



IDENT-Cité

A new breed of diversity experiments with trees, urban style

TreeDivNet:

A global network of tree diversity experiments, which provides a unique platform for research on the relation between tree species diversity and ecosystem functioning in major forest types around the world

TreeDivNet is a global network of tree diversity experiments that provides a unique platform for research on the relationship between tree species diversity and ecosystem functioning in major forest types around the world. TreeDivNet is the largest network of biodiversity experiments worldwide, with over 1,000,000 trees planted in more than 20 experiments. One of these experiments is IDENT, the International Diversity Experiment Network with Trees, focussing on high density plantations and gradient of functional diversity over controlled levels of species diversity.

These experiments investigate questions related to biodiversity in trees, for example the effect of specific mixtures on yield, complementarity, and environmental stress. The scientific goal is to identify some of the mechanisms through which species interact to promote co-existence, increased functioning, or tolerance to stress. Our objective also is to translate that knowledge into relevant guidelines for the management of forests and plantations, as well as conservation efforts.

The network is still expanding. The reasons for that are twofold: generalization and application to local issues. Indeed, in order to change the way forestry is done we need to show that our conclusions are not limited to one site, or one function or ecosystem service. We also need to address local issues, for example drought tolerance or specific mixtures of local relevance to foresters to bring them around. We also know from experience that people, scientists and practitioners alike, often need hands on experience of alternatives to begin using them. That is why we often accompany our experiments with operational scale demonstrations to help translate the science into real-world solutions.

IDENT-Cité: A research and education platform on the importance of trees and diversity in urban environments

But trees are not found only in forests. Like humans, which since 2008 officially turned into a predominantly urban species, in many places around the world trees are very much integrated into the managed landscape. While scientists and city planners are only starting to recognize the importance of trees in urban environments for human health, the urban forest is facing increased pressure linked to global changes (heat buildup, drought, insects and disease outbreaks). Many cities already faced or are bracing for increased mortality and hospitalization following sudden losses (for example the recent outbreak of the ash borer in North America, killing millions of city trees). IDENT is thus also geared towards documenting the effect of species interactions (and isolation) on forest resilience and tolerance, and informing the next generation of urban forests.

And this is where IDENT-Cité comes in. In spring 2015 we will establish the very first experiment in diversity with trees in the city, filling the gap between research at experimental sites within TreeDivNet, and educating people on the role of trees in the city and the importance of diversity.

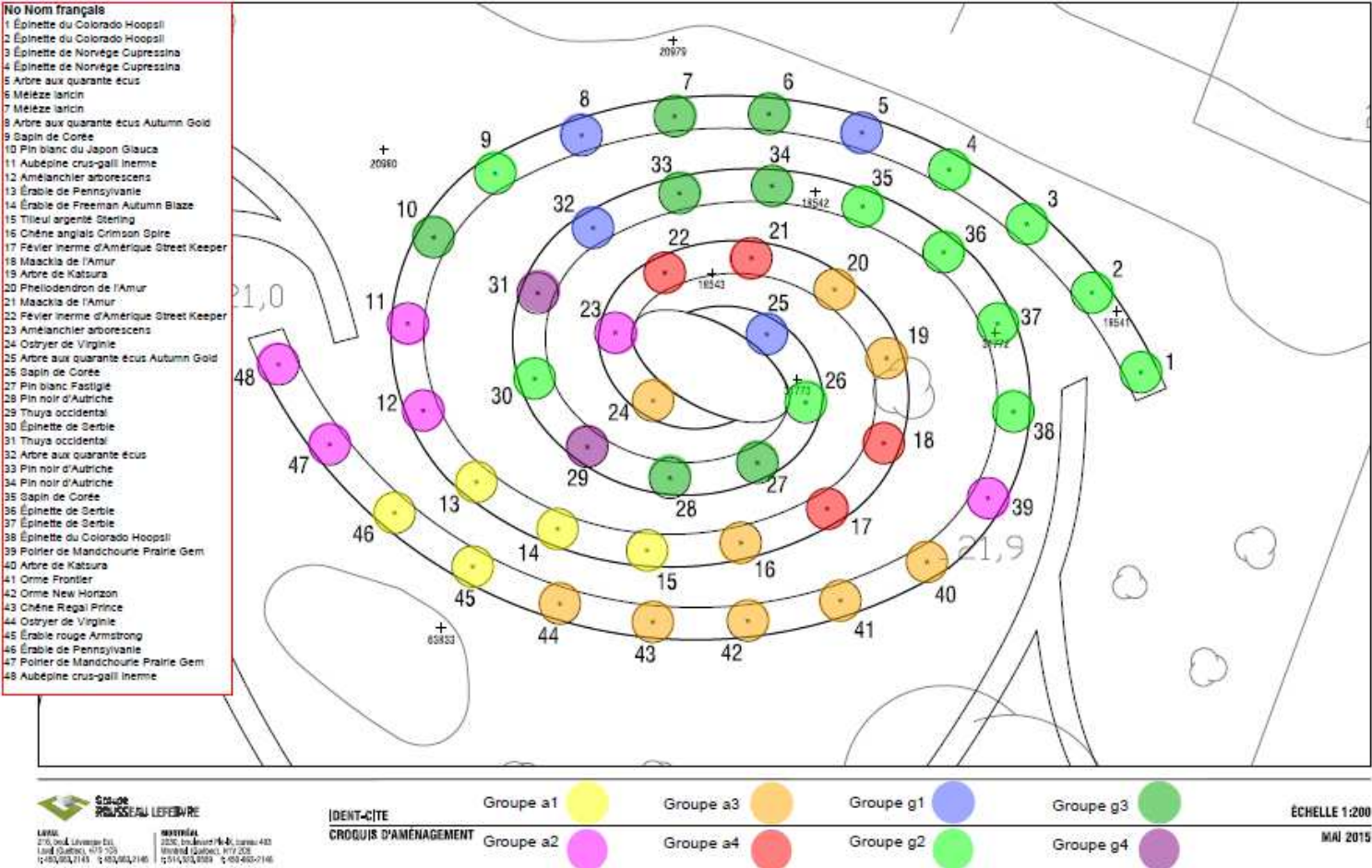
IDENT-Cité is a museum type of installation where trees of increasing levels of diversity were planted to form a vegetal maze in the form of a double spiral. Visitors will thus be able to experiment directly what diversity is, and how trees and diversity affect the environment. Many activities are proposed, with animation or simple information panels. The site also serves as an arboretum, representing tree species and cultivars available to citizens, as well as promoting new species to increase diversity.

The one millionth tree planted for science within the TreeDivNet was planted there, in spring 2015, marking a very important step for the network of course, but also an important one for research in biodiversity, with TreeDivNet being the largest network of its kind. This *Pinus parviflora* was also the first of its species planted in Montreal, where the site is located, the second largest city in Canada with a population of 1.65 million (3.8 for the agglomeration). Montréal is the second largest French speaking city in the World after Paris.

IDENT-Cité in Montréal was only the first of we hope many to come in different cities. But we are not stopping there, as a new experiment specifically designed to test hypotheses on the relationship of diversity with the resilience of urban green infrastructures was also established this spring in the Outaouais region (Complex-Cité) and we have plans for other sites within the urban fabric to further that objective.

TreeDivNet is here to stay, as its objects of research, trees and forests, are among the longest lasting organisms and ecosystems on Earth.

IDENT-Cité installation planted in Montreal in spring 2015. The design allows people to follow a gradient of diversity along a double spiral, using functional groups (species of similar characteristics – see colors). Maximum diversity is reached at the center, where activities will be held and information panels installed. All trees are identified with their characteristics, and a smart phone app is available to find them. The installation is part of a larger effort by the city to develop this park for education to the environment and access to nature.



Forests are changing worldwide.

Forests cover approximately 70% of land surfaces on Earth, but are continuously being reduced, both in size (deforestation) and in diversity (simplification). On the other hand, forest plantations are constantly growing and already represent 5% of the total forest cover, but produce over 15% of the timber we use, and soon about half of the world's production according to the FAO.

Why diversity matters?

The increasing concern about loss of biodiversity and its effects on ecosystem functioning triggered a series of manipulative experiments worldwide, which demonstrated a general trend for ecosystem functioning to increase with diversity. It also spurred action by scientists and policy makers to act together to identify effective policy solutions. The recognition that these environmental changes are inextricably linked inspired the creation of The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) in 2012.

Global changes and biodiversity losses and their impact of earth's ecosystems' capacity to provide for the needs of growing human populations are, indeed, major international issues requiring our immediate attention both for understanding the processes involved as well as for implementing solutions. Identifying the impacts of biodiversity and ecosystem services on human well-being is critical.

Close to 100% of forest plantations are monocultures, planted with a single species, most often fast-growing such as hybrid poplar and larch, pines and eucalyptus, as well as crop species such as rubber or oil palm. However there are documented benefits to establishing multi-species, more functionally diverse plantations (polycultures) instead:

1. They are more tolerant of all kinds of disturbances such as diseases, pests, and environmental stresses like drought;
2. They harbour greater biodiversity, provide greater environmental services such as water supply, erosion and flood prevention, pollination and pest control, etc., and put less stress on soils and resources such as water;
3. They are more easily accepted by society and certification agencies such as the FSC;
4. By selecting the right mixture of species, they produce just as much or even more than monocultures via resource-use complementarity, as well as a larger, more diversified basket of non-timber forest products.