

Nursery production in the poplar sector: statistics for Italy

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ABSTRACT This study analyses trends in the certification and commercialization of poplar nursery material in Northern Italy from 2019 to 2024, with the aim of estimating new plantation areas and forecasting wood availability for industrial use. Poplar cultivation in the Mediterranean region relies on certified, high-quality planting material produced by specialized nurseries using clones registered in the Italian National Register of Basic Materials (RNMB) or other European registers. Data collected annually by Council for Research and Agricultural Economics (CREA) in collaboration with regional authorities and FederlegnoArredo reveal that over 97% of certified poles are from RNMB-listed clones, with a significant share now consisting of clones with greater environmental sustainability (MSA). Although the traditional 'I-214' clone continues to dominate, interest in MSA clones, particularly 'AF8' and 'Tucano', has grown steadily. Piedmont remains the leading region in certified pole production, accounting for nearly 80% of the Northern Italian total in 2024. By correlating certified nursery production with field inventory data, it is estimated that 6,000 hectares of new plantations are established annually, potentially producing 0.7 million m³ of roundwood. This predictive capability is critical for strategic planning across the poplar wood supply chain. Despite a general increase in certified material and wood prices, the sector still faces challenges such as limited foreign trade data and a persistent domestic supply deficit. Continued monitoring and nursery adaptation to market trends will be key to supporting sustainable and productive poplar cultivation in the years ahead.

KEYWORDS: Nurseries, poplar, wood availability, clones.

Introduction

In the Mediterranean area, poplar stands are cultivated following specific protocols with the goal of producing high-quality wood for industrial purposes (Nervo et al. 2024). While cultivation techniques play a key role, the foundation of high-quality wood production lies in the use of certified planting material. For this reason, farmers rely on specialized nurseries to supply plants of selected clones registered in the Italian National Register of Basic Materials (NRBM) (decree of Agricultural Ministry of 30 December 2020) which currently includes 89 different clones. The quality of basic material is ensured by the high level of expertise that Italian nurserymen show in the breeding and care of tending (watering, fertilizing, weeding, and pruning) nursery material, that is sold with optimal characteristics for successful establishment in poplar plantations. Every year, the Research Centre for Forestry and Wood of the Council for Research and Agricultural Economics conducts a survey of certified poplar nursery material available for sale. This survey provides an indirect estimate of surfaces potentially planted with poplar trees.

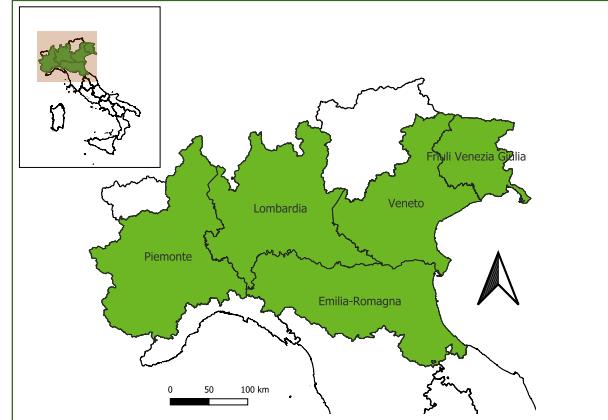
The following section will present an overview of certification and market statistics for Italian poplar nursery material from 2019 to 2024 along with an estimation of planted surfaces for the same years.

Materials and methods

The data collection and processing activities, made in collaboration with Federlegno Arredo (<https://www.federlegnoarredo.it/>) primarily focus on five regions of Northern Italy, where poplar cultivation is particularly established and supported by a dedicated supply chain:

Piedmont, Lombardy, Emilia-Romagna, Veneto and Friuli-Venezia-Giulia (Fig. 1). These five regions account for 94% of Italy's total poplar cultivation area with about 12,500 ha in Piedmont and 20,000 ha in Lombardy as principal Regions (Corona et al. 2018).

Figure 1 - Map of the Italian Regions considered in the statistics.



The data presented below, are related to number of poplar poles cultivated in the nurseries and ready to sell (certified) to farmers for poplar stand establishment. These data were obtained from nursery campaigns conducted between 2019 and 2024.

Each year, data are collected from the Regions on the number of certified poles, categorized by clone and age (one or two years). Although this information does not reflect the actual plant material marketed for assessing new poplar plantations (not all prepared material is sold and not all sold material survives the plantation) it serves as a reliable predictive indicator for assessing new poplar plantations and, consequently, the future availability

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of wood for industry. The statistics derived from certified material allow to:

- (i) asses the conditions of the Italian nursery market in the poplar sector;
- (ii) estimate the annual poplar surfaces planted with certified vegetative material;
- (iii) estimate the poplar surfaces that will reach maturity in the coming years, and predict the future availability of wood for industrial use;
- (iv) evaluate the availability of new MSA (Greater Environmental Sustainability) clones, resistant to the major poplar diseases and woolly aphid, in comparison to the traditional 'I-214' clone (Corona et al. 2023)

Through previous investigations, a correlation had been identified between nursery production and, through ground surveys conducted for the Poplar Inventory (Rizza et al. 2024), the area under newly planted poplar trees. Considering 60 percent of nursery production, an average planting density of 300 trees per hectare, and an average cropping rotation of 11 years, it is possible to estimate the future amount of poplar area available for harvest.

We categorized the data grouping the MSA clones, compared to the traditional 'I-214' clone, clones registered for biomass for energy purposes and new clones registered for environmental purposes.

The raw dataset underlying these analyses is openly available on Zenodo (doi.org/10.5281/zenodo.15781310).

Results

Clones for industry purposes

In 2019, approximately 3,831,002 poplar poles were certified. About 50.5% were of the 'I-214' clone, and around 30.8% were from the MSA group. The two most available clones in the nurseries were 'I-214' and 'AF8'.

In 2020, around 4,674,856 poplar poles were certified. Of these, 51.5% were poles of the 'I-214' clone, and 28.0% were of the MSA group. 'I-214' and 'AF8' remained the two most available clones, with 'AF8' also being certified in larger quantities among the MSA group. In all the period considered, this year saw the highest level of certified poplars, with a decrease in subsequent years, settling at around 3,000,000 certified poles annually.

In 2021, approximately 3,554,094 poplar poles were certified, marking a decrease from the previous year. 'I-214' accounted for 56% of the certified material, confirming its continued popularity among poplar growers and industry. Only 23.4% of the certified material was from the MSA group. The number of MSA clones certified decreased from 14 in 2019 to 12 in 2021.

In 2022, about 3,261,721 poplar poles were certified. The 'I-214' clone covered 47.9% of the certified material, while the MSA group represented approximately 28.5%. This year marked a slight shift in interest towards MSA clones, not in the number of poles certified, but in the number on clones, which increased to 26 (compared to just 12 in the previous year). Some clones were reintroduced, and some new ones were added. Along with 'AF8',

'Tucano' became one of the most certified clones.

In 2023, a further drop in certifications was recorded, with only 2,597,628 poles being certified. 'I-214' accounted for 50.2 % of the certified material, while the MSA group rose to 34.9%. The number of MSA clones remained at 26, with increased interest in 'AF8' and 'Tucano'.

In 2024, certification numbers increased, returning to levels like 2019, with 3,803,639 poplar poles certified; 31% were MSA clones (26 clones), with 'I-214' representing 45.8% of the certified material. Both 'AF8' and 'Tucano' registered further increases in certification.

The trend of the past 6 years, broken down by clone groups, is shown in Figure 2.

Clones for other uses

Regarding clones for biomass purposes, the amount of material certified increased from 577,420 poplar poles in 2019 to 808,900 in 2024, representing 15% of total in 2019 and 21.3 % in 2024. In both 2019 and 2024, the most certified clone for biomass purposes was 'AF18'. Considering black poplar clones for environmental purposes, 5,090 one-year-old poles were certified in 2024.

The trend for the past 6 years, broken down by clone groups, is shown in Figure 1 while all the data available by year and by clone are viewable in Table S1 in supplementary material.

The regional distribution of certification

Among the Regions of Northern Italy, Piedmont has consistently been the Region with the highest number

Figure 2 - Number of poplar poles certified by clonal groups from 2019 to 2024.

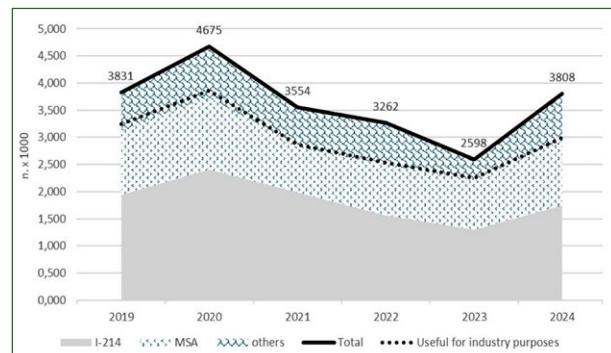
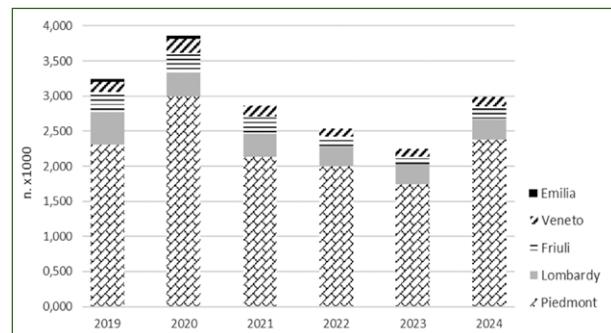


Figure 3 - Number of poplars certified for each Region. The values include only the clones for industrial uses (without 'others' values). Data from Emilia were available only until the year 2022.



of certified poplars in the years considered, followed at a distance by Lombardy (Fig. 3). In 2024 Piedmont produced 79.5% of the total of Northern Regions and the Cuneo province (in Piedmont) produced 82.6 % of Piedmont total and 69% of all the Regions considered with only 12 nurseries.

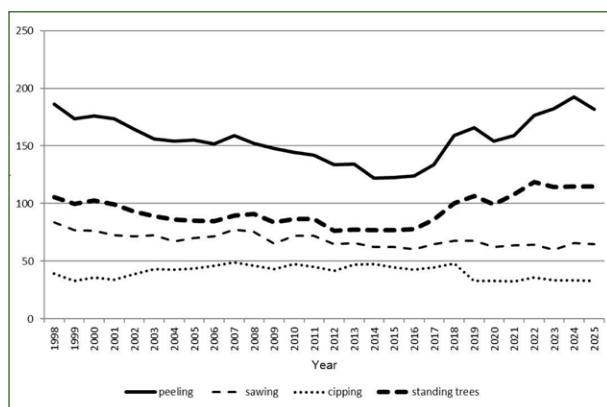
Estimation of newly planted poplar surfaces

Considering that approximately 60% of the certified material for industrial purposes is actually sold and considering a planting density of around 300 trees per hectare over an 11-year cycle, we calculated the annual poplar stand surfaces and the potential availability of wood for various uses (plywood, sawn timber, packaging, particle boards, and others). We estimated an average of 6,000 new hectares per year with an average production of 200 m³ per hectare, corresponding to about 700,000 m³ of roundwood annually available in the Country for plywood, that accounts for approximately one-third of the raw material processed by plywood industries (FAO 2024).

Discussion and Conclusions

Over the past 6 years, the number of certified poplars has shown a slight increase, following a period of stagnation that occurred between 2011 and 2015. The increase in certified material began in 2016, but it wasn't until 2019 that the number of certified poplars exceeded 3,000,000 again, a level not seen since 2001. The trend described above was stimulated by the rise in poplar wood prices since 2016, as highlighted in Figure 4.

Figure 4 - Deflated prices for the assortments of poplar wood and for standing trees.



At the same time, the cost of the material has increased in recent years, rising from € 4.00 per two-year-old poplar pole in 2016 to € 5.10 in October 2024. The 'I-214' clone accounts for half of the total certified poplars, while all MSA clones together represent approximately 30% of the certified material. These data reflect, in part, the growing interest in cultivating clones that require fewer inputs, but above all the participation in the Rural Development Programme measures that require a percentage of MSA clones to be cultivated alongside 'I-214' to qualify for pay-

ments. Regarding regional production shares, Piedmont Region maintains the lead since 2019, registering 79.5% of the whole production of the Northern Regions considered in 2024, confirming that few nurseries produce most of the total poplar nursery material.

The participation of the Regions in the communication of data is of particular importance. It also allows for projecting future plantations and forecasting the availability of wood material for industry. Exchanges of propagation material occur with other European Countries, but the actual quantities traded are not investigated.

Based on the above, it is possible to assume that from 2028 there will be an increase in available poplar surfaces for harvesting, potentially reaching 6,000 hectares.

The nursery sector, particularly in the poplar sector, will plan future production based on the wood market conditions and the industrial activity anticipated in the coming years. The continued deficit in domestic poplar wood production, expected to persist in the medium term, could positively impact the wood market and encourage new poplar plantations. In this regard, specialized nursery companies are trying to increase the availability of poplars by offering a broader range of clones, which is essential for achieving more sustainable poplar cultivation.

Acknowledgements

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