

## EFFECTS OF CULTIVATION CONDITIONS ON THE HERB YIELD OF BASIL (*OCIMUM BASILICUM* L.)

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### Abstract

Basil (*Ocimum basilicum* L.) is a medicinal, culinary, and aromatic plant cultivated worldwide that has gained increasing attention because of its economic and health-related importance. Improving its cultivation technology may contribute to higher yield and better product quality, particularly under regions with different environmental and soil conditions. The aim of the present study was to evaluate the cultivation potential and yield performance of basil under the soil conditions of the Nyírség region (Hungary) and to compare the effects of different cultivation practices on yield.

### Introduction

*Ocimum basilicum* L. (basil) is a member of the Lamiaceae family and is widely cultivated worldwide as a medicinal, culinary, and ornamental plant. It is distributed from Central Africa to Southeast Asia and plays an important role in horticulture, gastronomy, and medicinal plant research (Varban et al., 2014; Beldean et al., 2020; Kissvarga, 2024; Keskinbaş and Sağlıker, 2026). Basil is believed to have originated in northwestern India, although it has been cultivated for thousands of years in tropical regions of South Asia, Africa, and Central America (Allen, 2020; Ivanova et al., 2023).

In Central Europe, basil became widespread during the sixteenth century, while it was introduced into Hungary through Germany in the middle of the twentieth century. The earliest references to basil in Hungarian literature can be found in *Herbarium* by Péter Méliusz Juhász and *Posoni kert* by János Lippai. Today, in addition to Hungary, the major basil-producing countries include Spain, Turkey, Italy, Egypt, Pakistan, and Bulgaria (Bernáth, 1994; Bernáth, 2000; Bernáth, 2013; Bernáth & Németh, 2007).

In Hungary, basil cultivation generally requires irrigation because of the prevailing climatic conditions. Consequently, large-scale field production is limited, and cultivation is mainly carried out in greenhouses and as potted plants (Radácsi, 2014). The success of basil production largely depends on the genetic background of the cultivars and the cultivation practices applied. The main objectives of basil breeding are to increase yield and improve postharvest keeping quality (Nagy, 2021).

### Materials and Methods

The experiment was conducted in 2024 near Pócspetri, Szabolcs-Szatmár-Bereg County, Hungary, on loess-derived sandy soil. Two basil (*Ocimum basilicum* L.) cultivars, 'Genovese' and 'Red Rubin', were included in the study. Seedlings were raised in the greenhouse of the Demonstration Garden of the University of Nyíregyháza using Kekkila seedling substrate. Seed germination was determined from a sample of 100 seeds, resulting in a germination rate of 78%.

The seedlings were transplanted into the open field on 22 June 2024 (Figure 1). Two cultivation treatments were applied during the experiment: an intensive treatment, consisting of daily irrigation and two foliar applications of OmeX Super fertilizer during the growing season, and a semi-intensive treatment, consisting of daily irrigation only. The effects of these treatments on plant growth and yield were evaluated.



Figure 1. Transplanting basil seedlings into the experimental field at Pócspetri in 2024.  
*Source: Photograph by the author.*

Harvesting was carried out on 4 August 2024 (Figure 2). The fresh weight of the plants was determined using a digital balance. After two weeks of natural air drying, the dry weight was also measured. Based on these measurements, fresh and dry biomass yields, as well as their corresponding yields per hectare, were calculated.



Figure 2. Manual harvesting of basil followed by drying. *Source: Photograph by the author.*

## Results

Both basil (*Ocimum basilicum* L.) cultivars adapted successfully to the open-field growing conditions at Pócspetri in 2024; however, considerable differences in yield were observed between cultivars and cultivation treatments. In all cases, the intensive treatment, which combined daily irrigation with foliar fertilization, resulted in higher fresh and dry herb yields than the semi-intensive treatment based solely on daily irrigation.

At the first harvest, the 'Red Rubin' cultivar produced 6000 kg ha<sup>-1</sup> fresh herb yield and 408 kg ha<sup>-1</sup> dry herb yield under the intensive treatment, whereas the 'Genovese' cultivar achieved 5468 kg ha<sup>-1</sup> fresh herb yield and 818 kg ha<sup>-1</sup> dry herb yield. At the second harvest, yields increased in both cultivars. The highest yields were again recorded for the 'Genovese' cultivar under the intensive treatment, reaching 6994 kg ha<sup>-1</sup> fresh herb yield and 1057 kg ha<sup>-1</sup> dry herb yield (Figure 3).

The second harvest also demonstrated the good regrowth capacity of both cultivars. Dry herb yield increased by approximately 29% in the intensive treatment of the 'Genovese' cultivar and by about 20% in the intensive treatment of the 'Red Rubin' cultivar compared with the first harvest. Under the semi-intensive treatment, the increase in yield was smaller for both cultivars. Overall, the results indicate that, under the conditions of the present study, the 'Genovese' cultivar had the highest yield potential. Furthermore, the intensive cultivation treatment, combining irrigation and foliar fertilization, clearly increased both fresh and dry herb yields.

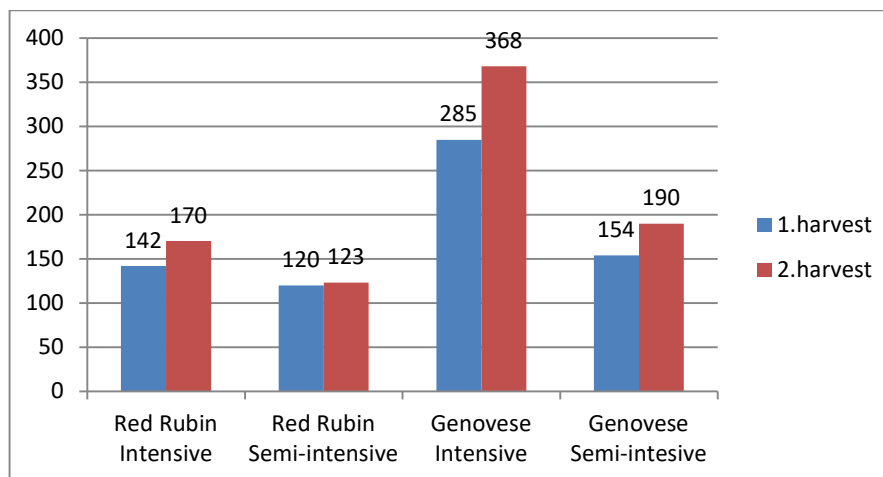


Figure 3. Dry basil yield in 2024, expressed in grams, after the first and second harvests.

## Conclusions

The results of the 2024 field experiment demonstrated that, under the studied growing conditions, intensive cultivation, combining daily irrigation with foliar fertilization, had a positive effect on basil yield. Among the two cultivars evaluated, 'Genovese' showed the highest yield potential, particularly in terms of dry herb yield, whereas 'Red Rubin' produced lower yields. The increase in yield observed at the second harvest in both cultivars confirmed the good regrowth capacity of basil when appropriate cultivation practices were applied. These findings indicate that basil can be successfully cultivated on the loess-derived sandy soils of the Nyírség region under irrigated conditions. However, the application of intensive cultivation practices is recommended to achieve higher yields.

## Summary

Basil (*Ocimum basilicum* L.) is an important medicinal, culinary, and aromatic plant, the cultivation of which in Hungary generally requires irrigation. The aim of this study was to compare the yield performance of the 'Genovese' and 'Red Rubin' basil cultivars and to evaluate

the effects of intensive and semi-intensive cultivation practices on loess-derived sandy soil in the Nyírség region, Hungary. Fresh and dry herb yields were determined at two harvests during an open-field experiment. The intensive treatment, combining daily irrigation with foliar fertilization, consistently produced higher fresh and dry herb yields than the semi-intensive treatment based solely on daily irrigation. Among the two cultivars, 'Genovese' exhibited the highest yield potential, particularly in terms of dry herb yield. Yields increased at the second harvest in both cultivars, confirming the good regrowth capacity of basil. The results indicate that basil can be successfully cultivated under the environmental conditions of the Nyírség region when appropriate irrigation is provided, while the application of intensive cultivation practices can further enhance productivity.

**Keywords:** *Ocimum basilicum* L., basil, Genovese, Red Rubin, cultivation practices, herb yield, irrigation.

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