

Press release – 16 February 2021

Controlled production of white truffles *Made in France*: a global first

***Tuber magnatum* Pico, known as the Piedmont or Italian white truffle, is the rarest and most expensive of truffles. It can only be found in the forests of a few European countries, and supply frequently does not meet the strong global demand for this fungus. In 2008, nine years of joint research by INRAE and Pépinières ROBIN enabled the latter to start selling trees for commercial truffle production in France. The persistence of white truffle was verified in truffle orchards between three and eight years old, and in one four-year old orchard, the first truffles were harvested in 2019. The scientific results of this research were published on 16 February in the journal *Mycorrhiza*. The production of *T. magnatum* truffles in an orchard outside its natural distribution range is a global first that opens the way towards developing the cultivation of this truffle in France and also elsewhere in the world.**

The Italian white truffle (*Tuber magnatum* Pico) is the most prized by many gastronomic restaurants throughout the world. Its distinctive aroma already made it unique in the 1700s when the Princes of Savoy used it as a tool in their diplomatic negotiations. The ascocarps (truffles) of *T. magnatum* are produced by a fungus that lives in symbiosis with trees such as oak, willow, hornbeam and poplar. This truffle is harvested naturally in Italy and the Balkan peninsular, and more rarely in Switzerland and south-eastern France. Its annual production is only a few tens of tonnes. Attempts to cultivate *T. magnatum* started in the 1970s in Italy, where more than 500,000 plants were sold. The first truffles were harvested 15 to 20 years after planting, but only in around ten orchards that were all within the natural range for this truffle. It is therefore impossible to confirm whether this production was due to the trees planted or the truffle being naturally present in these regions.

Since 2008, Pépinières ROBIN has thus been selling trees mycorrhized with *T. magnatum* according to the process developed by INRAE/Pépinières ROBIN, under license to and controlled by INRAE. Each plant is thus verified individually by INRAE experts before it is sold; they check for the presence of the fungus by analysing morphological traits and performing DNA analyses. In the context of a joint INRAE/Pépinières ROBIN research programme, five French orchards were studied. The first result was the persistence of white truffle in the soil three to eight years after the trees had been planted in four orchards in French regions with differing climates (Rhône-Alpes, Bourgogne Franche Comté and Nouvelle Aquitaine). The principal result of these efforts was the harvest of three truffles in 2019 and four in 2020 from the orchard in Nouvelle-Aquitaine. These are therefore the first truffles to be harvested in an orchard outside the natural distribution range of this species.

Truffle growing has seen considerable global growth in recent years. In France it is also developing in many regions, enabling farmers to diversify their activities while respecting the environment: truffles are an agroecological crop that does not require chemical inputs and favours biodiversity. The results of this study now open the way towards the cultivation of *T. magnatum* outside its natural distribution range, on

condition of planting high-quality mycorrhized trees in appropriate soils and ensuring the correct management of orchards.

Joël Giraud, French Minister of State for Rural Affairs, attached to the Minister for Territorial Cohesion and Relations with Local Government praised this world first in truffle-cultivation.

“As former MP of the Hautes-Alpes and member of the government in charge of rural territories, I would like to congratulate this world first in truffle growing. It is a perfect illustration of the capacity of rural areas to innovate, which the government supports and encourages”.

A fungus worth its weight in gold

Truffles are fungi that live in strict association with trees (mycorrhizal symbiosis) where each benefits from the other. The truffle draws from the soil the minerals that are essential for the tree, which in exchange supplies sugar to the truffle. There are 180 truffle species in the world, but only a few are of gastronomic and economic interest. The best known are the black truffle (*Tuber melanosporum* Vittad), the summer or autumn truffle (*Tuber aestivum* Vittad) and the white truffle (*Tuber magnatum* Vittad).

The white truffle, better known as the Alba or Piedmont white truffle, is mainly harvested in the Balkans and Italy where it is a crucial component of the cultural heritage. At a European scale, it is of considerable economic importance, with forest harvesting alone generating income estimated at €0.9 billion a year. Because supply is always much lower than demand, this truffle with its distinctive aroma can be sold for between €1500 and €3000 per kilo. But prices soar each year during the auction season, when they can reach €50,000 per kilo!

The INRAE/ROBIN research programme

Truffle cultivation is based on the technique of controlled mycorrhization, a symbiotic relationship between a young tree - such as an oak - and a fungus, the truffle. Plants mycorrhized with black truffle (*T. melanosporum*), also called truffle plants, were developed during the 1970s by INRA in Clermont-Ferrand. Today, 90% of black truffle production in France comes from orchards of mycorrhized plants. For the white truffle (*T. magnatum*) controlled mycorrhization has been much more difficult to develop, which is why until now it could only be harvested in forests.

A partnership between INRAE and Pépinières ROBIN, initiated in 1999, has enabled the development of a reliable method for the large-scale production of plants mycorrhized with *T. magnatum*. This joint research programme led to the breeding of the first mycorrhized plants in 2003. In order to valorise this exclusive know-how through the production and sale of plants mycorrhized with *T. magnatum*, Pépinières ROBIN signed a right of option for a license with INRAE Transfert. In 2008 this right of option became a licensing agreement for exploitation of the INRAE/ROBIN process. The mycorrhized plants thus produced are now sold by Pépinières ROBIN following individual morphological and DNA controls by INRAE staff.

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About Pépinières ROBIN

Pépinières ROBIN was founded by Max Robin in 1948 at Saint Laurent du Cros in the Hautes-Alpes region of France. Given its geographical situation and local demand, Max ROBIN initially specialised in the production of forest plants for mountain reforestation.

He would very soon be developing innovative solutions, such as the first ROBIN ANTI-CHIGNON® pots to improve the performance of his plants.

Joined by his son Bruno in 1980 and then by his two daughters, Christine and Cécile, the ROBIN family set up a controlled mycorrhization laboratory in 1988 at Saint Laurent du Cros with support from ANVAR (the French Research Valorisation Agency). In this laboratory, using cutting-edge technologies and thanks to qualified and skilled staff, Pépinières ROBIN was very soon mastering all the steps in controlled mycorrhization.

As well as this facility, it equipped itself with nursery greenhouses and acclimatisation systems to ensure the satisfactory growth of young mycorrhized plants at the second production site operated by Pépinières ROBIN in Valernes in the Alpes de Haute Provence.

Thus for more than thirty years, Pépinières ROBIN has been producing mycorrhized plants under controlled conditions using numerous fungi, and notably:

- HIGH PERFORMANCE CONTROLLED MYCORRHIZED PLANTS®: young forest plants that can improve performance in terms of rooting and growth in forest plantations, and particularly under difficult conditions of poor soil or drought.
- Plants for the production of edible mushrooms: PLANTS CHAMPIGNON ®
And for the cultivation of Lactarian or Boletus mushrooms in a MUSHROOM ORCHARD®
- HIGH QUALITY TRUFFLE PLANTS such as *Tuber melanosporum*, *Tuber aestivum* and *Tuber aestivum* var. *uncinatum*, for planting under numerous plant species. These different truffle plants have been produced under license and controlled by INRAE since 1996.

At a very early stage, Pépinières ROBIN naturally became interested in mycorrhization, with *Tuber magnatum* being the rarest and most sought after type of truffle.

This global first of the controlled production of *Tuber magnatum* under truffle plants outside the natural distribution range of this truffle has thus confirmed the position of Pépinières ROBIN as a world leader in the field of controlled mycorrhization.