

TURKEY



ITALY



CROATIA



SPAIN



MINI TREE PRODUCTION & GERMINATION HANDBOOK



STUDENTS HAD INCLUDED IN EACH STAGE:

01

WHAT SHOULD BE
DONE IN THIS STAGE?

02

WHICH **MATERIALS**
ARE NEEDED?

03

WHAT ARE THE COMMON
TIPS?

04

WHAT COMMON **MISTAKES**
SHOULD BE AVOIDED?

05

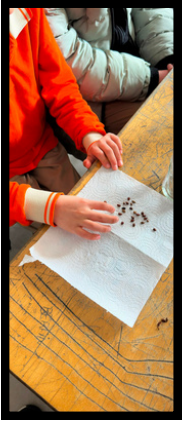
WHAT **OBSERVATIONS** OR **PERSONAL**
EXPERIENCES CAN WE SHARE?



TEAM 1.

SEED COLLECTION AND CHOOSING HEALTHY SEEDS

01



Select seeds that are plump, smooth, wrinkle-free, disease-resistant, reliable, and suitable for your local climate. If using fresh apples or other fruit, ensure they are organic and remove the seeds on the same day. The best are the organic fruit.

To choose good seed you can use the floating test, a simple method to check if seeds are still fresh and viable before wasting time planting them.

If seeds sink, they are healthy and viable because they are rich in nutrients, and the plant embryo is alive. These are the seeds you want to plant.

If seeds float, they are usually "dead" or non-viable because they are hollow, dried out. Nothing will grow from them.

You can either water the seeds and place them in the refrigerator for several days, or carefully open the outer shell of the seeds a little bit.

02

Gloves, Shovel, Garden soil, Pots, Organic apples or other fruit, Glass jar, Paper towels, Water.

03

Choose reliable and climate-resilient seed varieties (e.g., drought or cold-resistant).

Use organic apples (or other fruit) and extract the seeds immediately.

Gently open the outer shell of the seeds to assist germination.

Make sure the seeds have enough moisture and are kept in a warm, bright environment to trigger growth.



04

Putting the seeds in the pot before the soil. Always scoop the soil into the pots first, then plant the seeds.

05

Planting the apple seeds directly in soil after refrigeration (without doing a float test) did not produce a seedling. However, using the damp paper towel method inside a glass jar successfully resulted in seed germination after about two weeks.

(CEMAL, ADA, SOFIA, EMMA, AYETULLAH, EVA, IRENE, LUCAS)

TEAM 2.

CLEANING, DRYING, LABELLING AND STORING SEEDS

01

Clean the seeds, dry them, label them with the date and seed type, store them properly, and keep a daily record of their development.

02

Seeds, absorbent paper, clean cloths, paper or zip-lock bags, labels, a marker, a notebook, and optionally, a refrigerator.

03

Keep the seeds clean and dry, label them correctly, record daily observations, and use the refrigerator for any seeds that need cold stratification.

04

Storing damp seeds, allowing mold to develop, not removing impurities, storing damaged seeds, and forgetting to label them.

05

Learning that recording changes daily helps track seed growth. You will also discover that students from different countries use similar methods and that caring for plants is important for the environment and our future.



(MAJA, HUMEYRA, AVSIN, OSMAN, AZRANUR, SERGIO, JULIA)

TEAM 3.

PRE-GERMINATION PREPARATIONS: SOAKING, COLD STRATIFICATION, SCARIFICATION, HYGIENE AND MOLD PREVENTION

01

Place seeds (like apple seeds) in the refrigerator to prepare them for germination. You can do this by wrapping the seed in a damp cloth so the radicle (initial root) can come out.

For certain seeds like walnuts, root them by soaking them directly in water.

Slightly damage the tip of the seed and remove the outer coat to help the sprout emerge more easily (especially effective for apple seeds).

Check the cotton, napkins, or cloths frequently, adjust the water levels, and ensure the seeds get enough air.

02

- Seeds (such as apples and walnuts).
- Water (for soaking and moistening).
- A refrigerator (for cold stratification).
- Cloth, cotton, or napkins (to wrap or place the seeds in).

03

Proper airflow is crucial during cold stratification because it helps prevent fungi from growing.

Waiting for the seeds to germinate requires patience, but it is a fun process to observe.

If apple seeds are struggling, removing the seed coat and damaging the tip can speed up sprout emergence.

Healthy seeds have a much higher success rate of germinating after the cold stratification process.

04

Adding too much water will cause the seeds to rot.

Failing to check the cotton or napkins frequently enough leads to rotting.

Failing to ventilate or air out the seedlings will cause mold to form on them.

05

We observed that different seeds need different care—walnuts rooted easily just by soaking in water, whereas apples required cold stratification in the fridge first.

While one group successfully let the radicle come out simply by putting the seed in a damp cloth in the fridge without scratching it, another group noticed that slightly damaging the seed coat made apple germination much easier.

Some peers experienced mold due to poor aeration, and others experienced rotting seeds due to overwatering or not checking the napkins enough.



(DEAN, HATICE, MINA, VILDAN, JASMINE, FRANCESCO)

TEAM 4.

PREPARING THE GERMINATION TRAY/PLUG TRAY AND SOWING SEEDS: SOIL MIX. SOWING DEPTH, HUMIDITY, LIGHT AND TEMPERATURE

01

Sow seeds about 1 cm deep in small pots filled with soil.
Keep the soil moist and place the pots in a warm, bright location.
Transplant seedlings to larger containers when they grow.

02

- Different types of seeds.
- Small pots or trays.
- Soil.
- Water.

03

Keep the soil moist but not too wet.
Provide enough light and warmth.
Water seedlings after transplanting.
Protect them from strong wind and bad weather.

04

- Planting seeds too deep.
- Overwatering or letting the soil dry out.
- Giving seedlings too little light.

05

We planted apple seeds about 1 cm deep in small pots.
After a few weeks, the seeds germinated and the seedlings started to grow.
Most groups also had success with a sowing depth of 0.5–1 cm.
Some groups refrigerated seeds before planting, and bushes helped protect young seedlings from wind.



(SERGIO R., ROBERT, DERIN, FRANCESCO, AYETULLAH, MEDINE GUL)

TEAM 5.

WATERING, LIGHT, VENTILATION, SEPARATING WEAK SEEDINGS AND COMMON MISTAKES

01

At this stage, seedlings should be cared for through regular monitoring and proper management of key conditions. The soil should be kept moist but not overly wet, ensuring appropriate watering. Seedlings need sufficient light, ideally 12–16 hours per day, along with good ventilation to promote healthy growth. Weak seedlings should be removed to prevent competition and allow stronger ones to grow. It is also important to check them daily, provide adequate space by transplanting if they become crowded, and consider light fertilization if necessary. Common mistakes to avoid include overwatering, poor ventilation, insufficient light, and neglecting daily observation.

02

- Pots or trays (with drainage holes).
- Quality soil.
- Watering cans or spray bottles.
- Sunlight or grow lights.
- Fertilizer.
- (Optional) Fans for air circulation.



03

Keep the soil moist, especially in the early stages, to protect the roots.

Avoid overcrowding the seedlings.

Use a spray bottle to prevent overwatering..

Check plants daily to detect problems early

Space out stronger seedlings to support healthy growth.



04

Overwatering or underwatering.

Excessive watering.

Poor or insufficient lighting.

Poor ventilation or lack of air flow.

Overcrowding.

Handling young plants too much.



05

Low light and poor ventilation can cause plants to rot.

Seedlings may need transplanting if they become overcrowded.

Basic seedling care is accessible and manageable for everyone.

Successful growth depends on maintaining a balance of water, light, air, and space.



(JAKOV, SULTAN, NEFES, BELIS, HASRET, MICHELLE, ÉTIENNE)

TEAM 6.

TRANSFERRING SEEDLINGS FROM THE PLUG TRAY TO SEEDLING BAGS AND AFTERCARE: WHEN AND HOW TO TRANSPLANT, PROTECTING THE ROOTS, WATERING AND SHADING DURING THE FIRST WEEK

01

Gently remove the seedlings from their small pots.

Transfer the seedlings into larger pots filled with fresh soil, or into bags.

Perform the transplanting during cooler weather or in the late afternoon.

Water the seedlings immediately after the transfer is complete, and place them in a sheltered environment.

02

Seedlings (in their original small pots) - Larger pots or bags - Fresh soil - Water

03

Watering the seedlings right after transplanting helps them adapt more easily to their new environment.

Transplanting in the late afternoon or during cooler weather helps the plants experience less stress from the sun.

Choose a suitable place for the plants that has enough sunlight but is well-protected from strong winds.

04

Avoid touching or damaging the sensitive root systems when moving the seedlings.

Avoid putting newly transplanted seedlings in areas exposed to harsh, strong winds or intense, stressful midday sunlight.

05

We learned firsthand how critical it is to move seedlings carefully; touching and disturbing the roots too much can be harmful.

We found that timing is everything—shifting the transplanting process to the late afternoon or cooler weather made a difference in reducing sunlight stress on the plants.

We observed that immediate watering combined with a sheltered location perfectly helped the plants adapt to their new environment and continue growing in a healthy way.



(SEBASTIAN, URAS, NESRIN, EMMA, SOFIA , DELIA, ELIF)

TEAM 7. HARDENING THE YOUNG TREES AND PLANTING THEM INTO THE SOIL : OUTDOOR ADAPTATION , PLANTING HOLE , FIRST WATERING AND PROTECTION

01

Plant the trees and plants in a suitable area, prepare the soil by digging holes, water them regularly, and use tutors to help young trees grow straight.

02

- Tree or plant sprouts.
- Shovels for digging.
- Water for irrigation.
- Tutors (stakes) with ties to support the trees.

03

Make sure the holes are large enough for the roots, water the plants frequently, and protect young trees with tutors. It is also important to choose a place where the plants can remain and grow for many years.

04

Avoid planting in areas that may be affected by construction, digging holes that are too small, or neglecting watering and maintenance after planting.

05

Planting was quite easy because we already had experience with a vegetable patch. We planted sprouts instead of seeds and learned that regular watering and protection are essential for healthy growth. The activity also showed us the importance of trees for the environment and how mathematics can be used in practical tasks such as measuring planting holes.



(BRUNA, AYSE, CAGLAR, PIRI REIS, ASLI, IVAN, SARA, PIETO)

CONTENTS AND THEIR AUTHORS

TEAM 1. SEED COLLECTION AND CHOOSING HEALTHY SEEDS

Prepared by the students guided by Emine, Hatice, Erkan, Donatella, Anja and Blanca.

TEAM 2. CLEANING, DRYING, LABELLING AND STORING SEEDS

Prepared by the students guided by Merve, Derya, Elif, Karmen, Blanca and Osman.

TEAM 3. PRE-GERMINATION PREPARATIONS

Prepared by the students guided by Osman, Emine, Merve, Erkan, Donatella and Karmen.

TEAM 4. PREPARING GERMINATION TRAY AND SOWING THE SEEDS

Prepared by the students guided by Elif, Hatice, Derya, Anja, Blanca and Donatella.

TEAM 5. FIRST CARE AFTER GERMINATION

Prepared by the students guided by Emine, Merve, Erkan, Derya, Karmen and Blanca.

TEAM 6. TRANSFERRING SEEDLINGS TO SEEDLING BAGS AND AFTERCARE

Prepared by the students guided by Osman, Elif, Hatice, Derya, Donatella and Anja.

TEAM 7. HARDENING THE YOUNG TREES AND PLANTING THEM INTO THE SOIL

Prepared by the students guided by Osman, Emine, Erkan, Anja, Karmen and Blanca.



With sincere thanks to all students and teachers who contributed to this handbook.

This mini guide is the result of patience, observation, teamwork and a shared belief in the power of nature-based learning. Throughout this project, students from different schools and countries worked together, shared their experiences, and turned the journey from seed to young tree into a meaningful common product.

We hope that this handbook will not only reflect our project work, but also guide other students, teachers and schools who wish to carry out similar germination and tree production activities in the future. May every seed planted with care become a symbol of responsibility, cooperation and hope for a greener world.

Thank you to everyone who helped this project grow.



"A country without forests cannot be called a homeland."

K. Atatürk

Mathematical Modeling of Nature

