



Grow Minds
Grow Healthy Bodies
GROW GARDENS!



TEACHER'S GUIDE 2011



Montana's First Lady
 Nancy Schweitzer invites you
 to spark an interest in math
 and science with classroom
 gardening. Let's explore plants,
 promote healthy eating, and
 connect kids to the outdoors!



FIRST LADY NANCY SCHWEITZER

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February 2011



STATE OF MONTANA

Nancy K. Schweitzer
FIRST LADY

STATE CAPITOL
HELENA, MT 59620

February 28, 2011

Dear Educator:

I am excited to share with you a new opportunity that can help create the next generation of gardeners in Montana. Nancy's Garden is the newest feature of the Governor and First Lady's Math & Science Initiative (mathscience.mt.gov). The Governor and I want students, especially at a young age, to get excited about studying math and science and interested in future careers in our great state.

Nancy's Garden provides a gardening experience for every 4th grade student across the state by supplying grow boxes, seeds, curriculum and instructions for each classroom. The grow boxes were made by the Montana Correctional Enterprises and Eleanor's Garden, a new business in Montana.

With the help of experts, a teacher's guide was prepared which includes:

- Detailed growing instructions, tips and soil procurement guidelines developed by Montana State University (MSU) Extension for successful gardening in the classroom.
- A series of lesson plans for learning activities that will take your students through planting, growing, and finally eating your Nancy's Garden. These classroom lesson plans were developed by the Department of Agriculture, Agriculture in Montana Schools, the Indian Education Division of the Office of Public Instruction and Montana Team Nutrition Program.
- Resources and ideas for how to find volunteers that can connect your classroom garden to the community developed by the Governor's Office of Community Service. In addition, each learning activity card includes an idea for how to extend the lesson into a service-learning activity.

In addition, seeds packets were generously donated by Seed Savers Exchange and Fisher's Garden Store.

All of the curriculum, resources, and technical guide can be found on the Math & Science Initiative website: mathscience.mt.gov, and I encourage you to check back as we post additional resources.

I look forward to hearing about your students' gardening experience this spring and invite you to share pictures and stories by contacting me at: firstlady@mt.gov or P.O. Box 200801 Helena, MT 59620.

My best wishes for a wonderful growing experience this spring.

Sincerely,

A handwritten signature in black ink that reads "Nancy K. Schweitzer".

Nancy Schweitzer
FIRST LADY



LESSON PLAN 1:

GROW WITH NANCY!

Grow Minds. Grow Healthy Bodies. Grow Gardens!

OBJECTIVE: Investigate the process of planting and growing indoor gardens. Understand that each variety of greens have unique characteristics. Understand standard vocabulary used on seed packets by the seed industry.

GRADE 4



Read each Nancy's Garden activity before beginning the project in order to have a sense of the many opportunities Nancy's Garden brings to your classroom. Nancy's Garden begins with planting leafy greens. Planting, watering, observing, and caretaking leafy greens bring excellent educational opportunities to your classroom through science, math, nutrition, and teamwork activities. In addition, planting spinach and a variety of lettuce with different colors, shapes, and growing habits provides opportunities to compare and contrast food varieties. Read the technical guide in this booklet before beginning. Divide the class into groups based on the number of Nancy's Gardens you have available. Let students know they will be completing the steps to grow a Nancy's Garden right in the classroom. Inform students that they will need to keep a journal of each step.

LEARNING ACTIVITY:

- 1 Ask students to read the back of the seed packets. Have each group explain a term found on the packet such as: plant variety, days to germination, depth to sow, seed spacing, row spacing, days to harvest, thinning recommendations, and watering and feeding requirements.
- 2 Ask students to fill each Nancy's Garden with 2.5 quarts of pre-moistened potting mix to within $\frac{1}{2}$ inch of the top. Gently pat down the soil making sure not to compact the soil.
- 3 Students will plant one variety of leafy green for each Nancy's Garden per the directions on the back of the seed packet and in the technical guide. One packet will easily plant two Nancy's Gardens.

Note: When purchasing seeds for future use, choose multiple varieties of leaf lettuce and spinach, or a mixed variety packet. Choose varieties requiring a low number of days to maturity using information found on the back of seed packets.
- 4 Cover seeds lightly with potting mix and spritz the top of the soil with a spray bottle of water. Note: spritz several times per day or cover with clear plastic so seeds do not dry out during the germination process. Lettuce and other leafy greens germinate well in cooler temperatures. Watch for seedlings to emerge. Once the seedlings have emerged a watering can may be used. Be extra careful not to knock over the tiny seedlings with water.
- 5 Write the planting date and variety of seed on a craft stick. Push the stick in the soil along one side of Nancy's Garden. Keep the seed packets for reference.
- 6 Move each Nancy's Garden to a sunny window location. For information on thinning, feeding, and light requirements refer to the technical guide.
- 7 Compare the information on the back of the seed packets to the information in the journal. Make a chart using the data you collect.

★ **Service Learning Idea:** Students can work with an existing community garden, donate plants, or start their own. Students learn how to grow fruits and vegetables and how community gardens meet local needs of their community.

Materials:

- Potting mix (available at gardens centers)
- Quart size beaker or container
- Spray water bottle
- Craft sticks or plant stakes
- Seeds (see note at left)

Vocabulary:

Seed variety, days to germination, depth to sow, seed spacing, row spacing, days to harvest, thinning recommendations, watering and feeding requirement, and growing season.



"Leafy greens are very easy to grow and provide great nutrition. Ask students to use their journals as a guide for planting their own container gardens at home. Encourage students to bring in examples of what they have grown to show the class."

Montana Office of Public Instruction Educational Standards

Grade 4: Science Content Standards: 1.1, 1.2, 1.3 Math Content Standards: 2

Grade 5: Math: 1



LESSON PLAN 2:

SUPER SOIL!

Grow Minds. Grow Healthy Bodies. Grow Gardens!

Roughly three-fourths of the earth's surface area is made up of water. The rest of earth's surface is made up of diverse lands. A very small portion of these lands contain soils we can use to grow food, which we all depend upon for survival. Farmers and ranchers in the United States work hard to produce enough food to feed everyone in this country, plus a large number of people in other countries. Farmers realize they must get maximum production out of their soil to grow food, while at the same time keeping it sustainable (protecting it for future generations). As world populations continue to increase, each person's food producing portion of land is becoming smaller and smaller. Inform students that they will be conceptualizing the percentage of land available for food production by comparing the surface area of the earth to the surface area of an apple.

OBJECTIVE: Understand soils as an essential part of the environment. Understand scientific issues relevant to local and world-wide current events or problems. Understand modeling of decimals and fractions using various concrete materials.

GRADE 4

$\frac{3}{4}$ or .75 Covered in water!

$\frac{1}{8}$ or .125
Mountains, deserts,
north and south
poles.



$\frac{3}{32}$ or .094 Too hot, too dry, too wet, too steep, too rocky, soil too poor for crop production, and/or developed by man.

$\frac{1}{32}$ or .031 Soil suitable for food production.

LEARNING ACTIVITY:

- 1 Show students the globe and the apple. Allow students discussion time to make comparisons between the two shapes.
- 2 Cut an apple into four equal parts. Inform students three of the parts of the apple ($\frac{3}{4}$) represents the area of the earth's surface covered by water. Set these three pieces aside. The fourth part represents land area.
- 3 Cut the fourth part (land section) in half lengthwise. One section represents land such as deserts, swamps, Antarctic, arctic, and mountain regions which are not suitable for growing food; set this $\frac{1}{8}$ section aside.
- 4 Slice the remaining $\frac{1}{8}$ section into four equal parts. Three of these $\frac{1}{32}$ sections represent the areas of the world which are too rocky, too wet, too hot, or where soils are too poor for food production, as well as areas developed by man. Set these three sections aside. You will only have $\frac{1}{32}$ of the apple left.
- 5 Carefully peel the skin off the last $\frac{1}{32}$ section. This small bit of peeling represents the soil area on earth's surface which can produce our food!
- 6 Extend this lesson by studying soil science with lesson plans found at: aginmontanaschools.org or at: soils.usda.gov/education.
- 7 Repeat steps 1-5, guiding students to apply decimals to each portion of the apple.
- 8 Show students the poster "An Inch of Soil", and ask them to write a short essay about what the poster is trying to communicate to the reader.

★ **Service Learning Idea:** Students test soil locally or do a soil profile under the supervision of a teacher (and/or soil specialist) and present findings to their community (local farmers, a town meeting, city council, etc).

Materials:

- Large apple
- Paring knife
- Cutting board
- A world globe
- "An Inch of Soil" poster

Vocabulary:

environment, surface area, sustainable, portion, percentages, fractions.



NANCY'S TIP:

"You can help keep our soils healthy by composting and recycling. Try composting at home with coffee grounds, egg shells, and vegetable scraps."

Montana Office of Public Instruction Educational Content Standards - Grade 4

Science: 1.4; 4.1; 5.1, 5.3 Math: 1 Communication Arts: 2.9

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LESSON PLAN 3:

INVESTIGATING INSECTS AND INTEGRATED PEST MANAGEMENT

Grow Minds. Grow Healthy Bodies. Grow Gardens!

OBJECTIVE: Understand that specific insects may be considered pests in some habitats and beneficial in other habitats. Understand and identify insects as pests or as biological control organisms. Understand the general ideas of IPM.

GRADE 4



Conduct a scientific investigation in your *Nancy's Garden* when plants are at the mature part of their life cycle. Students will be looking for organisms, mainly insects, which are considered pests. Insects are everywhere, but less than 1% of all insects are pests, in fact many insects are beneficial. An organism may be a pest in one habitat and an important food web organism in another. Mosquitoes are certainly a pest when we want to play outside in our yards, but they are a great source of food for birds, bats, and fish. Because of

(continued on back page)

LEARNING ACTIVITY:

- 1 Ask students to carefully wash or disinfect their hands. Pests can be transmitted by humans as well! Let students know they will be examining the plants and the surface of the soil for insects.
 - 2 Divide students into groups of four. Ask each group to examine the plants in their *Nancy's Garden*, carefully looking under the leaves and on the soil's surface. Ask students to capture any insects and place them in the jars. Students may have to use their magnifying glass to see small insects.
 - 3 If students do not find any insects on the plants in *Nancy's Garden*, have students examine actively growing, outdoor shrubs and flowers for insects using guidelines in #2. Inquire about reasons insects were not found on indoor plants but were found on outdoor plants.
 - 4 Ask each group to make an illustrated chart of each type of insect found, based on the insect's physical properties. Have students quantify the results on charts and release insects outside. Assess the charts for approval. Post the charts and ask students to identify the four types of insects most commonly found. Assign each group one of these insects to further investigate. Students will be discovering if the insect is a pest in this environment and, if so, what natural biological control could be used for controlling the insect. If the insect is a predator of another pest, and works as a biological control, ask them to name the pest(s) the predator preys upon. Ask groups to report their findings using the vocabulary terms.
- ★ **Service Learning Idea:** Students work with an Insectary (a place for breeding insects) or start their own to grow insects that are natural predators to local weeds.

Materials:

- Nancy's Garden with plants reaching the end of their growing cycle
- Small jar and magnifying glass for each group
- Insect identification guide: www.insectidentification.org



NANCY'S TIP:

"The insect world is full of species that are beneficial. Learn about which flowers attract insects such as butterflies. Planting bee balm or coneflowers in your outside garden welcomes butterflies to stay for awhile."

Vocabulary:

insect, physical properties, pest, prey, habitat, environment, entomologist, biological control, investigation, results, Integrated Pest Management, beneficial insects.

Montana Office of Public Instruction Educational Standards - Grade 4

Science Content Standards: 1.1, 1.3; 3.4; 5.4

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LESSON PLAN 3:

INVESTIGATING INSECTS AND INTEGRATED PEST MANAGEMENT

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the complexity of our environment, entomologists know controlling insect pests is best done without killing beneficial insects. We would not want to kill every insect in our yard in order to get rid of mosquitoes because we would also be killing beneficial insects, such as pollinators and other insects that naturally prey on pests. Insects and other organisms that naturally prey on pests are known as biological controls.

Integrated Pest Management (IPM) is an effective and environmentally sensitive approach to pest management which relies on proper pest identification, making decisions on how many pests will be tolerated, prevention, and control. IPM models rely on many ways to control pests including: biological, physical, cultural, and chemical controls. This activity is one step in an IPM model which focuses on identifying insects and their role in our environment.





LESSON PLAN 4:

MMM MMM MONTANA!

Grow Minds. Grow Healthy Bodies. Grow Gardens!

OBJECTIVE: Understand how vegetables can contribute to daily nutrition. Identify garden vegetable varieties grown in Montana. Examine, sample, and compare the plants grown in Nancy's Garden. Understand the role of vegetables in a healthy dinner menu.

GRADE 4

Enjoying the vegetables grown in Nancy's Garden is a great opportunity to celebrate with delicious foods students have grown themselves. Plant parts like leaves, flowers, fruits, roots, seeds, and stems are enjoyed as delicious and nutritious foods. Vegetables, especially dark orange and green ones, should be consumed each day to maintain good health.



LEARNING ACTIVITY:

- 1 Ask the students to explore many kinds of dark green and orange vegetables and their nutrition benefits using this site: mypyramid.gov/pyramid/vegetables.html
 - 2 Ask students to wash or sanitize their hands and have a clean napkin on their desk.
 - 3 Harvest, wash, and distribute samples of the leafy greens from Nancy's Garden to each student, following your school's food safety guidelines. (Note: If the leafy greens you are using are either kale or chard, it is important to steam/cook the greens before taste testing as these raw greens have a very bitter taste and will be unpleasant in their raw form.)
 - ▶ Ask students to sample the greens from Nancy's Garden and record their observations about taste, color, shape, and texture.
 - ▶ Ask students to identify which plant parts (leaf, root, stem, etc.) are consumed from each sample.
 - ▶ Ask students if they think the taste of the vegetables from Nancy's Garden would be different from those bought at a store.
 - 4 Ask student volunteers to demonstrate how many leafy greens it takes to fill the following: one-fourth cup, one-half cup, and one cup. A typical serving of vegetables is usually a one-half cup or one cup portion. Fourth grade students are recommended to enjoy at least 2 ½ cups of a variety of vegetables each day.
 - 5 Ask students to identify and make a list of the dark green and orange vegetables that are grown in or commonly available (from home gardens, farmers markets, or grocery stores) in Montana. Have students sort the list by root, leafy, or stem vegetables.
 - 6 Instruct students to plan a dinner menu with their family that includes a serving of dark green and orange vegetables. Ask students to identify any vegetables that were grown in their home gardens. Ask students to identify their family's favorite vegetables. Make a chart of each and compare the data. Schedule time in class to allow students to share their home garden stories. An extended version of this lesson plan and others can be found at: opi.mt.gov/programs/schoolprograms/school_nutrition/#gpm1_7
- ★ **Service Learning Idea:** Under supervision, students prepare a nutritious meal for their peers and explain why each course is healthy.

Materials:

- Mature harvested vegetables from Nancy's Garden
- Napkins for each student
- Cutting board and knife (teacher prep of greens)
- Measuring cups: one-fourth, one-half, and one cup.
- Mmm Mmm Montana poster
opi.mt.gov/PDF/SchoolFood/Mmm-Mmm-Montana/Mmm-Mmm-Montana-poster.pdf

Vocabulary:

root, stem, leaf, nutrients, vegetable varieties.



NANCY'S TIP:

"Remember to wash raw vegetables before you eat them. You can also store them for winter using food processing and safety guidelines."

Montana Office of Public Instruction Educational Content Standards
Grade 4: Science: 2.2; 3.1 Math: 1; 2 Health Enhancement: 1; 7



LESSON PLAN 5: NATURE'S HARVESTERS MONTANA INDIANS

Grow Minds. Grow Healthy Bodies. Grow Gardens!

OBJECTIVE: Understand the relationship between Montana's Indians and indigenous plants. Understand the historic cultural practices employed by Montana's Indians to provide for their food needs.

GRADE 4

Montana Indians used (and still use) the earth as their gardens, letting the earth dictate the location of fruits, vegetables, and herbs. Indigenous plants that Indians use for nutritious food and medicines are part of the natural landscape. Traditionally, Indians did not dig and transplant trees, shrubs, or plants into a single garden; rather they harvested foods from the plants in their natural growing areas. These natural growing areas contain plants which have adapted to certain microclimates in geographical regions of Montana. Montana Indians take advantage of the unique growing

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LEARNING ACTIVITY:

- 1 Challenge students to locate some of these plants in your school's area. Remind students not to eat the plants as they may not have the knowledge of plants which many Indians still hold on to through oral and cultural traditions.

- ▶ **Bitterroot:** Montana Salish and Kootenai tribes continue their bitterroot harvest each year. Bitterroot is used for food and medicinal purposes.
- ▶ **Chokecherry:** Montana Indians used chokecherry with meat to make pemmican, called *wasna* by the Dakota (Sioux).
- ▶ **Wild Carrot:** Crow call this plant split root or *Bikka:sahte*.
- ▶ **Cattails:** The roots are dried and ground into flour by the Assiniboine and other tribes. The flour is used today, as it has been in the past, for making biscuits.
- ▶ **Wild Mint:** Steeped in a bowl of hot water and used by the Assiniboine for colds, flu, and upset stomach. Wild mint tea is called *whpé* by the Assiniboine.

This is a small list of the plants that Montana Indians use for food. Much of this information was taken from *A Taste of Heritage* by Alma Hogan Snell (Crow). For further lesson plans on Montana's Indians and their use of plants visit: opi.mt.gov/Programs/IndianEd/curricsearch

- ★ **Service Learning Idea:** Students learn about the Bitterroot plant, discover whether it's endangered and find out why it's important to the Salish and Kootenai tribe (and other tribes). Then students plant bitterroot in a local community or native plant garden. A closely linked lesson plan can be found on the Indian Education For All website above.

Montana Office of Public Instruction Educational Standards - Grade 4

Science Content Standards: 1.1, 1.6; 4.1; 5.5; 6.1

Indian Education For All: Seven Essential Understandings Regarding MT Indians:
opi.mt.gov/programs/indianed/IEFA

Materials:

- *Story of the Bitterroot* DVD Available in your school library.
- Field guides to Montana native plants or visit:
www.montana.plant-life.org

Vocabulary:

Indigenous, microclimates, variety, monoculture, disease, drought, natural disaster, perennial, vegetables, fruits, herbs, medicinal uses, pemmican



NANCY'S TIP:

"Learn about indigenous plants, their uses, and about the history of plant uses for the twelve tribes of Montana."



LESSON PLAN 5:

NATURE'S HARVESTERS

MONTANA INDIANS

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conditions in each region and assist plants by cultivating them so that they will produce year after year, or perennially.

Indians were able to rely on the abundance of natural resources for food each year. If a plant disease, drought, or a natural disaster were to destroy one particular food crop they had many others to choose from because they were not practicing monoculture, which is the agricultural practice of producing or growing one single crop over a wide area. Montana Indians know harvest areas and times through oral traditions and by carefully observing plant and animal life around them. One example of Salish traditions can be seen by watching *The Story of the Bitterroot*. Historically, Indians traded with tribes from other areas to obtain plants for food and medicinal purposes.



Indian Education For All (IEFA) – Seven Essential Understandings Regarding Montana Indians: opi.mt.gov/programs/indianed/IEFA

- EU 1– Tribal Diversity
- EU 2 – Individual Diversity
- EU 3 – Beliefs, Spirituality, Oral Hist.
- EU 4 – Reservations – land reserved
- EU 5 – Federal Indian Policy
- EU 6 – History from Indian Perspectives
- EU 7 – Tribal Sovereignty

Learn more about Montana's
Indian Education For All Program at:
opi.mt.gov/programs/indianed/





LESSON PLAN 6: EXPLORE YOUR ROOTS!

Grow Minds. Grow Healthy Bodies. Grow Gardens!

OBJECTIVE: Understand physical properties and classification of roots. Understand each variety of a plant has similarities and differences through scientific investigations (to include math). Collect and organize information and represent the data using graphs.

GRADE 4

A root is the principal water absorbing organ of a plant. The three primary functions of a root are to 1) anchor the plant in the soil, 2) absorb water and dissolved minerals, and 3) store food reserves. The other organs of a plant are the leaves, stems, and flowers. There are three main types of roots. Tap roots (radishes or carrots), fibrous roots (hairlike roots of grasses), or adventitious roots (developed for specific reasons, like to help ivy vines climb).



LEARNING ACTIVITY:

- Plant several radish varieties in your Nancy's Garden following the directions on the Grow with Nancy card and the back of the seed packet (save the seed packets). Inform students that after the radishes have matured (4-8 weeks) they will be digging them. When digging the radishes, leave a couple radish plants in the boxes and continue to care for them until they have flowered.
- After radishes have been dug, have students wash their hands, wash the radishes thoroughly, and wash their hands again. Lay the radishes on clean trays to display them. Discuss physical characteristics of each radish variety. Match the plant parts to plant organs: stem, root, leaf, and flower. Inquire about the missing flowering parts. Explain how some of our food sources come from roots. Discuss other root crops which we use for food.
- Cut one of each of the varieties of radishes into small pieces and allow students to taste each variety, following your school's guidelines for food safety. Explain to the students that they will be working in groups to plan a scientific investigation.

Divide students into groups and ask each group to make a list of similarities and differences of each radish variety by carefully observing each one using the guidelines below:

- ▶ Define physical properties of each radish.
 - ▶ Identify characteristics of a physical property (size, color, shape, texture).
 - ▶ Measure radishes to determine differences and similarities.
 - ▶ Classify radishes multiple times by a variety of physical properties.
 - ▶ Classify each variety of radishes by taste (sweet, tangy, spicy, etc.).
- Have each group transfer their information to a concise and organized chart on the poster board. Assess the charts for approval. Have each group present their chart to the class. Discuss the observation characteristics chosen by each group and the presentation methods. With all charts posted, ask groups to create a graph based upon the physical information they gathered during their investigations.
 - Share extra clean radishes with other classes. Try growing carrots and other root crops in your Nancy's Garden. Repeat the scientific investigation with each root crop.

- ★ **Service Learning Idea:** Have students create a cookbook with recipes for a variety of root vegetables.

Materials:

- Nancy's Grow Box readied to plant
- Packets of several varieties of radish seeds
- Rulers
- Sheet of poster board for each group

Vocabulary:

organ, root, stem, leaf, tap root, fibrous root, adventitious root, physical property, characteristics, classification, shape, size, color, similarity, and difference.



NANCY'S TIP:

"Root crops are one of the easiest foods to grow. Grow your own radishes, carrots, and other root crops at home in containers or in a garden. Share the extras that you grow with others!"

Montana Office of Public Instruction Educational Standards - Grade 4

Science Content Standards: 1.1, 1.2, 1.3; 2.2; 3.1, 3.5 Math Content Standards: 2; 3

Planting and maintaining Nancy's Garden



Nancy's Garden is an easy and fun way to teach students about gardening at a time when growing plants outdoors is not practical. The first step in being successful using the garden boxes is to provide sound planting techniques from the beginning.

This technical guide was produced by the Montana State University Extension Service. A list of materials that may need to be purchased is provided below.



Materials needed:

- **Soilless media.** This can be purchased at most garden centers as “potting mix.” It is important not to use topsoil, as it can contain pathogens and insects that can damage the seeds or seedlings. Each garden box will contain approximately 2 ½ quarts of potting mix.
- A **5-gallon bucket** to “pre-moisten” the soil
- A **graduated cylinder** to measure out the soil. The cylinder should be at least “quart-sized.”
- **Water.** You will need water to “pre-moisten” the soilless media before adding it to the box and also for use in a spray bottle to initially keep the soil moist.
- **Seeds.** There should be a variety of seed provided, including: lettuce, spinach, kale, radish and carrots.
- **Garden tags,** so you can label what you planted.
- A common household **spray bottle** to moisten the soil for the first few weeks.
- **Watering can** to water the seedling/plants after they have emerged.
- Indoor or general **plant fertilizer.**
- **Optional Grow lights** (only if there is not enough adequate light in a window sill).

Your local County or Reservation MSU Extension Agent(s) will be able to help you locate sources in your community to purchase the materials needed or answer questions about growing vegetables in Nancy's Garden boxes.

They can also help you connect with local Master Gardener volunteers, 4-H leaders, 4-H Teen leaders or food producers that can serve as guest speakers or in-class assistants with *Nancy's Garden*.

For a list of MSU Extension agents, view the directory in this guide or visit msuextension.org/localoffices.cfm.

You may also contact MSU Extension State Horticulture Associate Specialist Toby Day at toby.day@montana.edu.



math
science
.mt.gov



The Nancy's Garden Box

Nancy's Garden boxes were made by Montana Correctional Enterprises out of recycled materials—unused license plates and lumber from beetle killed timber. The boxes were designed to be placed in a well-lit window, or if windows sills are not available, under grow lights in the classroom. Each box should contain a plate at the bottom of the box (for drainage) and a drain plug in case the boxes become waterlogged.



Each Nancy's Garden box contains three parts: the box, a plate which is fitted into the bottom of the box, and a drain plug.



Directions:

- 1 The drain plug provided should be firmly pushed into the bottom of the box prior to planting .
- 2 The plug can be removed later if necessary, especially if the box is over-watered.
- 3 The plate provided should then be placed in the bottom of the box to ensure proper drainage.
- 4



Measuring and Mixing the Soilless Mix:



5 The potting soil should be placed in a 5-gallon bucket so that the bucket is half full.

6 Water is then added (approximately 3 pints) to pre-moisten the soilless mix

7 The soilless media should be mixed by hand so that it is not too wet, but is evenly moist and will form a ball. You should not be able to “squeeze” water from the soilless media.

9 The box should be filled to within $\frac{1}{2}$ ” of the top of the garden box (this will be approximately 2 $\frac{1}{2}$ quarts of the pre-moistened soilless mix). Be sure not to “compress” the soil.

11 Some of the garden seed, such as carrots may be very small. For ease of planting, you may want to fold a small piece of paper to evenly distribute the seeds.



Measuring and Mixing the Soilless Mix and planting:



13 The seeds should be planted in two rows using the proper seed spacing and depth written on the seed package. It is ok if the seeds are spaced a little closer together than recommended, but they may need to be thinned to the proper spacing later. Small seeds can be shaken into the rows using the folded piece of paper. Larger seeds (such as radish) can be placed by hand.

14 Once the seed has been placed in the rows at the proper spacing and depth, lightly cover the seed with the soilless media.

16 Once the seeds have been planted, put tags in the garden boxes to know what was planted and the date they were planted. Mist the garden boxes with lots of water. The garden boxes should be misted often (4 or more times a day) so that the soilless media remains moist. The boxes can be misted once a day and covered with plastic wrap if you are unable to mist three to four times a day. The whole idea is to keep the soil moist when the seeds are germinating.

17 Once the seedlings emerge, a watering can should be used, but be careful not to water the seedlings directly as the water pressure may knock over or damage the seedlings, making the experiment less successful. In the pictures above, water is added to the garden boxes, but not directly to the seedlings which can cause them to fall over.



Measuring and Mixing the Soilless Mix and planting:



20



21



22

20 To understand how much to water Nancy's Garden Boxes, a simple weight measurement of the boxes should be performed. A box that is dry and needs water will weigh approximately 2300 grams (5 lbs). A box that is totally saturated will weigh approximately 3300 grams (7¼ lbs). The weight of the box should remain between 5 and 7.25 lbs to provide adequate water to the plants until you get accustomed to how much the plants will need. If the weight is over 7.25 lbs, remove the stopper at the bottom and allow the boxes to drain. Once drained, replace the stopper and reduce water amount as the box is being over-watered.

21



23

22 Nancy's Garden Boxes should be fertilized approximately every two weeks. The easiest way to fertilize the boxes is to purchase an indoor or general plant fertilizer and follow the directions. In the pictures above, the boxes are fertilized using a liquid plant food and given the recommended amount described on the bottle. You may also use an organic fertilizer. However, whether you are using inorganic or organic fertilizer, make sure to thoroughly wash the vegetables before consuming.

23



Connecting Community to the Classroom

There is an abundance of community resources that can help you with Nancy's Garden. Consider inviting volunteers to help students with Nancy's Garden in the classroom or with service-learning activities that take classroom learning out into your community. Be creative and grow your own volunteer network. Here are just a few ways to get you started finding a volunteer in your hometown.

Garden Clubs

Contact your local garden club to find volunteers that are interested in youth education. For a full list of garden clubs in Montana check out the Montana Federation of Garden Clubs website at www.mtfgc.org.

Youth Organizations

Many schools and communities have youth clubs with older students and adult advisors that may be interested in volunteering in your classroom. For example, 4-H (montana4h.org), Future Farmers of America (FFA) (montanaffa.org), Family, Career, and Community Leaders of America (FCCLA), DECA, Key Club, and High School science clubs to just name a few.

Montana State University (MSU) Extension, local County or Reservation Extension Offices offer a wealth of resources:

- information on horticulture or food production
- help you connect with local Master Gardener volunteers (Community members who receive formal training in research-based home horticulture practices and must volunteer to receive certification.)
- 4-H leaders and 4-H Teen leaders
- food producers that can serve as guest speakers or in-class assistants

Included in this packet is a full list of Montana's MSU Extension agents. You can also obtain a copy online at www.msuextension.org/localoffices.cfm.

Local Colleges

Ask your local college if there is a student, professor or club that could provide technical expertise in your classroom. Good places to start are Offices of Civic Engagements and Career Centers.

Local Expertise

Check with local nurseries or businesses that sell plants in the growing season.



VOLUNTEERS



VOLUNTEERS

National Service

There are nearly 9,000 national service members in Montana. The Governor's Office of Community Service can provide information about how to find a program in your area. Check out the website serve.mt.gov or call 406-444-9077. To find members in your area check out the AmeriCorps in Montana map and the Senior Corps map.



AmeriCorps members and AmeriCorps VISTA members are located across the state to generate volunteers and assist with community-based projects.



Senior Corps connects volunteers age 55 and over with service opportunities in their communities that match their skills and availability.



Learn and Serve is designed to integrate community service with classroom learning.

Recruit Your Own Volunteers...

- **BuildMontana:** Consider posting a volunteer opportunity on the BuildMontana website (buildmontana.org) a service of the Montana Nonprofit Association, designed to connect Montana non-profit resources for strengthening our Montana communities.
- Have students make posters asking for classroom volunteers
- Place ad in school newsletter
- Ask parent councils for help



Montana's First Lady Nancy Schweitzer invites you to spark an interest in math and science with classroom gardening. Let's explore plants, promote healthy eating, and connect kids to the outdoors!



mathscience.mt.gov

Sample Service Learning Project: Engage Students with Community Gardening

Consider working with a local community garden to plan service-learning activities. Gardeners might need help weeding, planting, or harvesting. Some community gardens even have plots connected to schools and/or set aside for growing food to donate to local food pantries. If there is no community garden in your area, consider having older students research reasons why and whether a community garden might be beneficial. Have the younger students help with grade appropriate steps.

The Five Stages of Service-Learning: Following are sample ideas to walk your class through a service-learning journey

Investigate: Identify a local, national, or global need you would like to address.

- What is a community garden? Where are gardens in our area? What plants grow in the garden? Who decides what grows in the garden and who harvests the garden? What is the purpose of a community garden?

Preparation and Planning: Develop a strategy for change and common vision for success.

- Who are the gardening experts in the community? Who participates in community gardens? How can we be involved in gardening? What skills can we provide to the gardeners? Is there a need in the community for a new garden?

Action: Implement the service activity to make a difference.

- Plan and execute your activity. Students could help plant a garden, weed a garden, or advocate for a new garden. Work with the community on an activity that addresses a community need.

Reflection: Think about how your service and learning relate to you, your community, and your future.

- At each step, students can reflect on their experience. Have students journal, write poetry, draw pictures, or give presentations to the community. Reflection is the opportunity to integrate activities that can be assessed, as well as all of the multiple intelligences. (What did we know? What do we need to learn? How will we learn it? What we learned?)

Demonstration/Celebration: Showcase your results and celebrate your outcomes.

- How did we work as a group? What did we learn? What grew? What didn't? Can we / how should we demonstrate our success? How can we tell others about what we learned? How can we celebrate the work we contributed?

Service Learning

Service-learning is a teaching and learning strategy integrating meaningful service with academic study and reflective practice to enrich learning, build civic engagement, and strengthen communities.

(From Youth Serve America)



What is a Community Garden?

A community garden is any piece of land gardened by a group of people. To find a garden in your area check out the American Community Gardening Association at communitygarden.org or contact your local MSU extension agent.

NANCY'S TIP:



"Gardeners love to talk about what they are growing! Ask your volunteer about the favorite things they grow and what they have planned for the growing season."

Learn more about service-learning at:

- Go to Service Learning, service-learning experiences and lesson plans for teachers gotoservicelearning.org
- Youth Serve America www.ysa.org
- Education Commission of the States - Service Learning/Community Service ecs.org/html/issue.asp?issueID=109



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*Indicates past or current Master Gardener Program

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