/matrix>

Agriculture Partnership Program



Maine Agriculture in the Classroom

- Willie Grenier – Executive Director



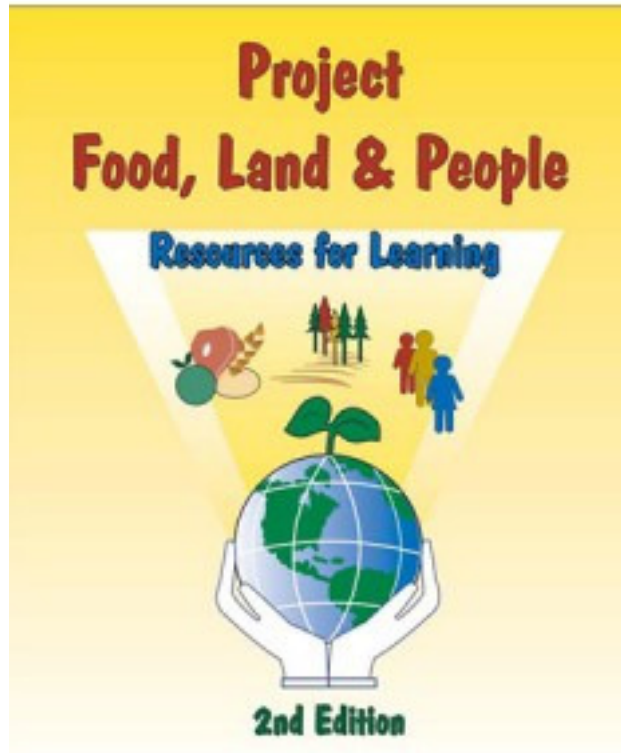
Department of Agriculture – Integrated Pest Management

- Cathy Murray - Entomologist



science methods class – 16 hours teaching time spent on agriculture
(one-third of the total time)

Resources from MAITC & Department of Agriculture



Integrated Pest Management

Used Here

IPM is a holistic approach to pest management.

IPM is better for our environment.

Plants are monitored to detect problems early.

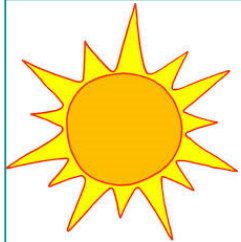
IPM uses 'good bugs' against 'bad bugs.'

Our Goal

Healthy Plants and a Healthy Environment

© Univ. of Vermont, Entomology Research Laboratory, 2005

From Soil to Plate



Macronutrients – N (nitrogen),
P (phosphorus), K (potassium)

Micronutrients – Mn, Fe, Cu, Zn



Macronutrients – CHO, Proteins, Fat

Micronutrients – vitamins, minerals
(Ca, Mg, P, Na, K)



Pre-test questions

- [Pre-test questions](#)
- Results: $N=12$
- Q1

Vegetable	Plant Part
Tomato	<u>Fruits</u> (3), Seed (1), Stem (2), Don't know (6)
Radish	<u>Root</u> (10), Leaves (1), Stem (1)
Carrot	<u>Root</u> (10), Don't know (2)
Green Bean	<u>Seeds</u> (3), Stem (2), Don't know (7)
Potato	Root (10), <u>Stem/ Tuber</u> (1), Don't know (1)

Q2. What do seeds require to germinate?

Answer: water, warmth

Some misconceptions

- Seeds require pollination to germinate (2)
- Seeds require sunlight to germinate (3)
- Seeds need minerals to germinate (1)
- Seeds need soil to germinate (1)
- Don't understand the word germinate (1)

Q.3 What are the three essential chemicals in fertilizers?

- Answer: N, P, K
- No one got it correct.
- Most students put down oxygen, hydrogen, carbon, nitrogen

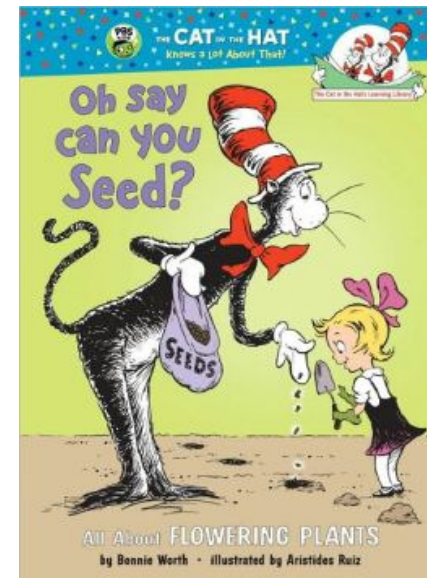
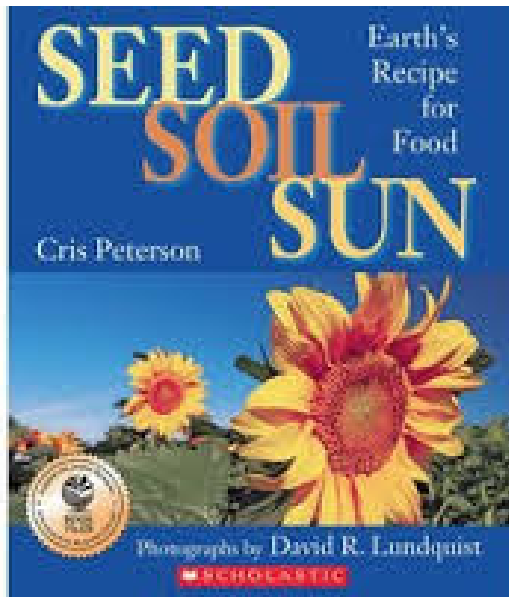
Q4. Describe the test for the presence of sugar, starch, protein and fat in food?

- Fat- grease on paper towel (1)
- Starch – iodine (1)
- Don't know (10)

5E Learning Cycle

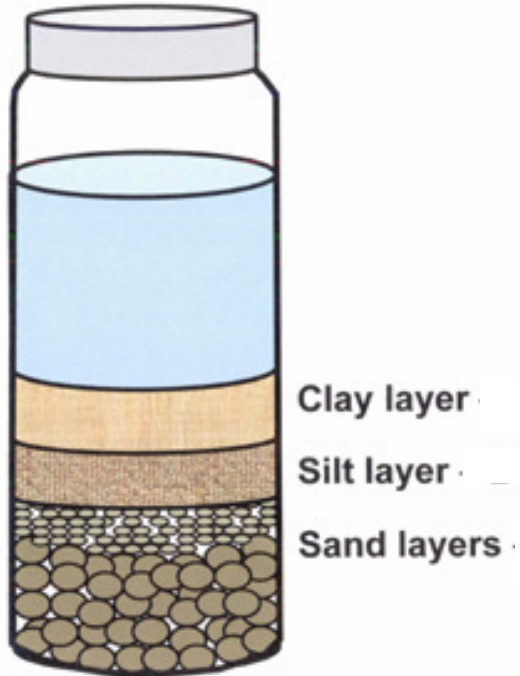
Engage

- Study the soil layer by shaking some soil with water in a plastic bottle.
- Journal the germination of seeds in a plastic cup.
- Language integration: Read two trade books





Study of soil texture



N.B. Use soil in your yard. Don't use potting soil bought from stores.

Explore

1. Seed Surprises (PK-3)

- an inquiry-based activity to understand
 - conditions of germination – warmth and moisture
 - Conditions of growth – temperature, moisture and light
- Math integration: Measure the length of the shoot of the germinated seeds and draw a graph to show the increase in length

2. Root, Root for life (Grades 2-6)

- an inquiry-based activity to understand
 - the growth of carrot and radish
 - the functions of roots

3. Mighty Macros (Grades 6-12)

- an inquiry-based activity of Food test
 - Glucose – Benedict's test
 - Starch – Iodine test
 - Protein – Biuret test
 - Fat – Spot test

4. Test Nitrogen (N), Phosphorus (P), Potassium (K) in soil using the Soil Test Kit.

Germination of seeds



Growth of the plants



What parts of the plants are we eating?

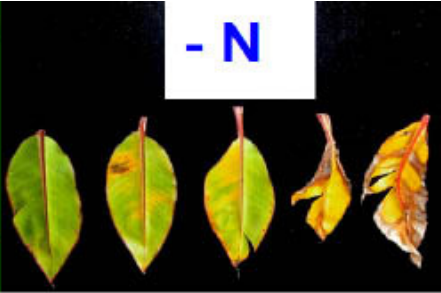


Today Activities

- Food Test
- Soil Test

N deficiency:
leaves turn
light green,
then yellow
patches
appear.
Midrib often
turns pink.

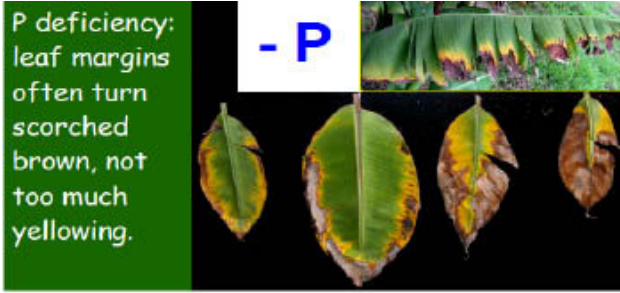
- N



Nitrogen is vital in chlorophyll production (for green leaves), DNA and proteins.

P deficiency:
leaf margins
often turn
scorched
brown, not
too much
yellowing.

- P



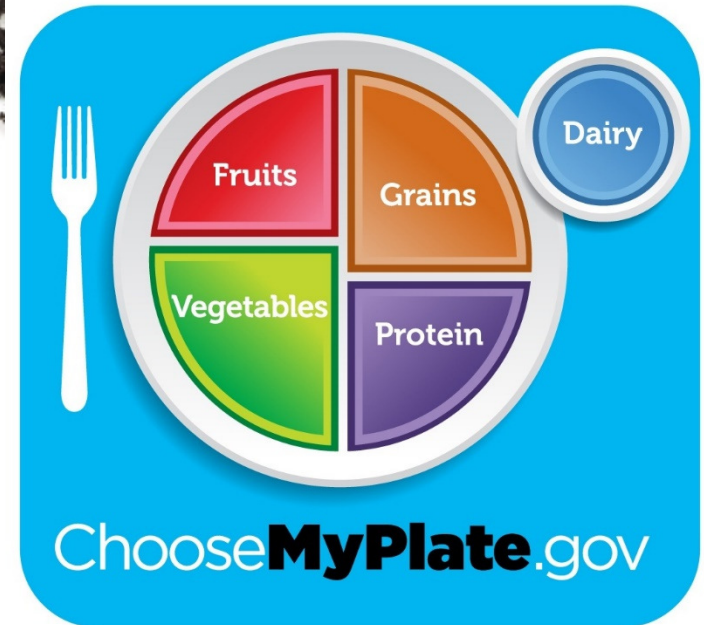
Phosphorus is important for roots growth, and flower and seed formation.

K deficiency:
leaf margins
and tip turn
yellow, then
scorched
brown.

- K



A balanced diet
- To be healthy



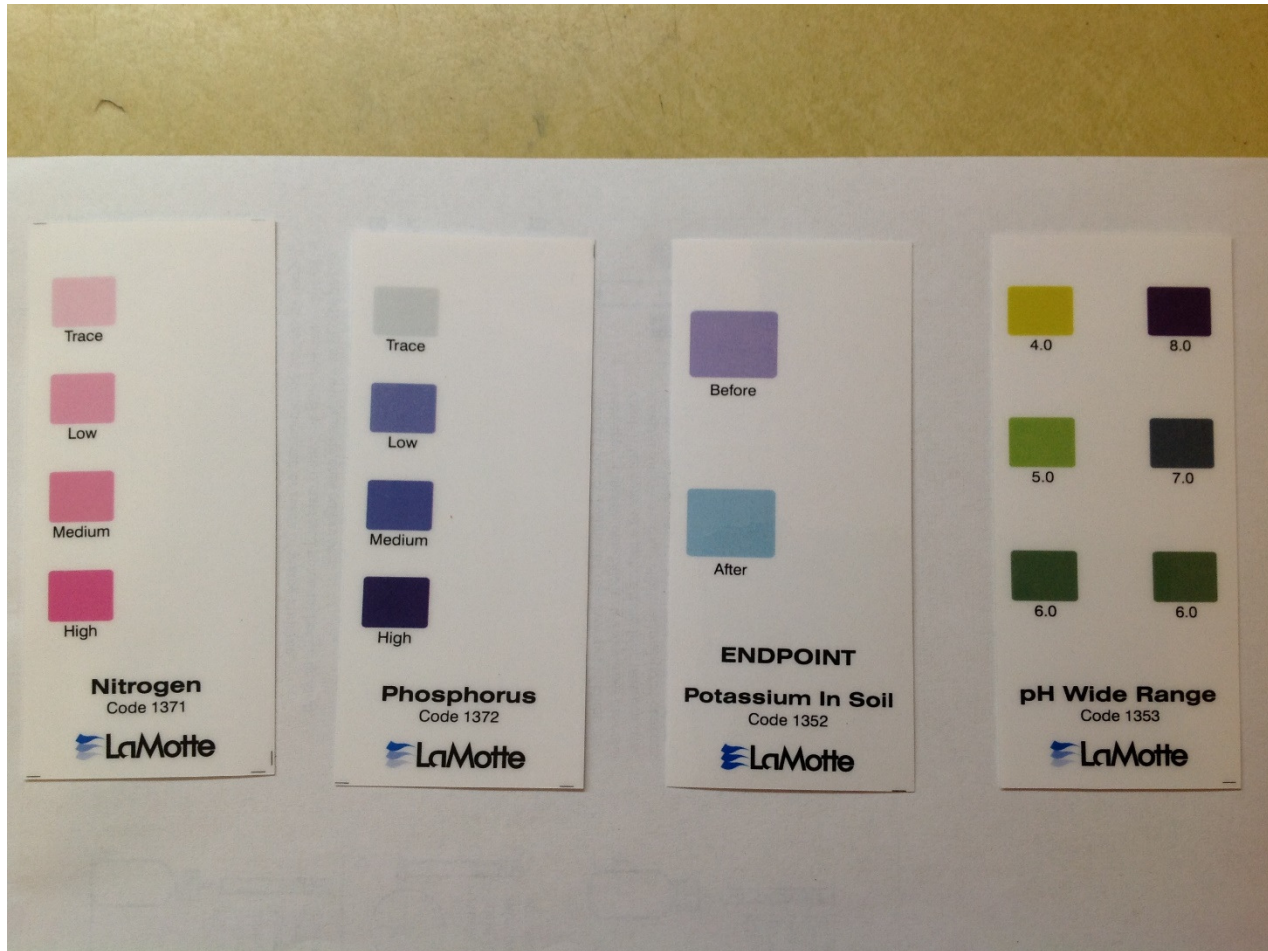
National Standards

- Science Standards (NGSS)
 - Science as Inquiry
 - Life Science
 - Earth Science
- Language Arts
 - Reading and Writing
- Math
 - Collecting Data and Representing Data

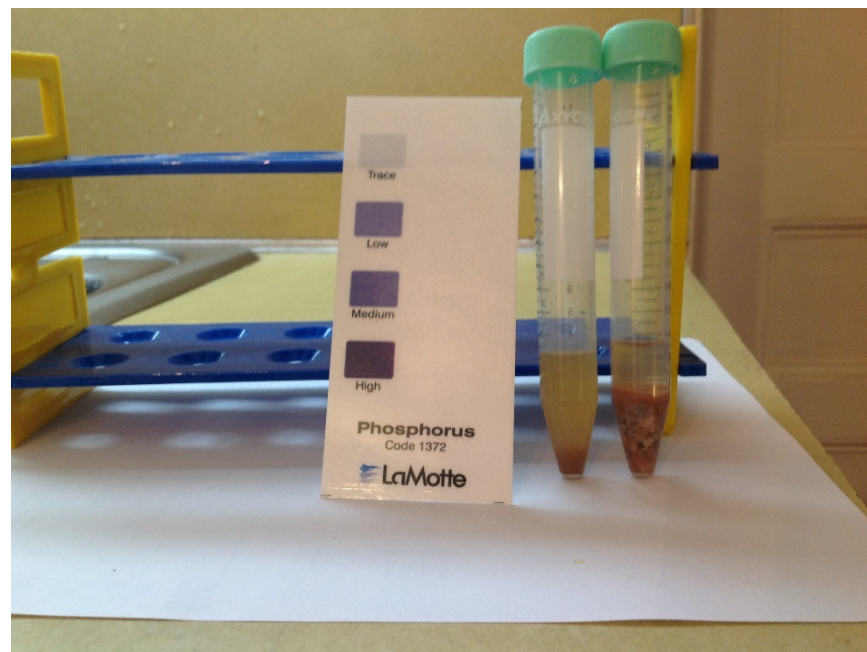
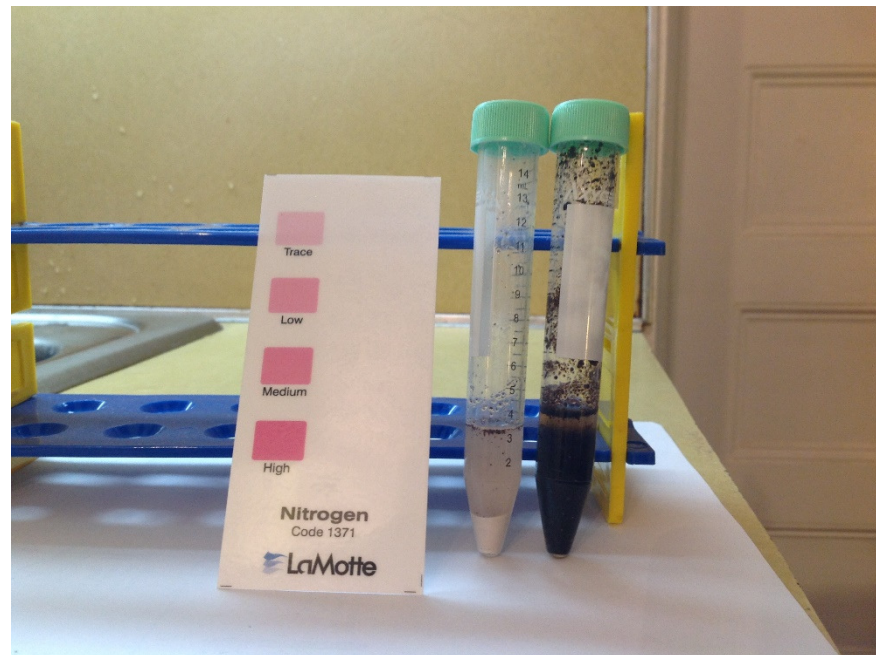
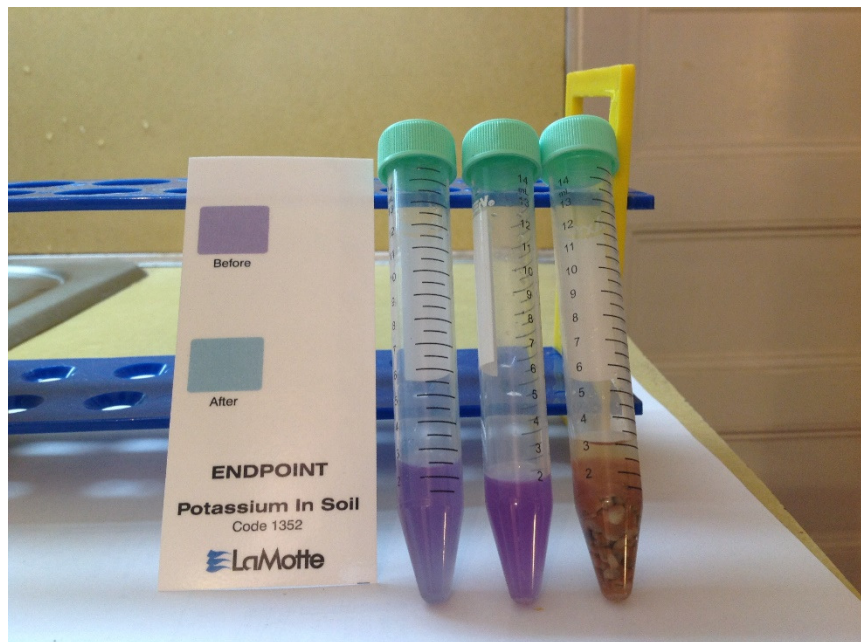
Test for Nutrients in Food

- Test for carbohydrates
 - Glucose e.g. honey
 - Sucrose e.g. sugar
 - Starch e.g. rice, bread
- Test for protein e.g. milk
- Test for fat e.g. butter, oil

Test for nutrients in Soil



Soil Test – N, P, K and pH Chart



Explain

- Growth cycle of plants (seeds germination & plant growth)
- Conditions for germination
- Importance of soil
- Importance of chemical nutrients in soil – NPK
- Importance of food nutrients for humans –
Carbohydrates, Protein and Fat

Useful websites

- Simulation of plant growth

Explorelearning.com

- Soil test and Soil analysis

www.kansasgreenyards.org

healthy yards videos

- Using test strips for pH and NPK
- Texture analysis

- Nutrients for Life

[Properties of soil - videos](#)

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Questions and Comments

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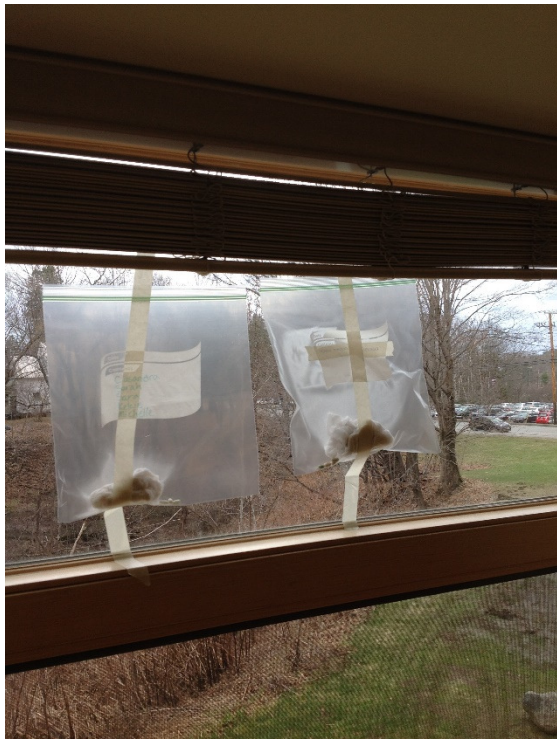
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Seed Germination

- Misconceptions
- Knowledge gained



NPK – Up, Down, All Around

- N (Up) – promote green leaf growth
- P (Down) – promote healthy root system, and also flower blooms and fruit production
- K (All Around) – build strong cells

Evaluation

- Post-test (can be multiple choice questions or open-ended questions or a reflection paper on student's learning experience)

Benefits

- An authentic experience of learning about agriculture
 - Maine Agriculture in the Classroom
- Inquiry-based science learning
- Brainstorming ideas
- Researching and Collaborating
- Problem-solving

