AIRFRESH

Newsletter #3

Editorial

We are pleased to present the third newsletter of the project **AIRFRESH "*Air pollution removal by urban forests for a better human well-being*"**. The main objectives, core actions, and performed activities are presented here.

The Project Team

AIRFRESH: Objectives and Actions

Peri-urban reforestation, near densely populated cities where it is not easy to plant trees, can help **improve air quality** and meet clean air standards in cities. For that, municipalities and city planners need a **quantitative assessment** of the role of urban trees in affecting air quality and a **suitable selection** of tree species.

We selected two front-runner cities, **Aix-en-Provence** in France and **Florence** in Italy, where human exposure regularly exceeds the World Health Organization protection limits of particles ($PM_{2.5}$, PM_{10}), nitrogen dioxide (NO_2), and surface ozone (O_3).

The project AIRFRESH, which started in September 2020 aims to: 1) estimate the **air pollution removal capacity** by a reforested test area; 2) estimate and quantify the **environmental and health benefits** provided by the urban trees in both cities; and 3) propose recommendations for **re-naturing strategies** (e.g., number and type of tree species to be planted) for attainment of the air quality standards in both cities.

Activities performed

Tree selection is a crucial step for proper urban planning

To overcome the urban challenges (air pollution and climate change effects mitigation) by vegetation use, it is necessary to answer the fundamental question of **which plant species are more suitable to use**, and which one should be avoided.

We ranked about **300 plant species** according to their: 1) effectiveness in removing $PM_{2.5}$, PM_{10}, CO_2, NO_2, and O_3; 2) capacity of emitting biogenic Volatile Organic Compounds; 3) O_3 and particles formation potential; 4) tolerance to air pollution, drought, pest and disease; and 5) pollen allergenicity.

In Aix-en-Provence, we selected several **promising tree species**: *Tilia*

platyphyllos, Acer saccharinum, Platanus orientalis, *Quercus cerris, Celtis australis*, and *Sophora japonica*.

Fig. 1 - Tree selection in Aix-en-Provence (*Tilia platyphyllos, Platanus orientalis, Acer saccharinum, Quercus cerris, Sophora japonica*, and *Celtis australis*).

In Florence, we selected: *Acer opalus, Acer rubrum, Cupressus sempervirens, Tilia platyphyllos,* and *Ulmus Plinio*. Cypresses and elms are clones resistant to fungal diseases, developed by CNR.

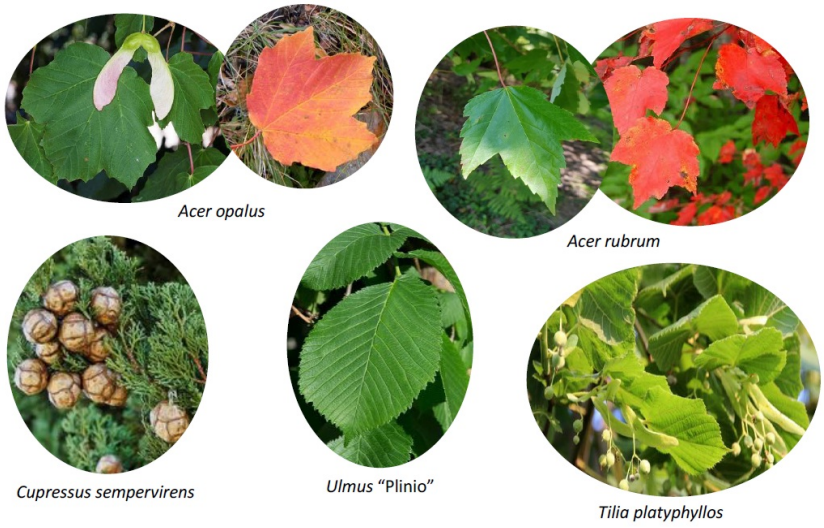

Fig. 2 - Tree selection in Florence (*Acer opalus, Acer rubrum, Cupressus sempervirens, Tilia platyphyllos,* and *Ulmus Plinio*).

Planting and maintenance

Based on the delivered list of suitable tree species, **400 fast-growing trees** were planted in **January 2022** in peri-urban areas located in Southwestern Aix-en-Provence and Southwestern Florence.

In Aix-en-Provence, we have **4 areas with 100 trees each** (>3 m tall): *Tilia platyphyllos, Acer saccharinum, Platanus orientalis* and a mixed with *Quercus cerris, Celtis australis, a*nd *Sophora japonica*.

Fig. 3 - Selected test area for greening activities (1.2 hectare) in peri-urban areas in Southwestern Aix-en-Provence.

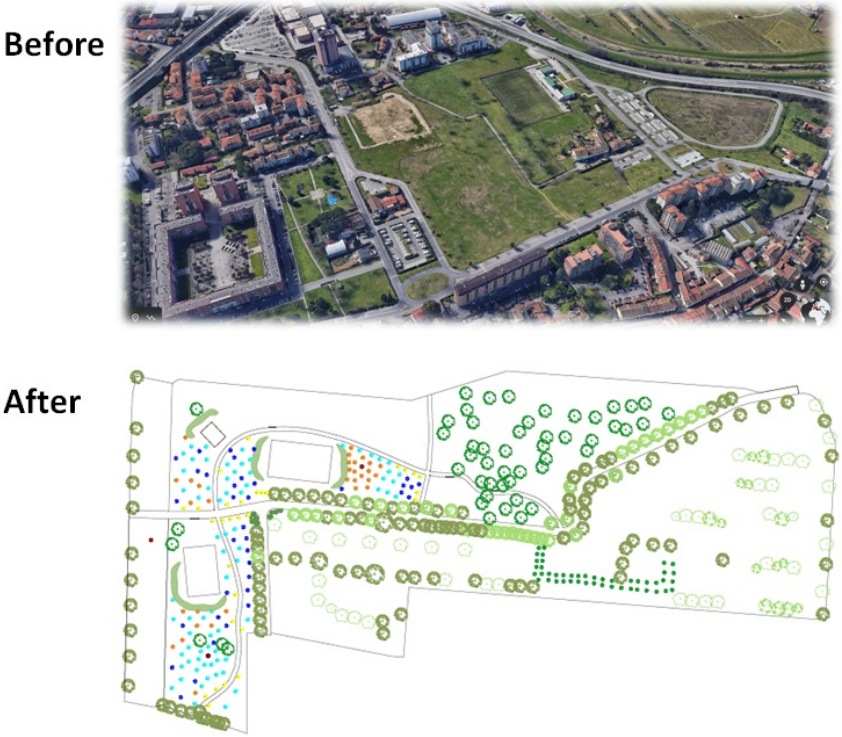

Fig. 4 - Selected test area for greening activities (1.5 hectare) in peri-urban areas in Southwestern Florence.

In Aix-en-Provence, the tree planting activities were carried out by the municipality of Aix-en-Provence and the company *idverde* for creating and maintaining the test area. The tree planting activities were carried out by the IRET-CNR and *Accademia Italiana di Scienze Forestali* in Florence. Soil moisture sensors were set-up to optimally irrigate the test areas.

Fig. 5 - Tree planting activities in Aix-en-Provence (top) and Florence (bottom) in January 2022 with irrigation system set-up.

Tree Planting ceremony in Aix-en-Provence - 8 March 2022

A tree planting ceremony was organized for the inauguration of the test areas to draw the citizen's attention to the importance of nature, trees, and biodiversity in the city.

The city of Aix-en-Provence organized the inauguration of the test area in presence of the Mayor, Ms. Sophie Joissains, the local and regional elected representatives, the citizens, and the AIRFRESH partners. Pierre Sicard introduced the project context, objectives, and expected results, and Ms. Sophie Joissains inaugured the test area. The last tree (*Tilia platyphyllos*) was planted by Sophie Joissains and Pierre Sicard.

Fig. 6 - Pierre Sicard during the ceremony speech with the Mayor Sophie Joissains, local elected representatives, project team, citizens, and the Mayor planting the last tree.

Tree Planting ceremony in Florence - 28 April 2022

The city of Florence and IRET-CNR organized the inauguration of the test area. Attended the event the councilor for the environment Cecilia del Re, local elected representatives, the citizens, and the IRET-CNR team. During the ceremony a *Tilia platyphyllos* was planted together with the authorities.

Fig. 7 - The Vice Mayor Alessia Bettini, Elena Paoletti, the IRET-CNR staff during the inauguration and the Vice Mayor and Elena Paoletti planting the last tree.

Field measurements to estimate the benefits after tree planting

The **direct contribution** of new green spaces in air pollution abatement and air temperature is evaluated by **continuous measurements** in and around the area after tree planting. In May 2022 and July 2022, the **AirQino sensors** was set-up within the test area, above and below the tree canopy. Data are sent by GPRS on IRET-CNR FTP for analyses and can be visualized online in near-real time.

First estimation - Each reforested area will remove annually at least 3.6 tons O_3, 3.9t NO_2, 1.2t PM_{10}, 0.5t $PM_{2.5}$, 33.5t CO_2.

Fig. 8 - Set-up of the AirQino sensors above and below the tree canopy in Aix-en-Provence (on 18 July 2022).

Dissemination and Communication

Lithuanian-French cooperation for Climate Change

Date: 6 April 2022

The main objective of the symposium, organized by the Research Council of Lithuania, was to encourage contacts between scientist from both countries in the field of the climate change and air pollution. Pierre Sicard (ARGANS) gave a talk about *"Urban trees as an effective solution to mitigate air pollution in cities*" with the Ambassador of France in Lithuania and Vice Minister of Environment.

Fig. 9 - Picture during the symposium in Vilnius, in presence of the Ambassador of France in Lithuania and Vice Minister of Environment.

Festival of lifestyles
Date: 30 April 2022

AIRFRESH was a guest of the "Festival of lifestyles", an event promoted by the Municipality of Florence and by the regional health authority. The day was dedicated to health, well-being, and healthy lifestyles. Initiatives included information, discussions, and workshops on the benefits of physical activity. Elena Paoletti (IRET-CNR) gave a talk on the well-being offered by the new green areas in an urban environment. The mayor of Florence Dario Nardella also took part in the event as well as Sara Funaro welfare councilor of the municipality.

Fig. 10 - Picture during the event “Festival degli stili di vita” in Florence, in presence of Elena Paoletti (IRET-CNR) and the mayor of Florence, Mr. Dario Nardella.

Accademia Italiana di Scienze Forestali
Date: 18 May 2022

The aim of the workshop was to raise awareness among stakeholders on the inestimable value of the urban forest of Florence by analyzing the importance of the complex and systemic set of trees, avenues, tree-lined squares, parks, gardens, and woods that characterize the city. During the workshop, Y. Hoshika (IRET-CNR) spoke about the AIRFRESH project focusing in particular on calculation models for the removal of air pollutants by tree species.

Fig. 11 - Pictures during the workshop Accademia Italiana di Scienze Forestali with Y. Hoshika (IRET-CNR) giving a talk about AIRFRESH project.

Workshop celebration 30 years LIFE program
Date: 21 May 2022

The workshop was organized at the demonstration site of the LIFE SySTEMiC Project at the Migliarino Regional Park (San Rossore, Pisa). E. Paoletti (IRET-CNR) took part in the workshop dedicated to the 30 years of the life program showing the importance, objectives and expected results of the AIRFRESH project.

XIII° Italian Society of Silviculture and Forest Ecology Congress
Date: 30 May 2022 – 02 June 2022

The Italian Society of Silviculture and Forest Ecology (SISEF) is strongly interested in urban greening and atmospheric pollution. During the Congress, an information desk on the AIRFRESH project was set up. J. Manzini (IRET-CNR) presented a poster regarding urban trees selection entitled "*Air quality and urban forests: which species to plant in our cities?*". The congress was also an opportunity to exchange knowledge with other LIFE ongoing projects such as LIFE SySTEMiC.

Fig. 12 - Picture during the XIII° SISEF Congress in Orvieto (Italy).

Workshop LIFE MycoRestore
Date: 16 June 2022

J. Manzini and Y. Hoshika (IRET-CNR) attended at the Workshop organized by LIFE-MycoRestore about the use of local mycological resources as biocontrol agents of forest pathogens to encourage networking and exchange of knowledge between LIFE projects.

Fig. 13 - Picture during the workshop LIFE MycoRestore in Vallombrosa (Italy).

Upcoming events

IUFRO Conference - Forests in a Volatile World
21-23 September, 2022
Vienna, Austria

International Conference on Acid Deposition
17-21 April, 2023
Niigata, Japan
www.acidrain2020.org

Partners

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