



Dispositif Chêne sessile de Darney – Placette RDI 05 (moyennement dense) – Pose des sondes d'humidité des sols

Adapter les réseaux sylvicoles du GIS Coop pour imaginer de nouvelles sylvicultures dans le contexte du changement global

Principle investigator: Seynave Ingrid, UMR Silva

LabEx partners: UR Biogéochimie des Ecosystèmes Forestiers (BEF), ONF-RDI, CNPF-IDF

Collaborations : UE Forêt Pierroton, UMR PIAF, FCBA, CPFA., Irstea,

Context — Adapting forest management to environmental, climatic and energetic crisis is of growing concern. The silvicultural options for attenuation and adaptation are multiple: changing species/genetic resources, favoring mixed stands, shortening rotations or increasing frequency and intensity of thinning.

To evaluate these options, the experimental approach is essential in particular to properly assess the effect of stand density on growth on wider ranges. The national networks of silvicultural experiments of the “Coopérative de données sur la croissance des peuplements forestiers” (GIS Coop) have been designed in this way: it includes different species, sampled over their production area, and encompasses large density gradients from open-grown to self-thinning stands. Since 1995, GIS Coop monitors stands growth on their plots (about 850 spread over 138 sites) from every year to every six years. For five years, in addition, the GIS Coop has raised floristic and soil data allowing a reliable estimation of soil physical and chemical properties. But to accurately evaluate the complex interactions between environmental drivers, stand management and stand growth, a long-term monitoring of climate, soil and tree growth should be carried out.

Objectives — The current project is a feasibility study to draw some conditions and costs for the efficient deployment of instrumentation in a large number of sites.

Approaches — For this study, the GIS Coop decided to focus on water availability that should become the major constraint for stand growth. Four experimental sites will be equipped with climatic weather stations, soil moisture probes and dendrometers.

Key results —

- The five test sites have been chosen to represent two forest management systems (regular and even-aged stands of Douglas fir and of sessile oak), to cover a large climatic gradient (from Northeast to northwest of France for sessile oak, from northeast to center for Douglas fir) and highly contrasted stand density regimes (on each site, three plots have been selected to cover a large range of competition from open growth to self-thinning).
- All the sensors were acquired by tender procedures; this stage served to formalise for each sensor the appropriate requirements with regard to the expected data quality (accuracy, resolution, and range of measure...), the constraints imposed by climate and soils conditions and by the isolation (energy and communication networks) of sites.
- The experimental protocol has been defined and more specially the plan relating to the establishment of the sensors. For each plot, the dendrometers have been installed on 15 trees evenly distributed along the diameter distribution. Soil moisture probes have been located at two depths with 3 replications per depth. The depths were selected, taking into account the specific characteristics of the soil, to allow comparison between sites.
- Three of the five selected sites (2 in sessile and 1 in Douglas fir sites) have been provided with the sensors and one Douglas site is currently being installed. The last one will be provided in the spring of 2019. The installation of these four sites required 96 man days by considering only days in the field.
- For two sites (i.e. six plots), time series are available over the growing season 2018 (from April to October).

Main conclusions including key points of discussion — At this point, it is too early to draw conclusions on the deployment of instrumentation in a large number of sites or on the effect of stands density on water availability. The key challenges were to protect sensors against the game (mainly wild boar, two soil moisture probes have been excavated) and sensor power supply (the sites are dispersed through France; an autonomy of six months is expected).

Perspectives — The expected results on the possibilities and the cost for an efficient deployment of instrumentation in a large number of sites, the costs for sites maintenance, and on the impact of the stand density on the water consumption will be produced in a few years. During the course of 2019, some preliminary results will be produced concerning the financial and human costs for the installation of the sensor and the quality of data.

Valorisation —

Valorisation scientifique :

Publication

Seynave I., Bailly A., Balandier P., Bontemps J.D., Cailly P., Cordonnier T., Deleuze C., Dhote J.F., Ginisty C., Lebourgeois F., Merzeau D., Paillassa E., Perret S., Richter C., Meredieu C. 2018. GIS Coop: networks of silvicultural trials for supporting forest management under changing environment. *Annals of Forest Science*. Doi : 10.1007/s13595-018-0692-z

Poster

Seynave I., Bailly A., Balandier P., Bontemps J.D., Cailly P., Cordonnier T., Deleuze C., Dhote J.F., Ginisty C., Lebourgeois F., Merzeau D., Paillassa E., Perret S., Richter C., Meredieu C. 2018. GIS Coop: networks of silvicultural trials for supporting forest management under changing environment. ICPF 2018, 4th international congress on planted forests. Beijing (China). 23-27 October 2018.

Diffusion :

Présentation du projet sur le site web du GIS Coop : <https://www6.inra.fr/giscoop/Actions/En-cours/XPSilv>

Les travaux menés dans le cadre des réseaux d'expérimentation sylvicoles ont été mis en avant par l'INRA et le département EFPA (document l'Inra dans la région Grand-Est : quelques marquants de ces dernières années)

Dans le cadre des vendredis lecture, l'article de Seynave et al. 2018 a également été mis à l'honneur sur les réseaux sociaux par la direction de la communication d'AgroParisTech
<https://twitter.com/AgroParisTech/status/1045568791776653312>

Leveraging effect of the project —

Le GIS Coop est un des services de l'infrastructure de recherche In Syla (<https://www6.inra.fr/in-syla-france>). Il constitue un service particulièrement intéressant pour répondre à l'objectif d'adaptation et d'innovation sylvicole. Les projets que le GIS Coop mènent depuis 2011 au sein de son groupe CoopEco, dont ce projet XPSilv, s'intègrent parfaitement dans les axes de In Syla en particulier pour adapter et raisonner les réseaux en tenant compte des changements globaux et pour déployer une instrumentation légère à haute technologie de façon à mieux caractériser sur des pas de temps longs, les facteurs de forçage environnementaux non contrôlés.