Interreg Sudoe
Fleurs Locales
European Regional Development Fund

Medio ambiente
eficiencia de recursos

Scientific monitoring of the vascular plants in the experimental plots

El Proyecto Fleurs Locales está cofinanciado por el programa Interreg Sudoe I Proyecto cofinanciado por el Fondo Europeo de Desarrollo Regional

1. OBJECTIVES :

a. Evaluation of the success of the experimental sowing;
b. Evaluation of the success of the restoration of mediterranean vegetation types targeted in the different sites.
c. Control of the general conditions of the experimental site. Ensure the integrity of the experimental conditions in order to be able to detect possible problems and react quickly.

Given the objectives, we distinguish two types of monitoring:

- A phytosociological monitoring, which will make it possible to measure objectives a and b.

- A general monitoring of the good progress of the trials, which meets objective c.

2. SKILLS REQUIRED :

The person in charge of the survey and the follow up should be able to recognize/identify each vascular plant that may occur in the experimental plots.

3. TIME REQUIRED :

- The phytosociological survey should take approximately 1 hour per microplot. Thus, the time required for the survey of the 16 plots of each experimental site is about 2 days for each follow up (for an experienced botanist).
- The control of the general conditions should take approximately 1 hour and a half per site and per follow up.

4. FREQUENCY :

- 3 phytosociological surveys/year between March and July.
- 1 technical follow-up per month for the months when there is no phytosociological follow-up

5. EXAMPLE OF CALENDAR

	Oct	Nov	Dec	Jan	Feb	Mar	Ap	May	Jun	Jul	Aug	Sep	Oct	…
Technical follow up	X	X	X	X	X		X		X		X	X	X	
Phytosociological follow up						X		X		X				

6. METHODS :

1. Phytosociological survey

- Inventory of all vascular plants that are present inside the experimental plots ;
- Estimation of ground cover realized by each species. Justification : For the purpose of vegetation monitoring, visual estimation of plant cover has the highest accuracy, precision and sensitivity (Bråkenhielm & Qinghong 1995).
- For each plot, fill in the survey form (see in annexes below) ; you can pre-fill this form with the list of the species that were sown in the plot.
- Dress the list of all the species that you observe inside the plot ;
- Estimate visually the ground cover realized by each species. Inventory of all vascular plants that are present inside the experimental plots ;
- Estimation of ground cover realized by each species. Justification : For the purpose of vegetation monitoring, visual estimation of plant cover has the highest accuracy, precision and sensitivity (Bråkenhielm & Qinghong 1995). Use the precise scale by LONDO (imagine the shadow produced by a vertical light source, see figure 1 below) :

r	1 single individual
+	2 - 5 indiv., ground cover < 5%
m	6 - 50 indiv., ground cover < 5%
p	> 50 indiv., ground cover < 5%
1	ground cover 5 - 10%
2	ground cover 10 - 20%

3	ground cover 20 - 30%
4	ground cover 30 - 40%
5	ground cover 40 - 50%
6	ground cover 50 - 60%
7	ground cover 60 - 70%
8	ground cover 70 - 80%
9	ground cover 80 - 90%
10	ground cover 90 - 100%

Table 1 : The precise LONDO scale as recommended for phytosociological surveys.

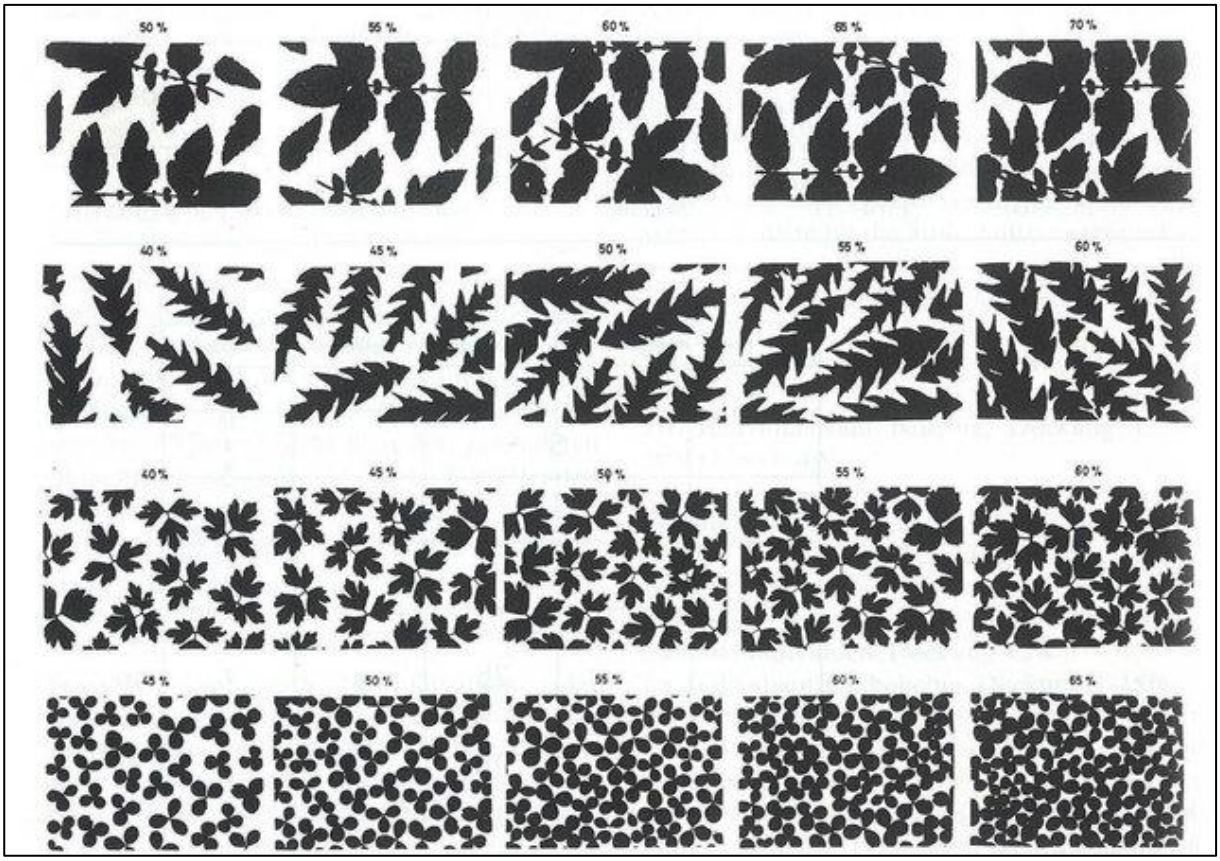

Figure 1 : Examples of ground cover by leaves of terrestrial vascular plants.

2. Global follow up of the experimental plot

- Identify and monitor any major anomalies (destruction, massive predation, etc.).
- Depending on the situation observed and the possibilities, apply the risk adaptation plan (over sowing, irrigation, etc.).

3. Photographic survey

A photo should be taken of each plot at each survey and global follow up, always from the same point.

4. Data analysis

Using these elements, each operator will be able to calculate :

1) the percentage of the sown species that germinated and succeeded in flowering ;
2) the relative contribution of each species to the community developed each year.
3) In addition, these kind of floristical survey are equivalent to a phytosociological relevé as used to characterize plant communities and vegetation types (« habitats ») of community interest. The surveys of the species found in the experimental plots can easily be compared to reference lists in order to evaluate their proximity to the natural vegetation types that were meant to be restored.

7. PERSPECTIVES

Recently, permanent-plot studies were considered among the six most important developments in vegetation science (Chytrý *et al*., 2019 ; Bello *et al.*, 2020). Thus, If possible, it would be very interesting to maintain the experimental plots for a mid- or long-time-survey, in order to document the evolution of the plant communities during the years to come.

8. REFERENCES

Bello, F. de, Valencia, E., Ward, D. and Hallett, L., 2020. Why we *still* need permanent plots for vegetation science. *J. Veg. Sci*. **31**: 679-685. https://doi.org/10.1111/jvs.12928

Bråkenhielm, S., Qinghong, L., 1995. Comparison of field methods in vegetation monitoring. *Water Air Soil Pollut.* **79 :** 75–87. https://doi.org/10.1007/BF01100431

Chytrý, M., Chiarucci, A., Pärtel, M. and Pillar, V.D., 2019. Progress in vegetation science: trends over the past three decades and new horizons. *Journal of Vegetation Science*, **30**, 1– 4.

Annexes

Interreg Sudoe Fleurs Locales			Scientific survey of vascular plants			
Site name		Date_survey 1	Date_survey 2	Date_survey 3	Date_survey 4	Date_survey 5
plot number						
Person_1						
Person_2						
GPS coordinates :		N		E		
Plot size :	x m^2		Management :			
Exposition :		Inclination (degrees) :		Elevation :	m (above mean sea level)	
Bedrock :			Type of soil (sand/silt/clay) :			

Ground cover [%]	vascular plants		litter (death organic matter)		bare soil	
	(bis-)annuals	perennials				
survey_1						
survey_2						
survey_3						
survey_4						
survey_5						

	survey_1	survey_2	survey_3	survey_4	survey_5
Vegetation heigth [cm]					
Soil moisture					
Degradations observed					
Other remarks					

(Bis-)annual species	Surveys				
	1	2	3	4	5

(Bis-)annual species	Surveys				
	1	2	3	4	5

Perennial species	Surveys				
	1	2	3	4	5

Perennial species	Surveys				
	1	2	3	4	5

Ground cover assessment	
scale by LONDO	
r	1 single individual
+	2 - 5 indiv., ground cover < 5%
m	6 - 50 indiv., ground cover < 5%
p	> 50 indiv., ground cover < 5%
1	ground cover 5 - 10%
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EL PROYECTO FLEURS LOCALES ESTÁ COFINANCIADO
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