

# Temporal dynamics and functioning of plant communities within the context of newly created transport infrastructures in the Mediterranean area

## Recensement des espèces et leurs évolutions dans le cadre de création d'infrastructures nouvelles-SYSTRA

### ABSTRACT

After analysing preliminary floristic data collected on the field in spring 2013 and plant functional traits extracted from databases, Diane realised a second field session in 2014. The biggest part of this field work took place in spring, at the vegetative peak, and kept on going less intensively until the end of the year. This field work allowed the assessment of floristic composition on 25 road slopes (5 per 10-year long age class) and the measurement of plant foliar and phenological traits directly in the context of road slopes (as decided during her first PhD committee). This field work was realised with the help of 2 Master students (3 months + 6 months internships paid from allowed budget) and a License 2 volunteer internship. The sampling scheme of plant functional traits allowed taking into account intraspecific variability due to age and mowing on road slopes. Diane helped with students surveyed 284 species during a whole year, precisely recording the onset, ending and duration of flowering by species, within mown and unmown parts of each road slope. For most abundant species, they also measured intraspecific (per mowing mode and successional stage) values of two foliar traits: Specific Leaf Area (SLA) and Leaf Dry Matter Content (LDMC). These foliar traits are related to the leaf economics spectrum and summarize the trade-off between acquisition and conservation of resource in aerial parts of plants. The study of these traits values distribution within communities will allow understanding the structuring role of resource use strategy in communities. Flowering onset and ending time, as well as flowering duration and flowering overlap between species will, in contrast, reflect the structuring role of reproduction phenology in road side communities.

The analysis of SLA and LDMC community weighted mean values revealed variations related to age and mowing. The contrasted successional changes observed between mown and unmown parts of road slopes were due to species turnover for both traits and partly due to intraspecific variation of trait values for LDMC. Actually, intraspecific changes of LDMC trait values were more consistent amongst species while intraspecific changes in SLA values according to age and mowing were more contrasted amongst species. Altogether, traits values variations were consistent with the expected transition from communities composed of plants with acquisitive strategies at the beginning of the succession towards the presence of more long-living plants with resource conservation strategies at the end of the succession. These changes also showed that mowing counter-selected plant investing into resource conservation in aerial parts, which was expected because of the critical resource loss affecting these plants undergoing a recurrent removal of aerial biomass. These results, presented during the second PhD committee (which took place on 2014/09/19), confirmed the interest of studying functional trajectories along succession and the impact of mowing on these trajectories while taking into account intraspecific variation and a site random effect. It will be the object of a first paper that should be submitted to Journal of Vegetation Science in April 2015. These results will also be presented through an oral presentation during ECOVEG 11 congress that will take place in Grenoble (France) in March.

Results also show that the onset of flowering varied with age, mowing and orientation, while the end of flowering only related to variation of LDMC. Besides, flowering duration decreased with age in unmown communities only and was negatively correlated with LDMC (positively with SLA). This result reveals that resource conservation in aerial parts (associated with high LDMC values) in late succession relates to shorter flowering duration. This result supports a trade-off in time investment between flowering, resource storage and seed maturation. Moreover, late mowing did not influence end of flowering, as many species completed reproduction before disturbance time. It thence underlines the practical interest of late mowing on Mediterranean road slopes.

Diane attended the joint meeting of British ecological Society and Société Française d'Ecologie, in Lille (France) in December 2014, where she met and discussed on interesting perspectives with several speakers and poster displays.

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**Project type :** PP

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**Flagship project :** no

**Project leader :** Thierry Fourcaud

**Project leader's institution :** CIRAD

**Project leader's RU :** AMAP

**Budget allocated :** 23920 €

**Total budget allocated ( including co-financing ) :** 47840 €

**Funding :** Labex

## PERSPECTIVES

The next step of this part of the project is to understand precisely what are the processes filtering species along the ecological succession and according to the two different disturbance regimes (mown/unmown). To do so, other component of foliar plant trait values distribution will be analysed. Flowering phenology data, gathered from the long term (one year long) monitoring of all species flowering, will also be analysed to understand the structuring role of reproductive functions in road side plant communities.

Results from these analyses will be presented and discussed through the writing of at least 2 other journal articles and -hopefully- thanks to presentations at the 58th Congress of International Association for Vegetation Science that will take place in Brno (Czech Republic) in July and at the 2015 annual meeting of the British Ecological Society taking place in December in Edinburgh (United Kingdom).