

FUN FACES OF WISCONSIN AGRICULTURE *BERRY BUNCH'S CRANBERRY FAST FACTS*



Production Information

The American Cranberry is a low-growing, vining, woody perennial plant with small, alternate, oval leaves. The plant produces horizontal stems or runners up to 6 feet (2 m) long. Short vertical branches 2 to 8 inches (5 to 20 cm) in height, called uprights, grow from buds on the runners and produce both vegetative and fruit buds. Each fruit bud may contain as many as seven flowers. They prefer sandy, marshy land called bogs.

Water is used during harvest to float the fruit for easier collection, and during the winter months to protect the plants from freezing and desiccation. The rest of the year the fruit is grown on dry beds.

Harvest begins in late September. Harvest has been improved from being done by hand, to using a two-handled rake, to mechanical pickers and water reels. There are two types of harvest methods: wet and dry. Wet harvest involves flooding a dry bog with water. Water reels (like egg beaters) drive through the water loosening the berries from the vines. Floating berries are corralled, loaded into trucks, and made into juices, drinks and foods. Dry harvesting uses a machine with moving metal teeth to comb the berries off of the vine. Berries are collected in a burlap sack on the back of the machine. The bags are lifted by helicopter so they don't damage vines. Many fresh berries are harvested this way.

Wisconsin Production

Wisconsin produces about 50% of the nation's crop with over 3.6 million barrels of fruit. An average acre will yield about 189 barrels per acre- a barrel weighs about 100 pounds. Cranberry marshes occupy more than 180,000 acres and cranberries are harvested on about 18,000 of those acres. There are about 240 growers in 20 different counties in Wisconsin. The cranberry was named Wisconsin's state fruit on April 5, 2004. Cranberry marshes date back to the 1830's which was before Wisconsin became a state.

Career Information

Seasonal workers are needed for harvest including fresh fruit sorters, truck drivers, machine operators, and pilots. Environmental affairs managers help producers protect the soil and groundwater. Crop scouts assist in preventing insect, disease and weed control. Recipe developers and food scientists find new uses for the cranberries and explore the nutritional benefits. Cartographers (mapmaker) assist producers in laying out fields.

Trivia

- There are about 450 cranberries in a pound; 4,500 cranberries in a gallon of juice, and 45,000 cranberries in a 100-pound barrel.
- American soldiers used dried cranberries in World War II to keep healthy and energized.
- 91% of Thanksgiving dinners include cranberry sauce in their menu.

Other Information

Cranberry marshes need support lands which consist of natural and man-made wetlands, woodlands and uplands. The support land is not used for growing the crop, but is important for the series of ditches, dikes, dams and reservoirs necessary to have an adequate water supply. The natural wetlands help control flooding and filter and recycle water. The marshes are home to many forms of wildlife and some endangered species.

In 1880, John "Peg Leg" Webb from New Jersey, discovered the cranberry bounce. Instead of carrying his load of cranberries down the barn steps, he poured them down the steps and watched how they reacted. The freshest, firmest fruit went to the bottom while the rotten and bruised berries didn't go down very far. A bounceboard separator was developed to simulate this test and is still used today.

FUN FACES OF WISCONSIN AGRICULTURE
MATH - BERRY LESSON PLAN



STUDENT'S NAME:

Answer the questions below. Show your work.

1. Your mom is making a fruit salad with Cranberries, Strawberries and Cherries. If she has 8 Cranberries, 7 Strawberries, and 16 Cherries, how many berries will be in her salad?

2. Your summer job is picking strawberries. If you get paid \$2 for each bucket of berries and you can pick 8 pails in one day, how much money will you have at the end of the day? At the end of a 5-day week (you don't pick on the weekends)? At the end of the month (4 weeks)?

3. If the strawberry season is 6 weeks long, did you make enough money to buy an Ipod?

4. One barrel of cranberries can hold 100 pounds. If you have 23 barrels, how many pounds of cranberries do you have?

5. There are 7000 cherries on a tree and it takes 250 cherries to make a cherry pie. About how many pies can each tree make?

6. If you cut one of the pies into 8 pieces, and you and your sister each eat a piece, what fraction of the pie is left?

7. You visit your sister in Door County and she takes you shopping. You stop at a cherry stand to buy some cherries. The sign says 10 cherries for \$.50. If you have \$2.00, how many cherries can you buy? If your sister gives you \$3.00 more, how many cherries can you buy?

8. One barrel of cranberries is 100 pounds. If an acre can produce 300 barrels, how many pounds is that? If there are 450 cranberries in a pound, how many pounds are produced in one acre?

9. Americans eat 500 million pounds of cranberries each year. If Wisconsin farmers grow 300 million pounds, is this more or less than half of what Americans eat?

10. Wisconsin ranks fourth in the United States production of Tart Cherries. The following states also account for the cherry production with the following percents:

- Michigan: 73%
- Utah: 8%
- New York: 5%
- Wisconsin 4%
- Washington, Oregon, Pennsylvania (together): 10%

If 650 million pounds of tart cherries are produced each year, how many pounds of cherries are produced by the above states?

Create a pie graph showing the distribution of tart cherry production in the United States, using the numbers above.

ANSWER KEY

1. Your mom is making a fruit salad with Cranberries, Strawberries and Cherries. If she has 8 Cranberries, 7 Strawberries, and 16 Cherries, how many berries will be in her salad?

31 berries in the salad

2. Your summer job is picking strawberries. If you get paid \$2 for each bucket of berries and you can pick 8 pails in one day, how much money will you have at the end of the day? At the end of a 5-day week (you don't pick on the weekends)? At the end of the month (4 weeks)?

\$2 X 8 = \$16 each day

\$16 X 5 = \$80 each week

\$80 X 4 = \$320 each month

3. If the strawberry season is 6 weeks long, did you make enough money to buy an Ipod?

\$80/week X 6 = \$480 over 6 weeks

Regardless of what type of Ipod, yes

4. One barrel of cranberries can hold 100 pounds. If you have 23 barrels, how many pounds of cranberries do you have?

100 pounds X 23 Barrels = 2300 pounds of cranberries

5. There are 7000 cherries on a tree and it takes 250 cherries to make a cherry pie. How many pies can each tree make?

7000 cherries / 250 per pie = 28 pies

6. If you cut one of the pies into 8 pieces and you and your sister each eat a piece, what fraction of the pie is left?

8/8 - 2/8 = 6/8 or ¾ of the pie

7. You visit your sister in Door County and she takes you shopping. You stop at a cherry stand to buy some cherries. The sign says 10 cherries for \$.50. If you have \$2.00, how many cherries can you buy? If your sister gives you \$3.00 more, how many cherries can you buy?

10 cherries X 4 = 40 cherries with \$2.00

10 cherries X 6 = 60 cherries with \$3.00

40 cherries + 60 cherries = 100 cherries with \$5.00 total

8. One barrel of cranberries is 100 pounds. If an acre can produce 300 barrels, how many pounds is that? If there are 450 cranberries in a pound, how many cranberries are produced in one acre?

*100 pounds X 300 barrels = 30,000 pounds in one acre
30,000 pounds X 450 cranberries = 13,500,000 cranberries/acre*

9. Americans eat 500 million pounds of cranberries each year. If Wisconsin farmers grow 300 million pounds, is this more or less than half of what Americans eat?

More than half (250 million pounds)

10. Wisconsin ranks fourth in the United States production of Tart Cherries. The following states also account for the cherry production with the following percents:

- Michigan: 73%
- Utah: 8%
- New York: 5%
- Wisconsin 4%
- Washington, Oregon, Pennsylvania (together): 10%

If 650 million pounds of tart cherries are produced each year, how many pounds of cherries are produced by the above states?

Michigan: .73 X 650,000,000 = 474,500,000 pounds

Utah: .08 X 650,000,000 = 52,000,000 pounds

New York: .05 X 650,000,000 = 32,500,000 pounds

Wisconsin: .04 X 650,000,000 = 26,000,000 pounds

Washington, Oregon, Pennsylvania (together): .1 X 650,000,000 = 65,000,000 pounds

Create a pie graph showing the distribution of tart cherry production in the United States, using the numbers above.

Cherry Production in the United States



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NOT SO WILD ANYMORE!**



Activity Length:

“Cranberries- Not So Wild Anymore” Video- Video is 14:30 long. Additional lesson- 45 minutes

Cranberry History and Geography- 20 minutes

Cranberry Art- 30 minutes

Berry Math Lesson – 30 minutes

Student Objectives:

1. Learn basic cranberry information through a video
2. Study the geography and history of Wisconsin
3. Create a medium to be used in painting a picture illustrating what was learned about the history and geography of Wisconsin

Wisconsin Model Academic Standards:

English	A.4.1	A.4.2	A.4.3	A.4.4	C.4.2	E.4.1	E.4.2		
Math	A.4.1	A.4.2	A.4.3	A.4.4	A.4.5	B.4.1	B.4.2	B.4.3	B.4.5
Science	A.4.1	A.4.5	C.4.2	C.4.4	C.4.6				
Social Studies	A.4.2	A.4.4	A.4.5	B.4.1	B.4.2	B.4.1	B.4.2	B.4.3	B.4.4
	B.4.5	B.4.6	B.4.7	D.4.3					

Introduction: Cranberry Fast Facts

Important Terms:

- Glacier- body of ice that flows under its own mass due to gravity
- Native Americans- first people to live in America. Cranberries were important for their diet.

Materials for this activity:

- Cranberries—Not So Wild Anymore video
- Cranberries
- White tempera paint
- Paint brushes
- Paper

Activity Outline:

“Cranberries- Not So Wild Anymore” Video

Students will gain a basic platform of cranberry knowledge to begin the remaining activities with.

1. Watch the video *Cranberries-Not So Wild Anymore* and take any student questions after it is completed.
2. Complete Cranberry Timeline Exercise

3. Complete Cranberry Terms word puzzle. Have students circle ten terms and define them on the back of their sheet.

Cranberry History and Geography

Drawing on the information given in the video, students will explore the geography and history that formed the land in Wisconsin that is ideal for cranberry growth as well as the people that pioneered cranberry uses.

1. As a class discussion, explore the following questions: What is a glacier? Where were glaciers found? Why isn't Wisconsin full of mountains like Colorado? Or flat like Nebraska? Discuss variances across the state and where hills versus flat lands can be found.
2. Explore further the history of the Native Americans. (Students may have learned this previously—so build on what they know and expand to the cranberries). Why did Native Americans use cranberries? How did the name “cranberries” originate? What were some uses for cranberries to the Native Americans? What do we use cranberries for today? (Be sure to include the many juices that contain cranberries, as well as snack mixes, Craisins®...)

Cranberry Art

This activity will allow students the hands-on opportunity to use cranberries while illustrating what they learned in the discussion and video.

1. Obtain a few cups of cranberries (depending on class size) and smash up the cranberries as the Native Americans may have. Being sure to talk about why they processed as they did.
2. Add the cranberries to white paint for the students to use. What would Native Americans use instead of white paint? What else could be added for color besides cranberries for red?
3. Instruct the students to create a picture representing something that they learned either in the video or the discussion.
4. Allow the students opportunities to show what they learned to another class or younger students.

Berry Math Lesson

1. Distribute Berry Math Worksheet for a classroom activity or homework assignment

Suggested Reading:

- *Cranberries- Fruit of the Bogs.* By Diane L. Burns

Additional Worksheets:

- Careers Guide related to cranberries
- Cranberry Timeline Exercise related to cranberries
- Cranberry Terms Worksheet

Related activities:

- Visit (www.oceanspray.com) Click on News, Special Events, Ocean Spray Kids for classroom activities and recipes
- Taste testing session with various types of cranberry juices. Purchase a variety of mixtures (i.e. Cran-Grape, Cran-Apple) and see if the students can guess the combination.

**FUN FACES OF WISCONSIN AGRICULTURE
CRANBERRY TIMELINE EXERCISE**



Materials needed:

- Scissors
- Large sheet of paper or poster board
- Paste or tape

Steps:

1. View the video *Cranberries- Not So Wild Anymore*
2. Review the timeline in the interactive curriculum unit that accompanies the video
3. Cut out the historical timeline year and event cards
4. Have the students match the year and events
5. Paste or tape the cards into a timeline on the sheet of paper or poster board

1000-1850	Late 1600's	1829	1850
1865	1873	1890's	1893
1899	1906	1920's	1943
1952	1970's	1980's	1990's
Wild cranberries were used to make pemmican.	Early settlers name the fruit "crane berry"	Daniel Whitney purchased the first recorded sale of cranberries	Law passed to protect wild supply of cranberries
First commercially grown cranberries occurring in Berlin (Green Lake County)	The Carey brothers ditched and diked their land- bringing water to the marshes	Peat fires near Wisconsin Rapids destroyed many cranberry bogs	Andrew Searles developed the variety called "Searles Jumbo"- it's still popular today
U.S. Standard established at 100 pounds = 1 bushel	The Wisconsin Cranberry Sales Company was formed	The flooding of marshes was begun to aid in harvesting	A mechanical picker was developed by Robert Case
The first TV commercial for cranberries was aired	Cranberry growers were first ag group to voluntarily stop using DDT	Electronic alarm systems for frost protection were developed	Cranberries became Wisconsin's #1 fruit crop

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Cranberry Terms

D L K A K U P F H G R E Y R U W W E U Q P E N M U T D M G D
N A C B D V F E O S P X J M M S S J E R H X U A M K A V I G
A O S C R A N E B E R R Y G T B H Q K X A J T F C F O K E A
L D I K N P X B J U H A I U I R A K E O R H W K T I U P U D
T N B T F W P X H O D X M Z J R N I L L V M P I X C M N B E
R A E V A Y W B O E F Y D O T N F K K M E T V K V D O M P L
O L D W U N S A J T O N U C T E F C I B S E O B S I O X E M
P T J X Z O I G C W K M G A V T Y R C L T N E A S V B E J P
P E V J I D J L R I Y A R A G H O I O U E G H O Y Z O B W J
U W D F I L W R L L D C Z E Q T U X E B R K R O Y W T M O A
S O M M P W N R L O Q I V F H S E R F R O E G M W K S S G C
E H J M V Z L W G J P V C U S G V V J E S O M H E F T V U P
L E Z Z D M W Q S R X O I T H A Q V M G T D O F M A H N M L
J V C H H I J J Z Q V K Y N V C F X Y C R R O S P N H O F O
N X R O I H P Q M W E Z Q H E X E X I R I D S L H H E E L K
E G I V S B E Y X F Z D V G T J R H H E O G E V L C N H M F
X J U W Q Y J R I O V R E S E R J L X V L D K S W S G S M J
E U E Y U A S L M J T E X Q T R T A N B Z T V M E X E Y K O
R S S Y O Y L T P T H O Q K X H W O S E B F A O M P E Q U D
E V V F T G L R E C F J U Y O K I O B E S M B E D H W L O N
U U D B L L O U Q M L N V R V T M Q M D W Z H J F Z J I F N
M T V I G C G E B B O X B B A R W E V U D O K F V Y G V M S
D F T X E N F I R Y W A Z G T A I Z H A S V Z S M Z I K N E
I Z L S R D R F B H E S I S W A I U A R C I B U J W T A A E
C K S Q F L C P M U R R E P G L N O K B M M L Q D X N W H D
A E Y H A B I T A T R E M H G I L F H Y N R K N M Y F H U P
D S T U M X C G X I K G G J B S O B C L E D P Y R T O S S U
B U F L Z S O H B I S F R Z Y R B X H J V D F D K C T S J K
D O D Q H Y N R D S L A V T E T B T X G M A C D U J C B P P
V A J O P Z X A E L D O C Q C M G Q Y M S A Q D W N M U Q D

ACIDIC
BED
BOOM
CRANBERRY
DIKE
ECOSYSTEM
EROSION
FLOWER

FRESH
HABITAT
HARVESTER
IRRIGATION
MARSH
PEMMICAN
POLLINATION

PROCESSED
RAKE
RESERVOIR
STAPLE
SUPPORTLAND
VINE
WETLAND

**FUN FACES OF WISCONSIN AGRICULTURE
BOUNCING CRANBERRIES!**



Activity Length:

Estimation - 15 minutes

Mistakes that became a discovery- 30 minutes

Bounce Testing - 20 minutes each day– (must be done 3 different days)

To Your Health - 30 minutes

Berry Math Lesson – 30 minutes

Student Objectives:

1. Students will utilize estimation skills in estimating the number of berries in a jar and seeds in a berry.
2. Students will use reading skills to discover an important test in the Cranberry industry.
3. Students will recreate what they read about to conduct their own experiment and record data.

Wisconsin Model Academic Standards:

English	A.4.1	A.4.2	A.4.3	A.4.4	C.4.2	E.4.1	E.4.2		
Math	A.4.1	A.4.2	A.4.3	A.4.4	A.4.5	B.4.1	B.4.2	B.4.3	B.4.5
Science	A.4.1	A.4.5	C.4.2	C.4.4	C.4.6				
Social Studies	A.4.2	A.4.4	A.4.5	B.4.1	B.4.2	B.4.3	D.4.3		

Introduction: Cranberry Fast Facts

Important Terms:

- Antioxidants- Compounds that neutralize free radicals when they are formed
- Anti-adhesion - Helps prevent bacteria from forming
- Carbohydrates – Carbohydrates are part of a healthful diet. Sugars and starches supply energy to the body in the form of glucose, which is the only energy source for red blood cells and is the preferred energy source for the brain, central nervous system, placenta, and fetus.
- Calorie - The amount of heat needed to raise the temperature of a liter of water 1 degree.
- Dietary Fiber – Dietary fiber is composed of non-digestible carbohydrates and lignin intrinsic and intact in plants. Diets rich in dietary fiber have been shown to have a number of beneficial effects, including decreased risk of coronary heart disease.

Materials for this activity:

- Cranberries- fresh if possible
- Cranberry products from grocery store: various cranberry juices, Craisins®, Craisin Trail Mix®, cranberry sauces (whole berry and jellied), cookies and other products.

Activity Outline:

Estimation

Students will gain a brief introduction to cranberries by determining how many are in the jar.

1. Before class, fill a jar with cranberries and allow students the opportunity to make guesses as to how many are in it.
2. Pass around a single berry and encourage students to take guesses as to how many seeds are inside the berry.
3. As a class, discuss methods for determining the answers to how many berries are in the jar and the number of seeds without actually counting each one. How accurate will each method be? What is the best idea?
4. Use one or more suggestions and determine the number of berries and seeds and compare students' answers.

Mistakes that became a discovery

Students will learn about the history of the "bounce test" to determine cranberry freshness.

1. The origin of the bounce test: A New Jersey grower, John "Peg Leg" Webb discovered the cranberry bounce test. Instead of carrying his crop of cranberries down the steps of his barn, he poured them down the steps. Only the firmest and freshest fruit reached the bottom of the steps. The berries that were bruised or rotten remained on the steps. This concept was used to develop the bounce board separators which are used today. Was it an accident that John Webb dumped his load of cranberries down the steps or did he have a theory that it would work?
2. As a class, discuss how new technologies are developed for the food industry? How were pieces of equipment developed for various harvesting, planting and processing? Can students think of equipment they use and how it might have been developed?

Bounce Testing

This activity will give students the opportunity to reconstruct the test they just read about while gathering and recording data. Begin the activity on a Monday so that trials can be run on Monday, Wednesday and Friday.

1. As a class, brainstorm ways to recreate this test in the classroom or the school (steps are ideal) If steps are not available, create an alternative launching area so that the berries drop by 1 foot.
2. Divide students into groups. Each group will have 20 cranberries. Push the cranberries off and put them into separate containers – one for those that bounce and one for those that don't bounce.
3. Collect initial data of sample weight and record it in a table. How many bounced and what did their appearance look like? How many didn't bounce and what was their appearance like?
4. Run the trials every two days and record the data. Discuss why any changes may have occurred from one trial to the next.

5. Calculate the percent of good berries in the sample.
6. Did the number of berries that bounced increase or decrease during the later trials? Why? How were the berries stored? Did this have an influence on their quality?
7. Organize information and create a classroom display to present it.

To Your Health

This activity will help students understand how to determine the health benefits of cranberries and the different products cranberries are made into.

1. Cranberries and cranberry products offer many important health benefits. Native Americans used cranberries to relieve a variety of health problems. Today's cranberries are not only a healthy, low-calorie fruit, they may also help prevent urinary tract infections and reduce the risk of gum disease, ulcers, heart disease and cancer.
2. Antioxidants are compounds that neutralize free radicals when they are formed. The human body is capable of producing antioxidants naturally, but under conditions of stress this antioxidant production can be severely impaired. Fruits and vegetables, including cranberries, provide an excellent source of additional antioxidants.
3. Cranberries have anti-adhesion properties that helps prevent bacteria from forming in the mouth. This helps reduce the build-up of plaque that can lead to gum disease.
4. Obtain various cranberry products from a grocery store. Products could include: various cranberry juices, Craisins®, Craisin Trail Mix®, cranberry sauces (whole berry and jellied), cookies and other products. Have the students look at the nutritional labels and refer to (www.teamnutrition.usda.gov). Go to Resource Library, Educators and then to Read it before you eat it poster for assistance in reading the food nutritional labels.
5. Develop a weekly school lunch (if you bring your lunch) and snack menu that includes cranberries at least once per day.

Berry Math Lesson

1. Distribute Berry Math Worksheet for a classroom activity or homework assignment

Suggested Reading Materials:

- *Cranberries: Positively Wisconsin*. Interactive curriculum and video from Wisconsin State Cranberry Growers Association (www.wiscran.org)
- *Cranberries: Fruit of the Bogs*. By Diane L. Burns

Additional Worksheets:

- Careers Guide related to cranberries
- Ag Statistics Lesson Plan related to cranberries
- *Wisconsin Cranberries Activity Book* - Cranberry Crossword (page 5) – Available from (www.wiscran.org)

Related activities:

- Research other scientific discoveries that were discovered “by mistake” and discuss the impact they have had.
- Visit the Wisconsin Cranberry Discovery Center website (www.discovercranberries.com) and click on Recipes. Have the class find five recipes that they like and that can be made in the classroom. Recipes that need to be prepared at home should be assigned to volunteers.
- Visit (www.oceanspray.com) Click on News, Special Events, Ocean Spray Kids for classroom activities and recipes
- Make a Popcorn and Cranberry Ornament. Download worksheet from (www.wisagclassroom.org) Hands-on activities
- Research other inventions, technology or equipment that has been developed for agriculture. Visit *Growing a Nation- The Story of American Agriculture* (www.agclassroom.org/gan) for more historical information.