

Effects of *Posidonia oceanica* (L.) Delile (1813) Flowering on elemental components and on trace elements concentrations

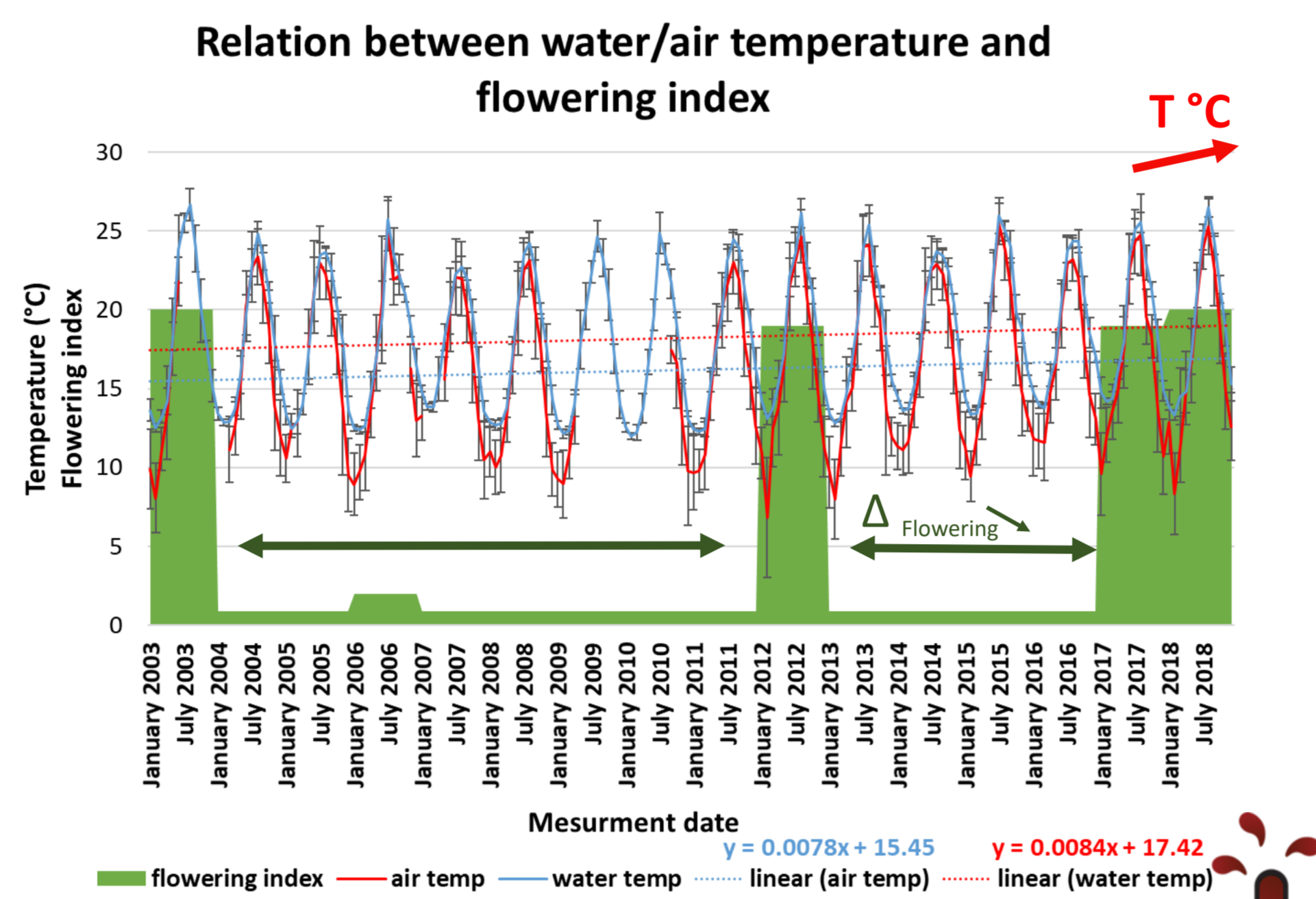
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Background

Posidonia oceanica : a magniophyte endemic to the Mediterranean Sea. Its flowering is patchy and unusual (Balestri et Vallerini, 2003). In 2003, an intense flowering event was recorded in the Mediterranean Sea with a high percentage of flowering (PF) and flowering intensity (FI) (PF = 0.86 and IF = 0.23 + -0.03 infl./stem (Diaz-Almela et al., 2006, 2007). Since 2003, the flowering phenomena are more frequent in Revelatta Bay.



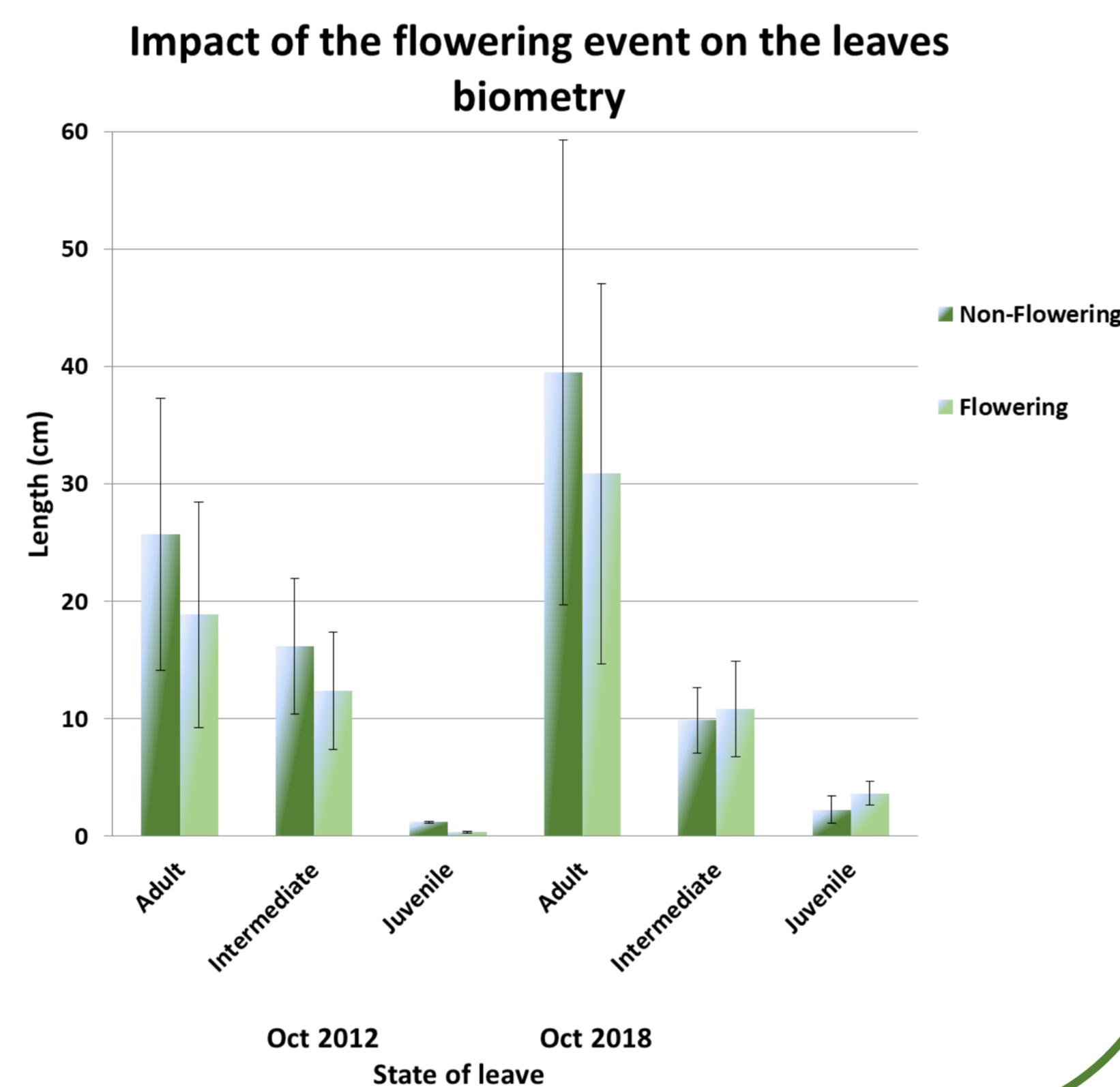
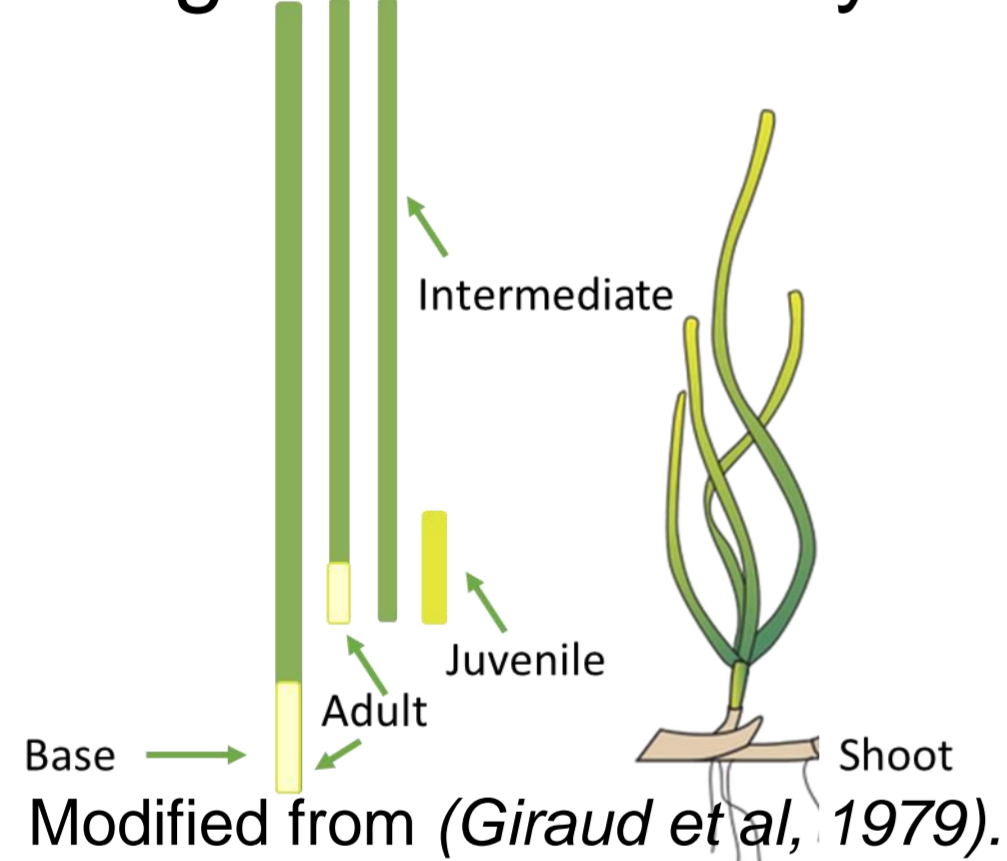
The maximum flowering intensity would be reached every 10 years (Pergent et al., 1989).

Biometry

- Negative impact on the biometry of flowering shoots;
- Even more visible on adult leaves (Gobert et al., 2001).

→ The inflorescence energy is used to the detriment of other leaves.

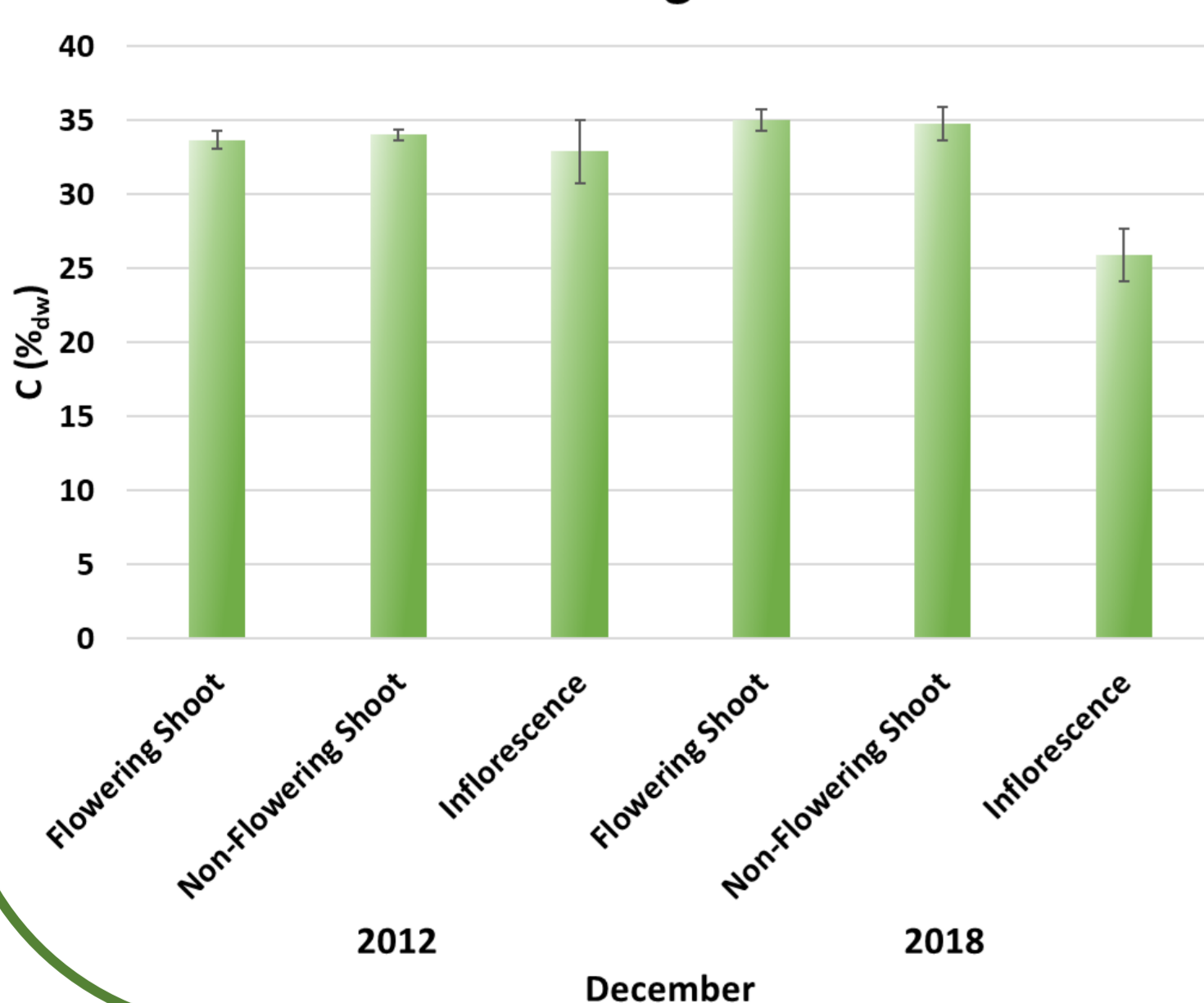
→ Modification in the flowering shoot biometry.



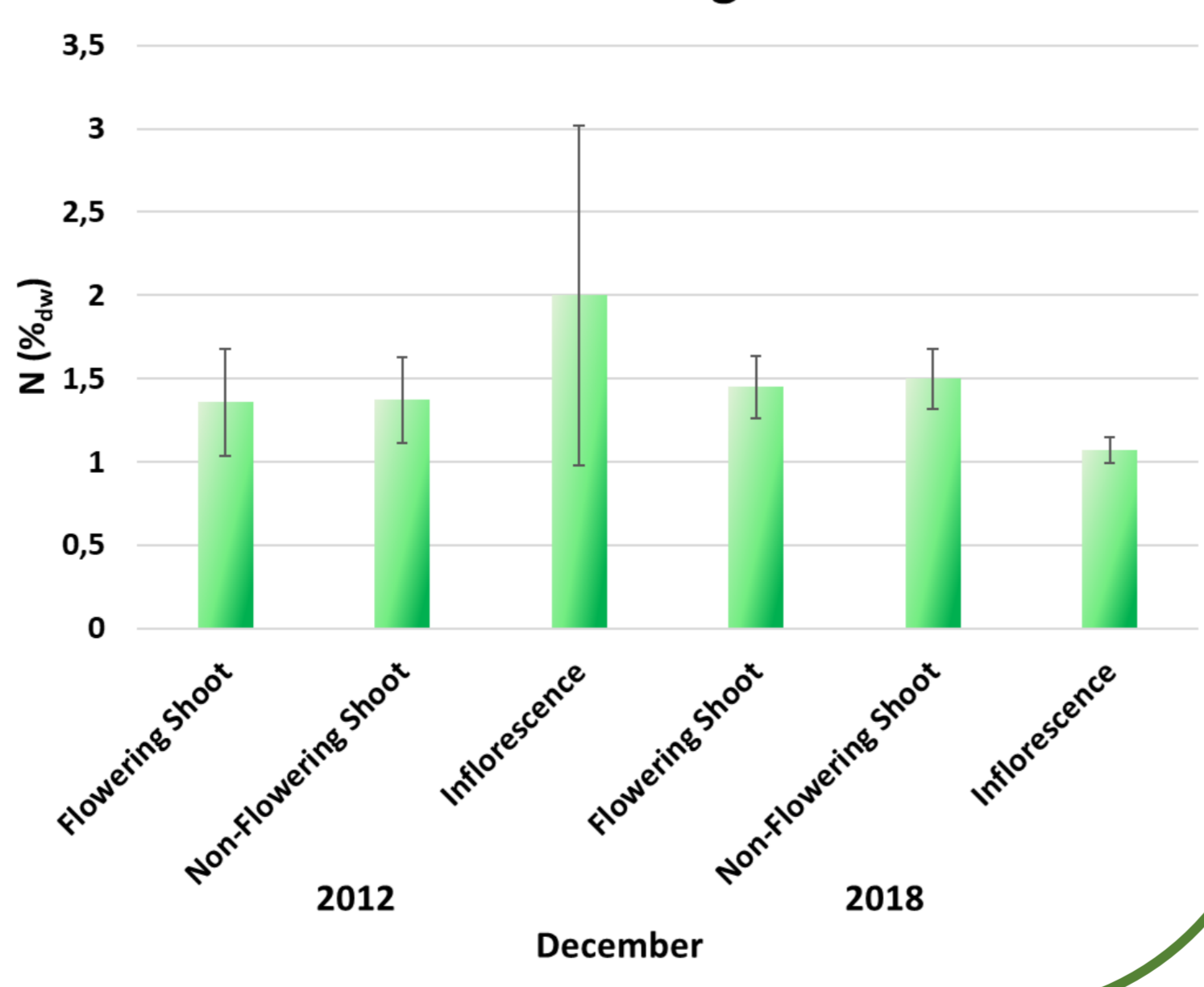
CN concentrations

- C%_{wd} is lower in inflorescence;
- N%_{wd} is lower in leaves of flowering shoots (Gobert et al., 2005).
- N is limited in the study site and an efficient resorption of N arise from leaves to ensure the flowering event.

Comparison of Carbon in flowering and non-flowering shoots



Comparison of Nitrogen in flowering and non-flowering shoots



Aims and Method

Research question:

Does the frequency of the flowering phenomenon impact the dynamics of CNP and traces elements in *P. oceanica* tissues (comparison between the last flowering event in 2012 and that of 2018)? Is the meadow weakening as a result of this stress? (Gobert, 2002; Diaz-Almela et al., 2006; Calvo et al., 2006).

Sampling:

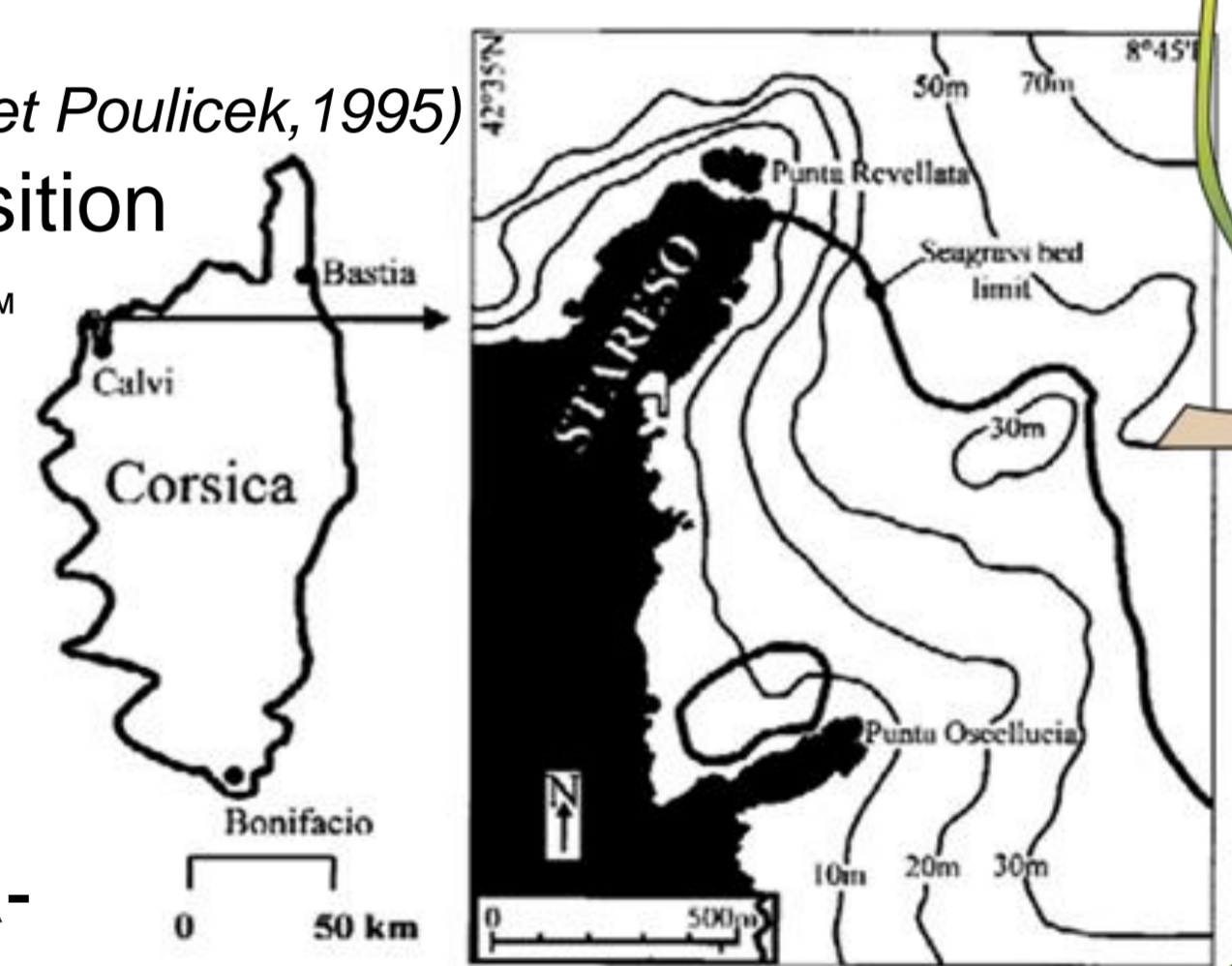
5 flowering and 5 non-flowering shoots were randomly taken at 10m depth and frozen at -18°C.

Sampling site:

The port of STARESO, the marine research station, was chosen for its low anthropic impact and its accessibility (same sampling site in 2012).

Analyzes of:

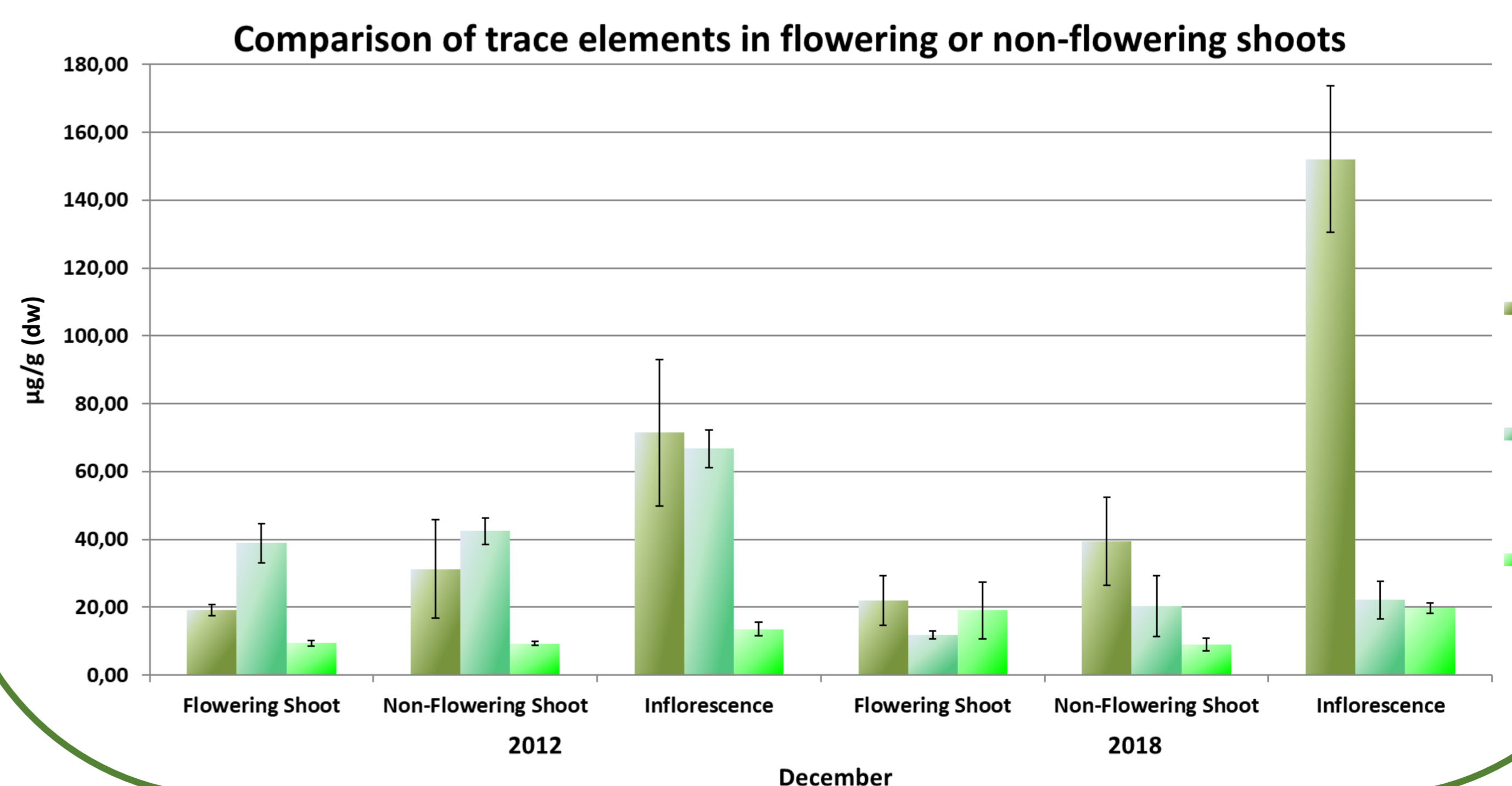
- ✓ Biometry (Giraud, 1979; Dauby et Poulicek, 1995)
- ✓ The CN elemental composition (elemental analyser: vario MICRO cube™, Elementar).
- ✓ P and Trace elements (inductively Coupled Plasma Mass Spectrometry: ICP-MS ELAN DRC II, PerkinElmer Inc.).



Mediterranean Sea, Corsica-France, 42°35'N, 8°43'E

Trace elements analysis

- Al: soil contaminant, co-absorption with Fe (Amiard, 2011; Benton Jones, 2012; Barabasz et al., 2002; Richir, 2012).
- Fe: essential element for flowering (Garnett et Graham, 2005; Tomoko et al., 2011).
- Cu: essential element for flowering and accumulated for fruit formation (Brown et Clark, 1977; Garnett et Graham, 2005).
- Al, Fe and Cu accumulate in the flowers → Depleting in the rest of the shoot.
- Fe ↓ in 2018 → Al counterbalance (co-absorption).
- Poor environment.
- Non-flowering shoots present a stronger concentration in essentials trace elements.



Acknowledgment

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Take home message

- The increasing frequency of flowering event in the *P. oceanica* meadow could have a negative long-term impact on the plant and its environment.
- During each flowering, the plant dedicates a large amount of resources in the flowers and deplete the rest of its system.