

Methodology for 2F for the planet

Welcome to our Erasmus+ research journey!

This booklet brings together the experiences and ideas of eight countries: Croatia, Germany, Italy, Lithuania, Poland, Portugal, Romania and Turkey. Working side by side to discover more about the nature that surrounds us.

Our goal is to learn how to explore and understand local flora and fauna by using common research methods. By collecting data and sharing samples, we can compare our findings, see the beauty of different environments, and also notice what we all have in common.



This project is not only about science—it is also about teamwork, curiosity, and friendship across borders. Each method described here will help us observe carefully, think critically, and enjoy the process of discovering the natural world. Together, we hope to inspire a deeper respect for biodiversity and to show that learning can be both exciting and meaningful when we connect with others across Europe.





When studying ecosystems, it is important to understand the role of abiotic factors, the non-living conditions that shape the environment and influence living organisms. By measuring these factors, we gain valuable insights into how plants, animals, and microorganisms adapt and interact within their habitats.

Soil, water and air temperature provide information about the basic living conditions of an area, as many species depend on specific temperature ranges to survive and thrive.

Wind strength affects seed dispersal, plant growth, and the distribution of both small and large organisms. Measuring wind helps us understand the dynamics of the local climate.

Light intensity is essential for photosynthesis. By measuring light both above ground and within the soil, we can assess how much energy is available for plants and how conditions differ between surface and underground environments.

pH levels in soil and water show us how acidic or alkaline a habitat is. Since many organisms can only tolerate a narrow pH range, this measurement is crucial for understanding biodiversity.

Ion concentration in water (such as nitrates or phosphates) indicates the chemical quality of aquatic ecosystems and helps us detect possible pollution or nutrient availability.

Relative humidity of air and soil moisture reflect the availability of water, a vital factor for the survival of plants and animals. These measurements also provide clues about climate conditions and seasonal changes.

Together, these measurements allow us to build a clear picture of the abiotic environment and explain how it supports life. By collecting and comparing data across different countries, we can better understand the variety of European ecosystems and the factors that influence them.

Pitfall traps is still one of the most significant and applied methods in ecological research on the quantitative relations of soil invertebrate fauna especially predatory groups such as ***Carabidae*, *Staphylinidae*** and ***Formicidae***.

The method is based on the fact that representatives of the soil fauna actively move on the surface and accidentally fall into hunting vessels from which they cannot get out. The biggest advantage of this method is that it allows continuous collecting soil fauna and there by maximizing the probability of catching the species they have short time activity and species that have a lower population density, and its with the application they achieve large catches. Furthermore, hunting bowls are cheap, easy to carry and they can be set up relatively quickly in the field.

example how to make one

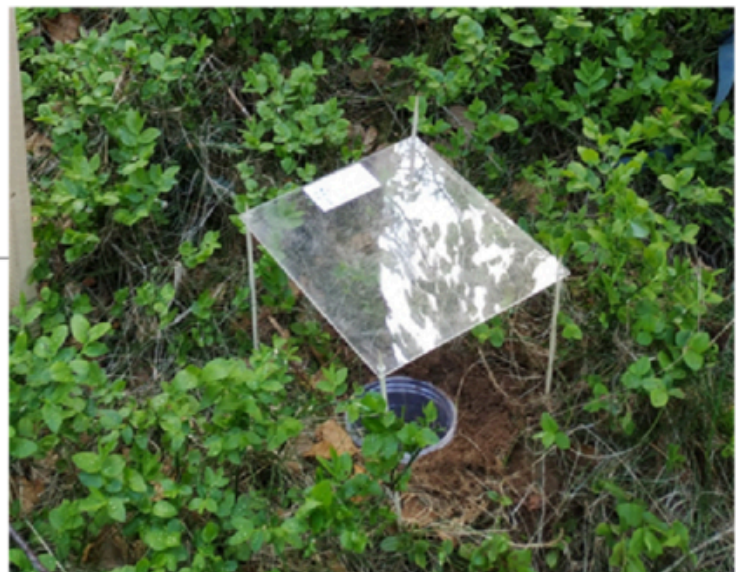
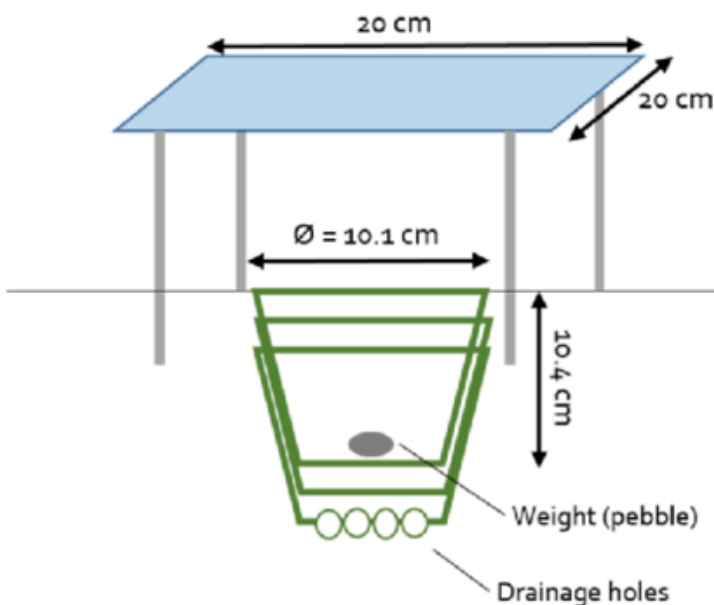


Figure 1. Specialist carabids in mixed montane forests are positively associated with biodiversity-oriented forestry and abundance of roe deer - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Pitfall-traps-Schematic-of-trap-design-and-dimensions-left-and-example-of-trap-placed_fig2_377641157 [accessed 17 Sept 2025]

Sweeping net

Simple, applicable, not expensive and enables quick collection of various groups of arthropods.

The net consists of a sturdy and lightweight frame (diameter 30-40 cm) to which a sturdy mesh fabric of conical shape is sewn and sturdy short handles.

It includes sharp and quick swings of the net left-right through the vegetation (sinusoidal, in an arc), while the collector must ensure that the opening of the net is never facing down.

The method is applied in qualitative and quantitative research where the number of swings, the length of the transect, and the sampling time must be accurately determined.



Figure 2. Sweeping net method. Modified and available from: <https://www.oikosjournal.org/blog/battlefield-study-grasshoppers-vs-wolf-spiderst> [accessed 17 Sept 2025]

Light traps

Light traps are mainly used for sampling nocturnal flying insects, especially moths (Lepidoptera). A light source (fluorescent or UV lamp) attracts insects, which are then collected in a trap. Advantages of the method: low effort as the insects are attracted to the trap so the researcher just needs to wait.

Problems in methodology: success rates can depend on night-time temperatures and humidity levels and some species may actually be repelled by light.



Figure 3. Contribution to the knowledge of the aquatic beetle genus *Berosus* Leach (Coleoptera: Hydrophilidae) in Serbia - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Attraction-of-beetles-to-UV-light_fig1_289994070 [accessed 17 Sept 2025]

Capture - Mark - Recapture

Technique is used to estimate population size in situations where capturing every individual is impractical. Live trapping is carried out, where sample organisms are harmlessly captured, marked, and then released. The total number of samples is recorded.

Information about the samples can be recorded before release, including gender, weight, length, colouration, species, and details of the method used to mark the organisms.

After a set period of time (to allow the marked organisms to naturally disperse back into their surroundings), the same area is resampled.

The total number of samples is recorded, including the totals for marked organisms (which are easily identifiable) and organisms captured for the first time (unmarked organisms).



Figure 4. Captured organisms that will be measured and marked.

Census

The method by which individuals are identified and counted in a smaller area while at rest, or rather, it shows the highest observed abundance of each species, allows for complete focus on birds, leaving more time for identifying calls, increasing the chances of observing static species, and it is also easy to record the presence of birds in relation to habitat characteristics.

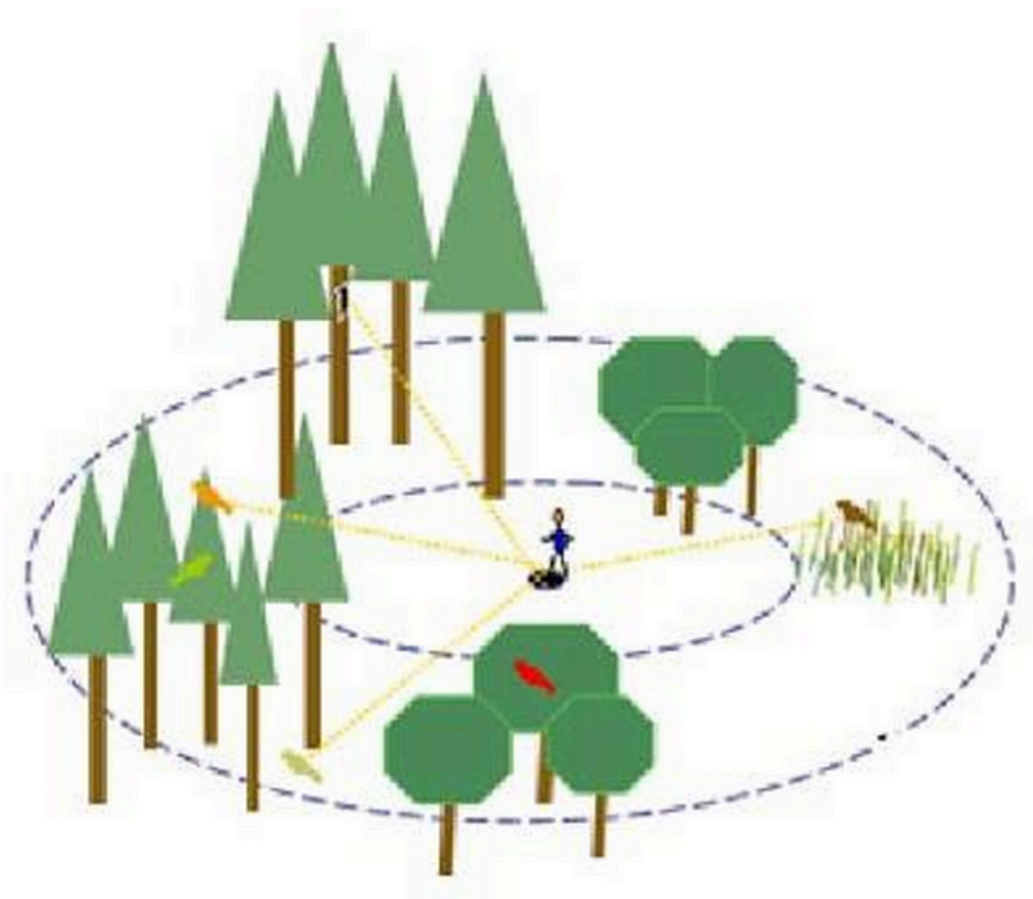


Figure 5. Schematic representation of the method taken from: Ternjej I., Brigić A., TERENSKI DNEVNIK, Terenska nastava iz ekologije (PMF Zagreb), Available from: https://www.pmf.unizg.hr/_download/repository/Terenki_dnevnik%5B1%5D.pdf [accessed: 1 Oct 2024]

Linear transect

Refers to movement along a specified route while recording significant species on both sides of the transect, covering the distance from point A to point B at the slowest walking speed. During this process, species are noted and identified, and individuals are counted and recorded as they are encountered - ensuring that the same species is not recorded two or more times.

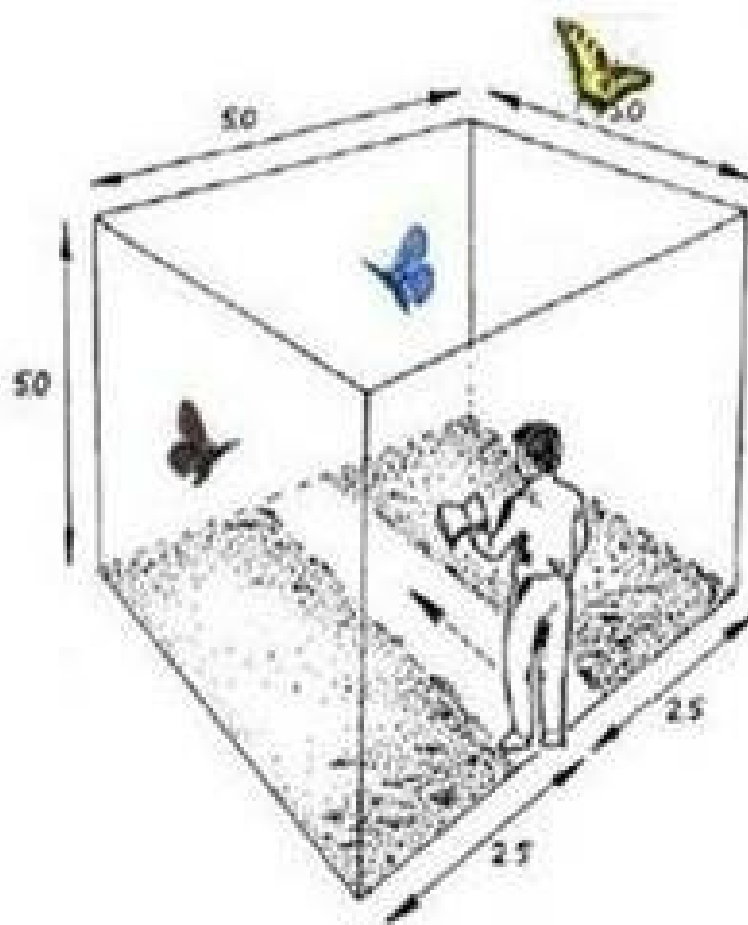
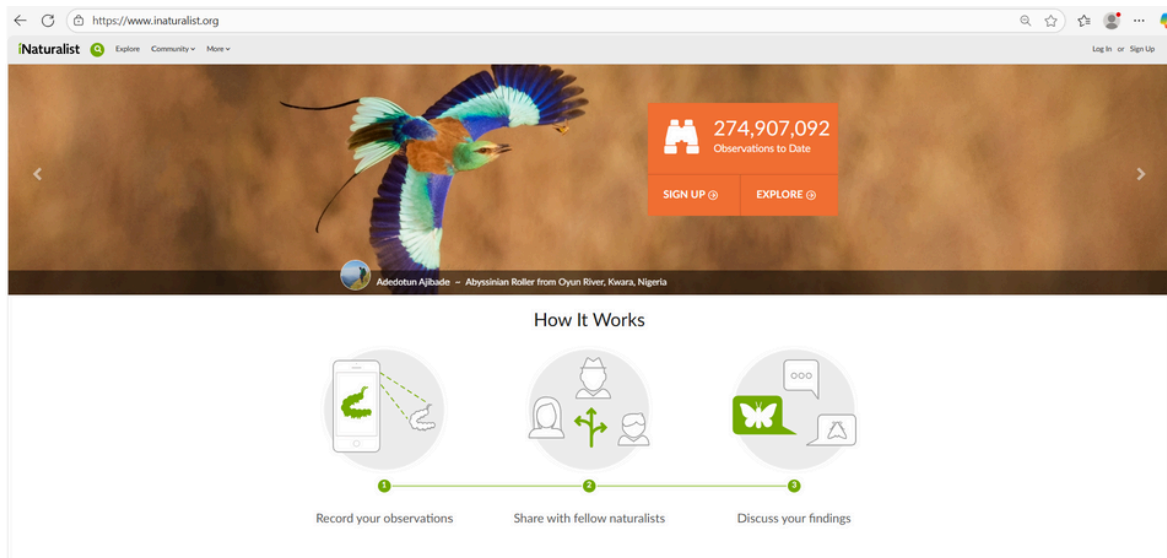


Figure 6. Diversity and status of day butterflies (Lepidoptera: Rhopalocera) in different plant associations of the Edough Forest Massif (Northeastern Algeria) NARIMAN LAREF, RANIA REZZAG-BEDIDA, MEHDI BOUKHEROUFA, RYM SAKRAOUI, RANIA LINA IKRAM HENADA, RACHAD HADIBY, FERIEL SAKRAOUI - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/The-linear-transect-method-Van-Swaay-2015b_fig2_358962225 [accessed 17 Sept 2025]

applications for assistance in data collection

iNaturalist

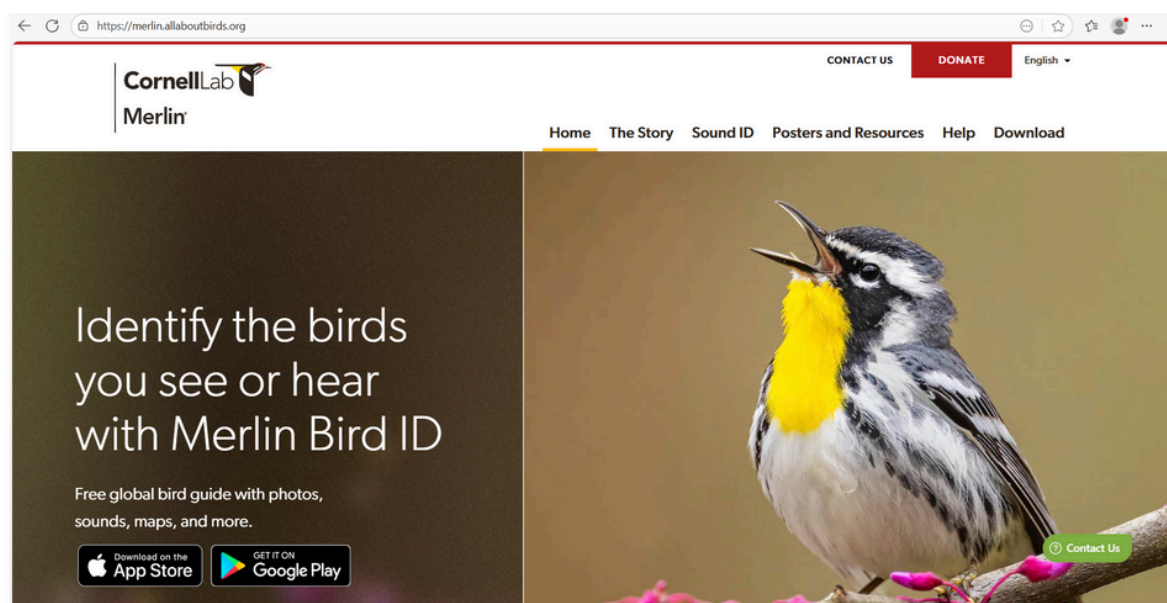


LINK: <https://www.inaturalist.org/>



Merlin Bird ID

From the Cornell Lab of Ornithology



LINK: <https://merlin.allaboutbirds.org/>

Recordings of bird songs



Recorders should be located **1-2 m** from the ground, on tripods, narrow poles, or trees <0.2 m diameter, avoiding branches, leaves around the unit as far as possible.



Recording of the bats

The detector uses the Heterodyne principle. Start off with the frequency set to **45kHz**, where many different bat species echolocate. Scan the area by sweeping the detector side to side, up and down. It is often possible to locate a bat pointing to the strongest ultrasound long before it can be seen. After detecting the bats, place the voice recorder of your phone next to the speaker of the detector and record the bats' voting.

Hand benthos net (“KRACER”)

The method of collecting macroscopic invertebrates, a frame is placed on the bottom, disturbing the bottom of the riverbed by moving the heels of the boots, and digging it at least 10 – 15 cm. The net should be close enough for the macrozoobenthos organisms to be swept into it by the water current, but far enough so that sand and gravel do not largely enter the net.

CNIDARIA – žarnjaci	TURBELLARIA – virnjaci	NEMATODA – obliči	OLIGOCHAETA – maločetinaši	HIRUDINEA – pijavice	ISOPODA – jednakožni raci
BIVALVIA – školjkaši	AMPHIPODA – rakušci	DECAPODA – desetonožni raci	HYDRACARINA – vodene grinje	EPHEMEROPTERA – vodencvjetovi	ODONATA (Anisoptera) – vretenca
ODONATA (Zygoptera) – vretenca	PLECOPTERA – obalčari	HEMIPTERA – stjenice	MEGALOPTERA – muljari	TRICHOPTERA – tulari	GASTROPODA – puževi
COLEOPTERA – kornjaši	DIPTERA (Muscidae) – dvokrilci, muhe	DIPTERA (Chironomidae) – dvokrilci, trzalci	DIPTERA (Tabanidae) – dvokrilci, obadi	DIPTERA (Culicidae) – dvokrilci, komarci	DIPTERA (Ceratopogonidae) – dvokrilci, komarčići
DIPTERA (Tipulidae) – dvokrilci, komari	DIPTERA (Simuliidae) – dvokrilci, svrbljivice				

Figure 7. List of macroscopic invertebrates. From: Ternjaj I., Brigić A., TERENSKI DNEVNIK, Terenska nastava iz ekologije (PMF Zagreb), Available from: https://www.pmf.unizg.hr/_download/repository/Terenki_dnevnik%5B1%5D.pdf [accessed: 1 Oct 2024]

planktonic shrimps


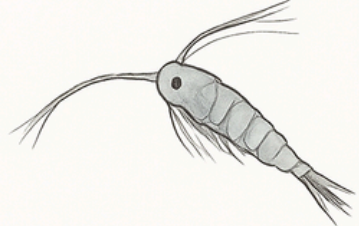
	Cladocerans	Copepods
		
Body shape	Laterally flattened, covered by carapace	Elongated, without carapace
Main movement organ	Antennae used for jerky swimming	Antennae used for smoother swimming
Typical habitat	Freshwater (lakes, ponds, rivers)	Freshwater and marine environments
Feeding	Filter feeders (phytoplankton, detritus)	Filter feeders, grazers, or predators

Figure 8. Visual representation of the difference Cladocera and Copepoda.

Table 1. Tabular presentation of the differences between Cladocera and Copepoda.

Feature	Cladocerans (Water fleas)	Copepods
Reproduction	Often cyclical parthenogenesis	Mostly sexual reproduction
Ecological role	Key food source for fish in freshwater	Key food source in aquatic food webs
Example	Daphnia (water flea)	Cyclops, Calanus



Birdhouse building instructions

Cut the wood panels

Back panel: approx. 30 cm high × 15 cm wide
Front panel: approx. 25 cm high × 15 cm wide
Side panels: approx. 25 cm high × 12 cm wide
(cut with a sloping top so the roof can shed rain)
Bottom panel: approx. 12 × 12 cm, with 2–3 small drainage holes.

Roof panel: approx. 20 × 20 cm

(extend beyond walls to protect from rain).

Make the entrance hole. Drill a round entrance hole in the front panel, size depends on the bird species, but most common is **2.5 cm**. Smooth the edges with sandpaper to prevent injuries for birds. Assemble the box. Attach the side panels to the back panel with screws or nails. Add the bottom panel ensuring it has drainage holes.

Attach the front panel with the drilled hole. Place the roof on top, preferably with a hinge or removable system for easy cleaning.

Do not paint the inside. If desired, paint the outside with non-toxic, water-based paint in natural colors for camouflage.

Avoid perches under the entrance hole, as they can help predators.

Placement

Mount the birdhouse 2–6 meters above the ground.

Face the entrance hole away from prevailing winds and direct sun (ideally east or southeast). Place in a quiet area, away from heavy human disturbance. Clean once a year (late autumn or winter).

Instructions for setting up Trail Cameras in the Forest

Choose the Location

Place the camera near animal trails, feeding areas, watering spots, or natural crossings. Look for signs of animal activity (tracks, droppings, rubbed trees).

Mounting Height and Angle

For medium and large mammals: mount 60–100 cm above the ground. For birds or smaller animals: mount lower, around 30–50 cm. Angle the camera slightly downward to cover the area. Avoid Direct Sunlight. Position the camera facing north or south to prevent sun glare and false triggers.

Secure the Camera

Use straps or locks to fasten the camera to a tree. Ensure the camera is stable and cannot be easily moved by animals.

Check the Settings

Set the correct date and time. Adjust sensitivity to avoid too many false triggers. Use photo, video, or hybrid mode depending on your purpose.

Test Before Leaving

Trigger the camera manually to confirm it is working. Check field of view and detection range.

Maintenance

Check batteries and memory cards regularly. Avoid leaving human scent near the site by wearing gloves when possible.

How to make a Herbarium

Collecting Plants

Pick healthy plants that show important parts like leaves, flowers, or fruits.

Do not take rare or protected plants.

Write down where and when you found the plant, and who collected it.

Pressing and Drying

Put the plant between newspaper sheets and arrange it flat so all parts are visible.

Place it in a plant press or under heavy books.

Change the papers every few days so the plant dries well and does not rot.

Leave it to dry for about 1–2 weeks.

Mounting

After drying, stick the plant onto a strong sheet of paper (A3 or A4).

Use glue or tape carefully so the plant stays in place but parts like flowers and leaves can still be seen.

Labeling

On the bottom right corner, add a label with:

Scientific name (Latin name)

Common name

Family name

Place and date of collection

Collector's name

Extra notes (soil, weather, other plants nearby)

Organizing

Put the sheets in order (for example, by plant family or alphabetically).

Keep them in a folder or box in a dry place.



Dry preparation of insects

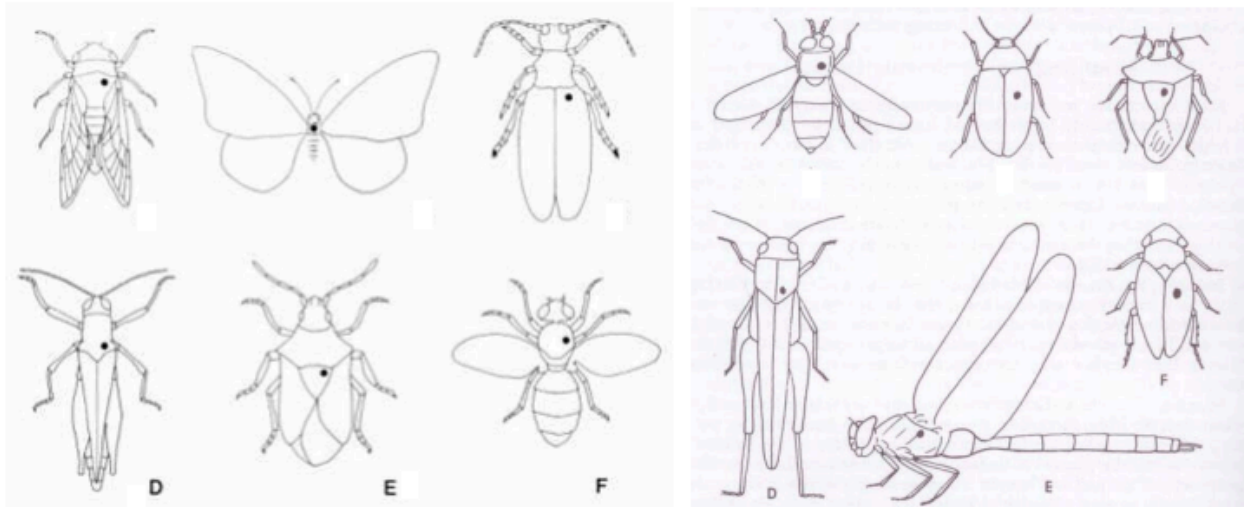


Figure 8. Display of the placement of the entomological pin. The black dot indicates the position of the entomological pin. Image sourced from: <https://extension.oregonstate.edu/sites/default/files/documents/9591/pinning-insects.pdf> [accessed: January 1, 2023.]

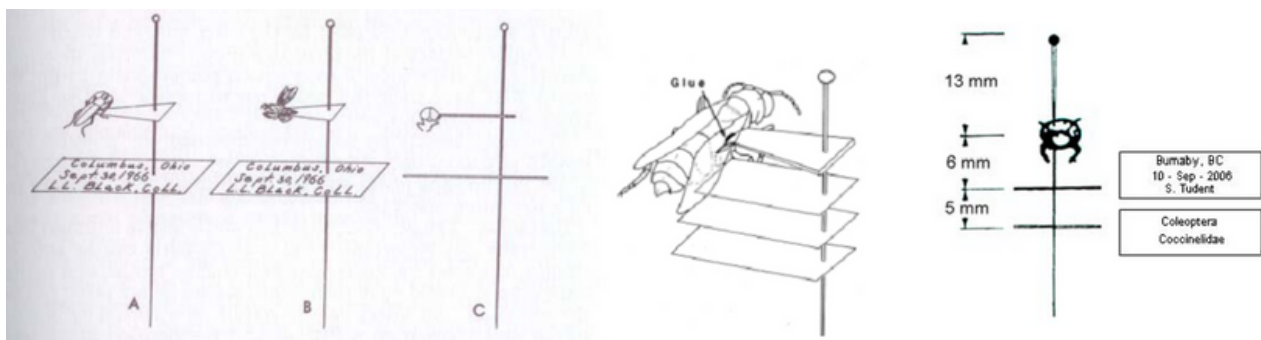


Figure 9. Illustration of the labeling and positioning of information cards. Images taken and modified from: <https://extension.oregonstate.edu/sites/default/files/documents/9591/pinning-insects.pdf>, [accessed: January 1, 2023.]

TERENSKI OBRAZAC / FIELD FORM

- datum /date: _____

- vrijeme (naoblaka i temperatura zraka)/(weather, cloud cover and air temperature):

- relativna vlažnost zraka/ : _____

- temperatura vode (water temperature): _____

Parametri za kemijsku analizu vode (parameters for chemical analysis of water)

Tablica 1. /Table 1.

Investigated parameter	izmjerene vrijednosti, value	bilješke,notes
tvrdća / hardness		
pH vrijednost, pH value		
OH ⁻		
NH ₄ ⁺		
NO ₂ ⁻		
NO ₃ ⁻		
PO ₄ ³⁻		
slobodni kisik O ₂ , free oxygen		
teški metal 1, heavy metal 1		
teški metal 2, heavy metal 2		

Notes and sketches



Literature:

Save my exams (2025), Data Collection Techniques. Available from:
<https://www.savemyexams.com/as/environmental-management/cie/20/revision-notes/2-environmental-research-and-data-collection/2-4-data-collection-techniques-and-data-analysis/2-4-1-data-collection-techniques/> [accessed 10 Sept 2025]

Ternjej I., Brigić A., TERENSKI DNEVNIK, Terenska nastava iz ekologije (PMF Zagreb),
 Available from: https://www.pmf.unizg.hr/_download/repository/Terenki_dnevnik%5B1%5D.pdf [accessed: 1 Oct 2024]

Thank you for spending time in nature. We hope that these short notes alongside with the fieldwork will be helpful in the implementation of the project.

#ppgvz #ecology #nature #2FforthePlanet

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