

ORGANIC AGRICULTURE INTEGRATION IN BASIC EDUCATION CURRICULUM (BEC)

Janet Caras-Sadia
Cabayangan National High School
Cabayangan, Braulio E. Dujali, Davao Del Norte

GRADE LEVEL	: Grade 9
SUBJECT MATTER	: Horticulture (Mathematics-please see the relevance)
TOPIC	: Seed Testing and Germination
PREREQUISITE	: Students should have prior knowledge about Plant Science
DURATION	: 1 to 2 sessions

LEARNING OBJECTIVES

Organic Agriculture Objectives:

- Identify the characteristics of a good seed.
- Explain seed dormancy and viability.
- Describe the different methods in testing seed viability e.g. rag doll, seed box.
- Perform the methods in testing seed viability.
- Compute the percentage of germination.

MAIN CONCEPTS AND SKILLS

(Please provide scientific concepts of germination)

Seed - a fertilized and ripened ovule which may develop into a plant by germination.

Seed testing - the operation involved in determining whether or not seeds are viable, free from diseases, injuries and foreign matters or their combination.

Germination - the development of the seed into a young plant.

Dormancy - a period in which a plant has no active growth in response to harsh environmental conditions. It also refers to the rest period of seeds.

Securing Seeds

There are two ways of securing the seeds to be planted:

1. You can buy seeds from seed stores in your town or order from reliable seed producers in the city.
2. You can also produce your seeds to plant.

Factors to Consider in Securing your Seeds to Plant.

- Quality of the product
- Adaptation of seeds to ones locality.

Advantages of Producing your own Seeds

- Supply of seeds for your farm is always made available.
- Higher percentage of germination is assured.
- Improvement of quality and quantity of the produce is possible.

Disadvantages of Producing your Seeds

- Seed growing is an exacting work.
- It competes with the normal work in the nursery.
- It calls for knowledge of the principles of plant breeding.
- It calls for keen observation.
- It requires close application of details.

Farmers are very much aware that the quality of seeds affects the yield of crops but still many are using low quality seeds. This is because of the inability of some farmers to secure good quality seeds. Good quality seeds should possess the following characteristics:

- Damage free –seeds that do not possess cracks, holes and are not broken
- True- to-type - seeds that carry the desirable characteristics of the parents
- Viable – seeds that germinate and able to survive until the stored food in the cotyledon is consumed up to the time it can support itself by absorbing plant food nutrients from the soil through their root system
- Free from mixtures – seeds that are free from weed seeds and other foreign matters.
- Free from seed borne diseases
- Properly developed – The size of seeds depends upon the amount of food stored in it. It is important that the seeds are large, plump and well developed. If the seeds are small and wrinkled, they may not contain enough stored food for their initial growth that is why crops that grow from poorly developed seeds are stunted during the early stages of growth and never recover sufficiently to produce normal plants.

After selecting your seeds, you must also test the viability of your seeds.

Nearly 50% of the local farmers who engage in small-scale vegetable growing save their own seeds for next planting season. This can be done provided that the seeds are still viable during the planting season. To be sure that the seeds are viable, you have to conduct seed testing and compute for the % germination.

Seed Testing

Purposes of Seed Testing

- Discover whether or not the seed is true to its name, except as to variety.
- Ascertain whether or not it has been intentionally adulterated.
- Remove the relative proportions of inert material and of foreign seed.
- Disclose the presence of noxious or other weed seeds.
- Find out the percentage of seed germination
- Find out the amount of seeds needed to plant in a given area.
- Economize labor and expenses in re-planting.
- Obtain a uniform stand of crops.

Methods of Seed Testing

- ***Floating in water.*** For example in rice, before the rice grains are sown in the field, farmers usually submerge the seeds in a container of water to test the seeds. All floating seeds are thrown away for they are empty and are not going to germinate. This method is also true to vegetable seeds.
- ***Breaking the seed coat.*** This method is practiced to seeds that have hard seed coat.
- ***Winnowing.*** If you winnow, all the seeds that are blown away or carried away by the wind are empty.

- ***Germinating the seeds using the following methods:***
 - a. rag doll
 - b. seed box
 - c. petri dish/plate

Seed Germination

External conditions required in the germination of seeds

- Viability or vitality. The seed must be viable with a good alive embryo. Immature and unhealthy seeds produce weak and unhealthy plants.
- Proper amount of moisture. The soil must be moist. Soil must contain sufficient quantity of moisture necessary for germination. The seed absorbs moisture which cause, all the parts to soften and swell to burst its covering and allow the embryo to come out. If the soil is too dry the seed could hardly absorb water to hasten its germination.
- Proper degree of temperature and amount of light.
- Suitability of the soil.

Why do some seeds fail to germinate?

- The seeds are in their dormant stage.
- The seed coat is thick and hard.
- The seeds are immature.
- The seeds have dead embryo.
- The ground is too dry
- The weather is too cold

Special treatment for some seeds in order to germinate

- By cracking the seed coat. If the seed has thick and hard seed coat, crack or file it to allow water and oxygen to get inside the seed. In cracking the seed, care should be observed so as not to injure the flesh of the seed which will be the source of infection and rotting that will cause the seed to decay.
- By heating. If the seed is in a dormant stage, heat it a little. By heating it up, the embryo becomes active as it starts to grow. Over heating is also dangerous as it will kill the embryo.
- By better storage facilities. The death of the seed embryo due to faulty storage facilities may be prevented by the use of better one where seeds are kept up until planting time.

When a seed begins to germinate, the root is the first part to grow. It becomes well established before the other parts of the embryo emerge above the surface of the soil so that the seedlings may not be easily dislodged from its position and the parts which are soon to be exposed to the drying influence of the sun and wind and may continually be supplied with water from the soil. The seed must be covered with fine soil more or less as thick as the seed itself.

Determining the Percentage of Germination of Seeds

Below are the rules in computing the % of germination of seeds

Rule 1: If you test 100 seeds, the number of seeds germinated equals the percentage germination of the seeds.

Example: You tested 100 seeds of eggplant using the rag doll method, 85 seeds germinated. The % of germination of the seeds then is 85%.

Rule 2. If you test less than or more than 100 seeds use the formula below in computing the % of germination of the seeds.

Example: Mr. X tested 125 seeds of hybrid tomato and 105 germinated. What is the % of germination of the tomato seeds?

$$\% \text{ germination} = \frac{\text{No. of seeds germinated}}{\text{No of Tested}} \times 100$$

$$\% \text{ germination} = \frac{105}{125} \times 100$$

$$\% \text{ germination} = 84\%$$

Rule 3. If you found out that the % of germination of your seeds is below 80, you need to adjust your seed bulk. Use the formula below in adjusting the seed bulk.

$$\text{Adjusted Amount of Seed} = \frac{\text{Amount of seeds needed}}{\% \text{ germination}} \times 100$$

Example:

You needed 200 seedlings to plant your garden. You found out that your seeds have only 75 % germination. How many seeds will you sow?

Let: X = the number of seeds to sow or your adjusted seeds

$$\text{Adjusted Amount of Seed} = \frac{200}{84\%} \times 100$$

$$X = \frac{200}{75} \quad \times 100$$

$$= \frac{111}{75} \quad \times 100$$

$$= \mathbf{266.6 \text{ or } 267 \text{ seeds}}$$

MATERIALS NEEDED

- Scissor
- Knife
- bolo
- Towel
- Soil
- Seed box
- Petri dish
- Rag doll
- Water
- tissue paper
- tray
- vegetable
- seeds
- plastic

PRESENTATION OF LESSON

A. Review

In the previous lesson, the students identify the parts of the seeds and their functions.

B. Motivation

Ask the students what are the crops that produce seeds?

Show some samples of seeds.

(Allow for varied answers from students).

C. Activities

1. Divide the class into 2 groups. Orient and give materials to each group.
2. Let the students do the Seed Germination/Testing Activity.
3. Let them compute the percentage of germination. Refer Appendix A.

D. Analysis

1. Did all the seeds that you soak germinate?
2. What do you call the seeds that germinate?
3. What do you call the seeds that did not germinate?
4. What are the characteristics of those seeds that germinated?
5. What are the characteristics of those seeds that did not germinate?
6. How long should seeds be soaked before they germinate?
7. How do you determine the percentage of germination of seeds?
8. How do you determine the new seeding rate?
9. What do you call the method you used in germinating seeds?
10. What are the steps in doing this method?
11. Which among the methods of seed germination is the easiest to do? Why?
12. Is it necessary to test seeds? Why?

E. Abstraction

Complete the table below showing the methods of seed germination, their procedure, advantages, and disadvantages. Let this be done by group. Refer to Appendix B.

F. APPLICATION

Let each group dramatize what they will do when they prepare the rice seeds for planting given is the area of their rice field.

G. EVALUATION

1. Let the students do peer evaluation of the performance of the members of their group during the group activities. Present the rubric to the students before the actual performance of their task.
2. Let the students put their group outputs in their portfolio. Let them reflect on the significance of these entries in their portfolio.

H. ASSIGNMENT

Let the students talk to at least two farmers and ask how they prepare the rice seeds for planting. Let them identify the procedure the farmers use and the effects of their method.

REFERENCES:

<http://hubpages.com/living/Seed-Germination-Methods-Resource-Manual-on-Organic-Agriculture-in-the-Basic-Education-Resource-Manual-on-IPPM>
<https://en.wikipedia.org/wiki/Germination>
<http://study.com/academy/lesson/what-is-seed-germination-definition-process>

Appendix A: Seed Testing/ Germination

Group 1 : steps in testing seeds using Rag doll meth

Step 1

Use a firm towel. The soft, very absorbent towels make poor rag dolls because they allow roots and shoots to penetrate into the fiber, making seedlings difficult to remove during counting. If no other type of towel is available, the soft towels can be used, but it is best to use two layers. These towels often hold too much water which drowns the seeds.



Step2

Wet the towel and allow free water to drip off for a minute. Lay the wet towel flat and add seeds



Step 3

Count out 100 seeds and place them on one half of the towel. Fold the towel in half and roll it into a moderately tight tube. Place the tube in a jar or salable plastic bag and place it in dark place. The rag doll should be kept in a warm place. A little water two times a day in the bottom of the jar or plastic bag will insure adequate moisture.



Step4

Make the first germination count for most crops in about three days. Open the towel and count the seedlings as you remove them. After another three to four days make another count. If you had 100 seeds, the number of seedlings removed equals the percentage germination.



Step 5

You can distinguish hard (dormant) seeds from dead seeds by pushing down on each-germinated seed with the flat part of a pencil eraser. If the seed does not flatten with gentle pressure, it is considered dead. Dead seed will usually be moldy at the end of the rest.



Step5

You can distinguish hard or firm (dormant) seeds from dead seeds by pushing down on each non-germinated seed with the flat part of a pencil eraser. If the seed does not flatten with gentle pressure, it is considered dead. Dead seed will usually be moldy at the end of the test.



Group 2: Petri Dish Method

Step 1

Prepare the plate that will be used. The diameter of the plate depends on the number of seed to germinate.



Step 2

Place damp tissue on top of the plate used.



Step 3

Count out 100 seeds of the seeds you want to germinate. Place another damp tissue paper on the top of the seeds. It should keep in a warm place. A little water from time to time will insure adequate moisture.



Step4

Make the first germination count for most crops in about three days. Had 100 seeds, the number of seedlings removed equals the percentage germination.

Appendix B: Table for Methods of Seed Germination

Complete the table below showing the methods of seed germination, their procedure, advantages, and disadvantages. Let this be done by group.

Methods of Germination	Procedure	Advantages	Disadvantages

Appendix C: Rubrics for Group Work Presentation

	CRITERIA				POINTS
	4	3	2	1	
Level of Engagement	Student proactively contributes to class by offering ideas and asking questions more than once	Students proactively contributes to class by offering ideas and asking question once per class	Students rarely contributes to class by offering ideas and asking questions	Students never contributes to class by offering ideas and asking questions	
Discussing	Respectfully discusses and helps direct the group in the solving problem	Respectfully discuss	Has trouble in discussions without letting other people have a turn	Does not consider other ideas. Blocks group from reaching agreements.	
Problem Solving	Actively seeks and suggest solutions to problems	Improves on solutions suggested by the other group member	Does not offer solutions, but is willing to try solutions suggested by other group members	Does not try to solve problems or help others solve problems	
Group/Teamwork	Works to complete all goals. Always has a positive attitude about the tasks and work of others. All team members contribute equally. Performed all duties of assigned team role.	Usually helps to complete group goals. Usually has a positive attitude about the tasks and work of others. Assisted team members in the finished project. Performed needy all duties of assigned team role.	Occasionally help to complete group goals. Sometimes makes fun of the group tasks and work of others. Finished individual task but did not assist team members. Performed some duties of assigned team role.	Does not work well with others and shows no interest in completing group goals. Often makes fun of the work of others and has negative attitude. Contribute little to group effort. Did not perform duties of	

				assigned team role.	
				TOTAL	