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POPULUS ALBA: A KEY SPECIES IN THE AGROFORESTRY SYSTEM ESTABLISHED IN CÂRCEA, DOLJ COUNTY

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Abstract: Agroforestry systems play a vital role in mitigating climate change impacts, especially in vulnerable regions like southeastern Romania, where drought significantly challenges young forest stands. In 2023, twenty 24m x 24m plots were established in HortiNova Nursery, located in Cârcea, near Craiova, Dolj County, combining forest species and agricultural crops. In two of these plots the combination between white poplar (*Populus alba* L.) and strawberry was introduced. This study aimed to assess the survival rate of the planted white poplar seedlings and their growth in height and collar diameter in the first year after planting. Additionally, climatic data (temperature, relative humidity, and precipitation) were collected using six HoBo sensors (Onset Computer Corporation) and one iMETOS 3.3 data logger. Soil analyses were conducted by the Dolj Office of Pedological and Agrochemical Studies. Out of the 144 white poplar seedlings, only 3 failed to survive, resulting in a survival rate of 97.9%. The shortest young tree measured 1.42 m, whereas the tallest one reached 3.34 m. The smallest collar diameter was 0.72 cm, while the largest was 6.12 cm. These findings indicate that the young white poplar trees exhibited strong growth and adaptability, contributing to their success in an environment with poor soil quality and minimal rainfall. In the face of rising temperatures and decreasing rainfall, white poplar remains a viable option for establishing both traditional forestry cultures and innovative agroforestry systems, especially in regions with poor forest land, such as Dolj County.

• Introduction

Agroforestry systems are receiving growing global attention due to their various benefits for both landowners and the environment, protective forest shelterbelts being one of the most common agroforestry systems worldwide and especially in Romania. These systems have been utilized for a long time, with the traditional concept and knowledge of integrating trees into farming being passed down through generations.

Romania has significant experience in using poplar species for afforestation and ecological restoration of forest ecosystems impacted by various factors, including landslides. Additionally, poplars have been employed in the afforestation of sandy soils in the southern part of the Oltenia Region.

The aim of this study was to assess the survival rate and the increment of white poplar seedlings in an agroforestry system established in HortiNova Nursery.

• Materials and methods

The experimental plot is in Cârcea, near Craiova (Dolj County; 44°16'53.6"N, 23°55'37.7"E), within the HortiNova nursery. The total area of 1.15 hectares was divided into 20 square plots with sides of 24 m, each containing a unique combination. Two plots were dedicated to the combination of white poplar and strawberries. The seedlings were locally grown and planted on November 26, 2023.

Each of the two plots consisted of 6 rows of white poplar, with 24 seedlings per row, spaced 4 meters apart between rows and 1 meter between seedlings within a row. Strawberries were planted between the white poplar rows on the same day, with a spacing of 50 cm between each plant. Additionally, in plot no.7, an irrigation system was installed on July 6, 2024, on row no. 2 and on 4 out of 5 rows with strawberries, and a quantity of 36 cubic meters of water was distributed on each row until the end of August 2024 (Figure 1).



Figure 1. Day of planting (a) and day when the irrigation system was installed (b)

On March 6, 2025, the height and collar diameter of the seedlings in plot no. 7 were measured. The height (H, m) was recorded using a telescopic measuring rod (Figure 2a), while the collar diameter (D, cm) was measured with a digital caliper (Figure 2b). The mean, minimum, maximum values, standard deviations, and coefficient of variation were calculated using Microsoft Excel.

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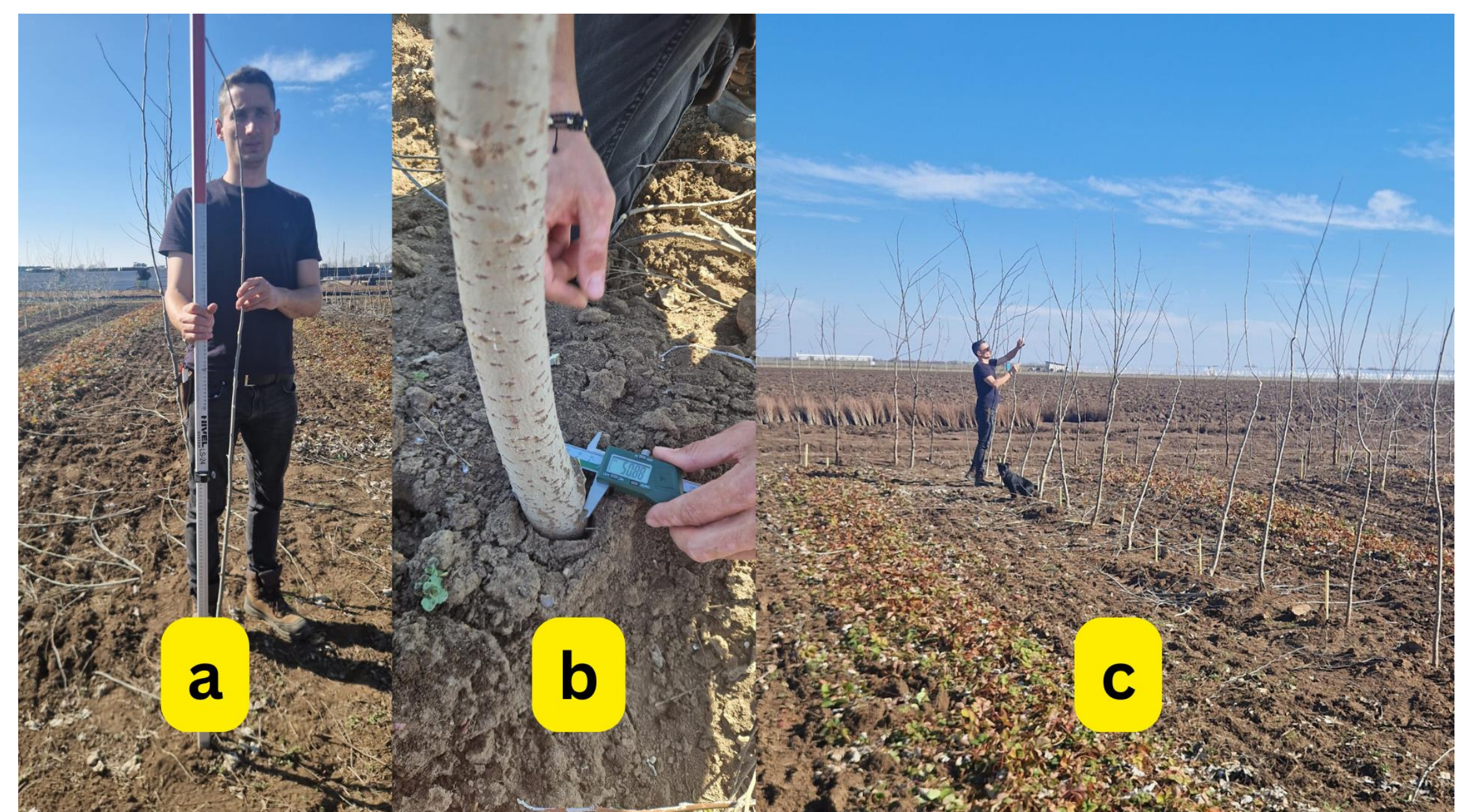


Figure 2. Measuring the height (a), the collar diameter (b) and performing artificial pruning (c)

• Results and discussions

Of the 144 white poplar seedlings, only 3 did not survive, resulting in a survival rate of 97.9%.

The shortest young tree measured 1.42 m, whereas the tallest one reached 3.34 m. The smallest collar diameter was 0.72 cm, while the largest was 6.12 cm.

The maximum mean values for both height and collar diameter were recorded for the seedlings from row no. 2, where the irrigation system was installed. The mean values were 2.25 m in height and 3.98 cm in collar diameter, respectively.

• Conclusions

These findings suggest that the white poplar young trees demonstrated robust growth and adaptability, which contributed to their success in an environment marked by poor soil quality and a very low amount of rainfall.

The growth in both height and collar diameter was greater in the irrigated cases compared to those where no irrigation was applied.

In the current climate, characterized by rising temperatures and decreasing rainfall, white poplar continues to be a viable option for establishing both traditional forestry cultures and innovative agroforestry systems, particularly in areas with poor forest land, such as Dolj County.

Agroforestry focusing on white poplar could be beneficial in the southern part of Oltenia region prone to high soil erosion and desertification, particularly given the effectiveness of its cover management in reducing erosion rates.