



TP2: MEIP



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Introduction

Beyond these statistical considerations, there are other non-statistical considerations that will "unfortunately" also guide your sampling:

- The financial cost
- The time
- The available staff
- The amount of information to process

Sampling in ecology

- In ecology, it is impossible to measure one or more characteristics across all units of a group of interest
- To undertake any study of plant (or animal) populations (= the set of species in a territory), it is necessary to use, according to the set objectives, the corresponding methods or techniques.
- However, for the use of a method or technique to yield the best results, the objective of the study must be clear, the scale of observation known, and the statistical processing of the data planned.

Definition of sampling

The procedure by which samples (fragments of a concrete or abstract whole) are taken. It must be clearly stated which properties are to be judged before a sampling plan can be designed.

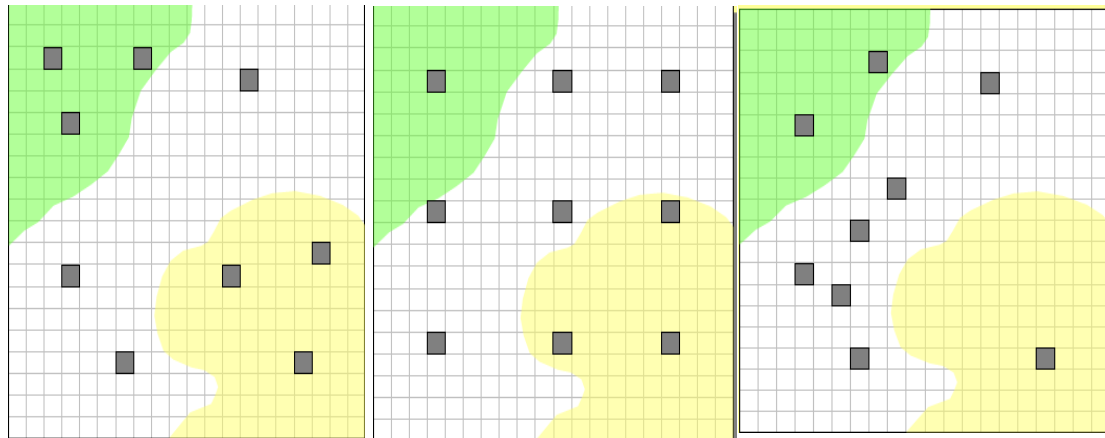
Sampling strategy in ecology

Choosing the sampling plan involves deciding how the data will be collected in the field (in certain randomly chosen locations, in all habitats frequented by the targeted species, etc.), thus choosing a method to locate the samples. Depending on the objective and the constraints encountered, several sampling plans are available and meet specific needs.

The three main types are:

- simple random sampling,
- systematic sampling,
- stratified sampling.

But there are others.



Stratified

systematic

random

Two major families of sampling strategies

Systematic sampling:

- Spatial (transects or grids/meshes)
- Temporal
- Spatio-temporal

Random sampling :

- Simple
- Stratified
- Cluster

How to plan your sampling

- The establishment of a sampling plan is conditioned by the choice of the problem and the way it is framed. The choice of the problem must be expressed in a of description (structure - function) or explanation from which the following choices derive.
- The choice of variables to study.
- The choice of observation scales and the division of the object (study area).
- The choice of methods for processing the collected data. (for example,

think about the statistical analysis of the results before starting the study).

- **statistical population:** is a collection of elements, possessing at least one common characteristic, allowing it to be defined, from which a representative sample is extracted and on which statistical conclusions are based.

- the statistical population related to the counting of larvae is the studied water pond and not the biological population of larvae because the randomly sampled element is a volume of water.

- **Target population:** This is the biological population on which the conclusions of a study must be based.

- The elements of a target population (larvae) can be counted within defined sampling units (scoop).

- **To estimate effectives:**

Sampling → Analyzes → interpretation

- **Several reasons to survey living organisms**

- ❖ Estimate the size of a population
- ❖ Track changes in a population over time
- ❖ Characterize a living community
- ❖ Determine the ecological significance of a site

Information requested ?

- Precise number (number of individuals)
- Quantitative data (number per given area)
- Qualitative data (presence/absence, relative abundances)
- Temporal monitoring

Some devices and tools used in the field

Berlese funnel: A two part funnel system for separating insects and other arthropods from soil or leaf litter. It consists of a jar on top of a mesh screen over another jar with a funnel. Litter is placed on the screen and a light or heat source applied. This causes the organisms to crawl downward and fall through the funnel into the bottom jar.



Black light: An ultraviolet lamp used to attract night flying insects. The simplest set up is to hang a white sheet on a line and hang a portable black light on one side of the sheet. Insects will land on the sheet and can be tallied, identified or collected.

Catch box or tray for insects: Almost any white plate, tray or sheet will work to catch insects that are beaten or shaken from foliage. Once insects are on the tray they can be collected with an aspirator, forceps or camel hair paint brush.



Collecting containers/vials: Used to hold insects or other specimens temporarily. Best to use clear plastic cups and vials so you can see.



Dip nets: Nets for collecting aquatic organisms, sediments and plants. Come in a variety of shapes and net thicknesses. May be purchased at pet supply stores.



Enamel paint: Small bottles of bright colors, including white, for marking hard-bodied insects for observational or mark-recapture studies. Depending on the insect body type, use fine brushes to mark the insect in a place that won't interfere with its normal movements.

Field measuring tape: A 25 or 50 meter measuring tape for measuring longer distances for transects, etc.



Field notebook: Used to collect data, make observations, write down questions, hypotheses, any ideas that come to mind while in the field. This can be any kind of easily portable, easy to write on notebook. There are even waterproof notebooks called "Rite-in-the-Rain". Not very necessary in the desert, though.

Flagging tape: Colored vinyl tape (non-adhesive) used to mark individual plants, branches, or areas. You see this tape on survey stakes and sometimes on tree branches that are marked by a utility company or land developer.

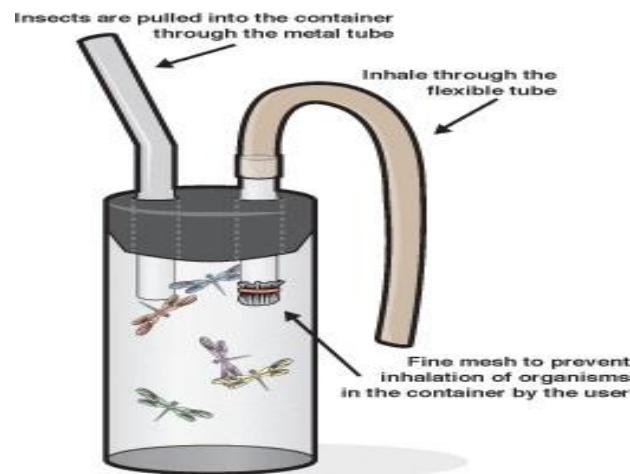


Forceps: These are tweezer-like instruments that come in various sizes for safely picking up organisms and objects.

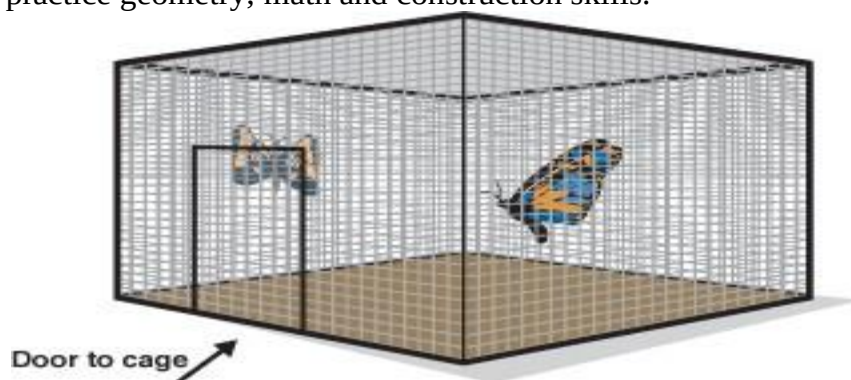


Insect marking materials: Various materials are used to mark insects. These include paint, liquid correction fluid, fluorescent powder, permanent markers and others. The type chosen is determined by: the animal being marked and the purpose and duration of the marking.

Insect aspirator: This is a vial with tubing used to collect insects too small to be safely picked up with forceps. You can make one with a plastic cup with a lid and straws.



Insect rearing cages: Cages of various sizes made of mesh over a wood, plastic or metal frame. Used to rear insects in captivity. These can be made using nylon mesh fabric available at a fabric store and a frame of your chosen material. Good project to practice geometry, math and construction skills.



Loupes, hand lenses: Usually have magnification from 2x to 20x. Small, easily carried and used. They are available as folding magnifiers, jewelers loupes, or small, clear boxes with the magnification lens in the lid.

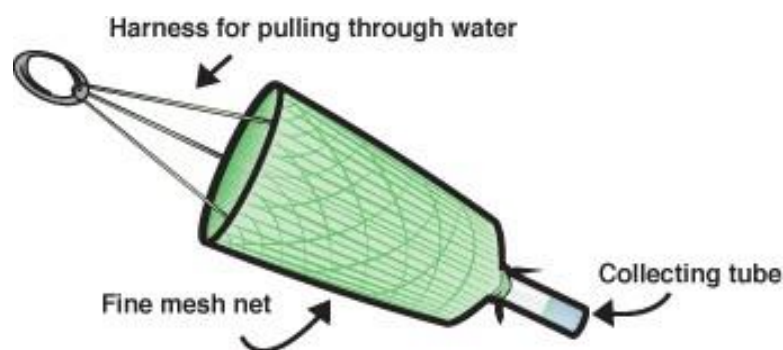
Netting to cover plants: Used to include or exclude birds, insects, reptiles or mammals. The type of netting will be determined by its intended purpose. For example, netting with very small weave will keep out insects and birds; a large, open weave will keep out only birds



pH test kit: pH refers to the acidity or alkalinity of a substance such as water or soil. pHydron papers are widely used and easily carried. A variety of test kits exist.

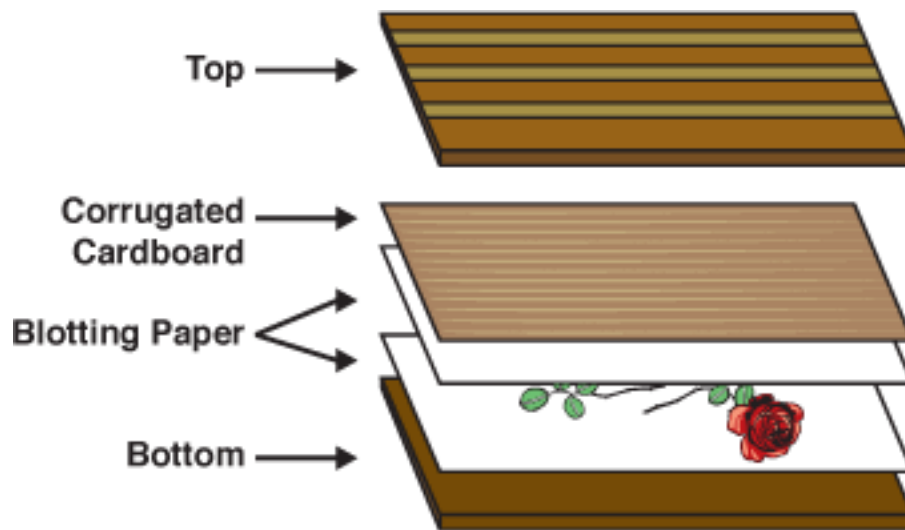


Plankton net: (pond/stream use only) This is a cone-shaped net with very fine cloth that permits water to pass through but not microscopic organisms. These organisms (plankton) are collected in a removable, plastic, conical tube at the end of the net.

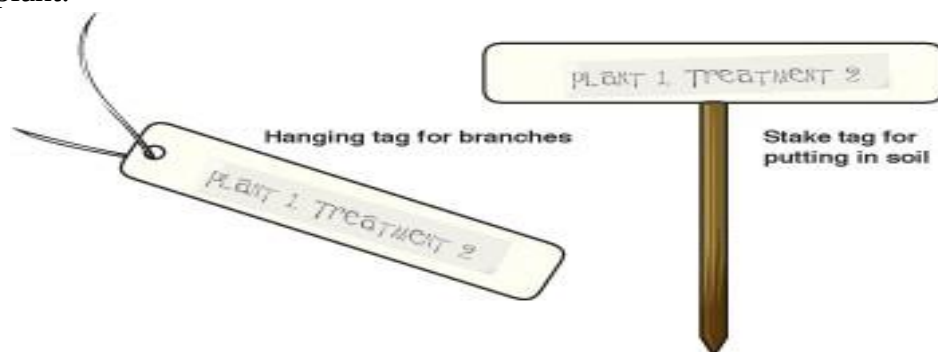


Plant press: Used to press and dry plant specimens. Consists of two outer covers with heavy blotting paper interleaved with corrugated cardboard. The plant sample (excluding roots) is placed between two sheets of heavy blotting paper

that are then placed between two pieces of cardboard. Multiple plant specimens are then placed between the outer covers that are strapped together. Plants are allowed to dry.



Plant tags: Plant tags are used to label and mark individual plants or parts of plants. They can be made of plastic or aluminum. A rectangle about 3dx 1dthat can be written on and has a hole in one end works fine. The hole is for tying the tag to the plant.



Plastic bags

Reclosable plastic bags such as Ziploc bags are great for many things, such as collecting seeds and soils. For aquatic purposes whirl-pak bags are best. They do not leak and are more puncture resistant.

Plastic pipettes: Clear eye droppers used to transfer small aquatic organisms. They have lots of uses.



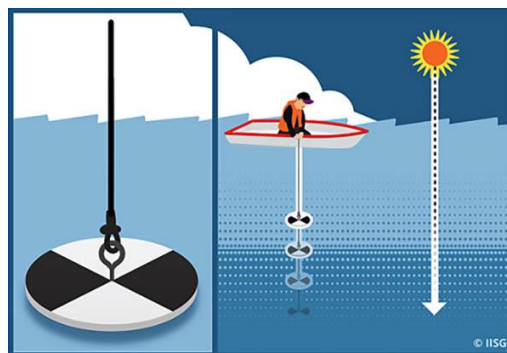
Psychrometer: Equipment used to measure the relative humidity in the air. Of course, humidity in the Sonoran desert is usually low, but it is a simple instrument, easy to use, that is excellent for taking year-long data.



Rain gauge: A marked container for measuring rainfall.



Secchi disk : This is used to estimate the degree of visibility in freshwater. It is a 20cm diameter circle marked in alternating quadrants of white and black. It is weighted on the bottom so it will sink, and has a rope that is marked in half meter segments.



Soil sieves: These are sieves of various mesh sizes used to separate soil samples and for finding insects in soils. Usually comes as a stacked set with four graduated mesh sizes.



Soil test kit: Used to test the soil for pH and the nutrients phosphorus, potassium and nitrogen.



Thermometers: Used to measure temperature in any projects.

Trowels: Useful for many projects that involve digging soil or leaf litter.



Water test kit: Used to test characteristics of the water such as pH, dissolved oxygen, and nitrogen.

Whirl pak bags: Plastic bags with a built-in twist tie at the opening. Fill the bag with water and aquatic organisms, fold it over the twist tie several times, and twist it shut. Hold water better than zip type bags.

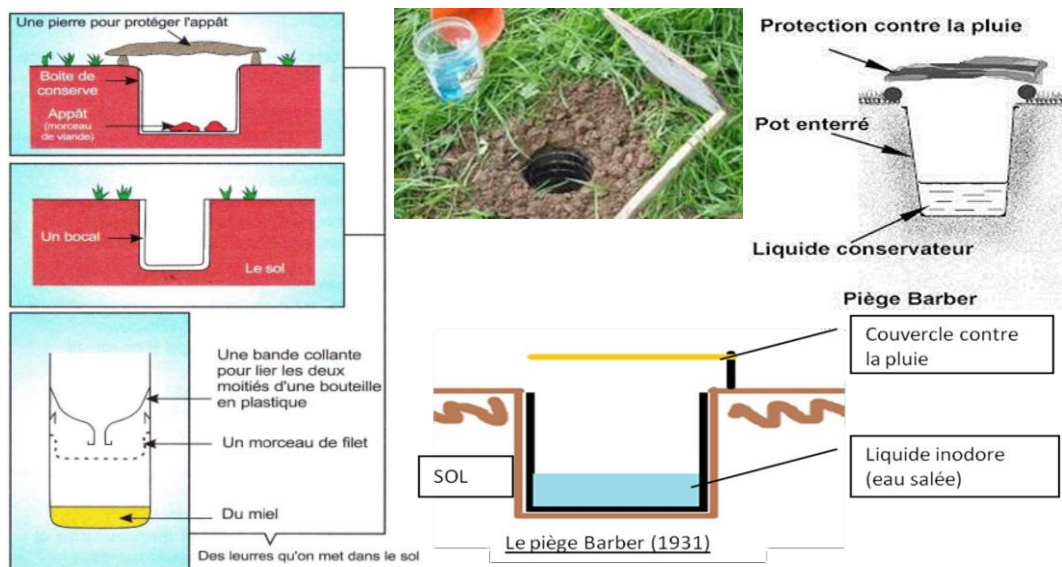


Wind gauge: Used to measure wind speed, an abiotic factor.



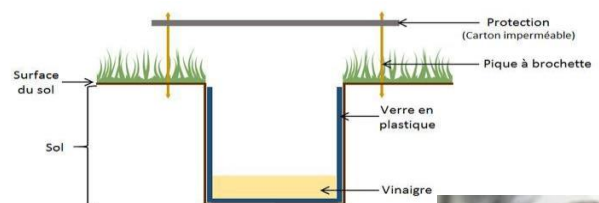
Tools for collecting animals

- Experimental device (trapping)



Method (barber pots or trap pots)

1. Description of study site
2. Equipment
3. Choice of locations



4. Sampling
5. Identification
6. Data entry
7. Statistical analysis

Field report

- First and last name
- Date and time
- Weather conditions
- Coordinates
- Name of municipality and location
- Photo
- Number of pots

Population analysis

Ecological indices

- Richness
- Abundance/Relative abundance
- Frequency of occurrence or centesimal A species is considered to be:
accidental ($F < 25\%$),
incidental ($25\% < F < 50\%$),
regular ($50\% < F < 75\%$),
Constant ($75\% < F < 100\%$)
ubiquitous ($F = 100\%$).