Comparative Assessment of Yield and Essential Oil Characteristics of Arapgir Purple Basil (Ocimum Basilicum L.) Cultivar Grown in Arapgir and Battalgazi, Türkiye.

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Abstract. This study aimed to evaluate and compare the yield components and essential oil characteristics of the local Arapgir Purple Basil (*Ocimum basilicum* var. purpurascens.) cultivar cultivated in two distinct ecological regions of Türkiye: Arapgir and Battalgazi. Arapgir, located in Malatya province, is recognized as the leading location in Türkiye for the cultivation of the Arapgir Purple Basil due to its long-standing production tradition and favorable microclimate. Battalgazi, also situated within the same province and agroecological zone as Arapgir, was selected for this study to investigate whether comparable yield and quality parameters could be achieved outside the primary production area but within similar environmental conditions. Field trials were conducted during the 2021 growing season under uniform agronomic practices. The key agronomic traits examined included fresh herb yield, dry herb yield, dry leaf yield, essential oil content, and essential oil yield. Results indicated that Battalgazi exhibited increases in fresh and dry herb yield as well as dry leaf yield compared to Arapgir. However, essential oil content showed a slight decrease in Battalgazi, while essential oil yield increased due to the higher biomass production. These findings suggest that while Arapgir remains a prominent location for high-quality essential oil production, Battalgazi may offer an advantageous alternative for achieving greater biomass and overall essential oil output. The results underline the importance of regional environmental factors and support informed decision-making for site-specific basil cultivation strategies.

Keywords: Arapgir Purple Basil, Essential Oil Yield, Fresh Herb Yield, *Ocimum Basilicum* Var. Purpurascens, Regional Comparison, Türkiye

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1 Introduction

Basil (Ocimum basilicum L.) is an aromatic herb known for its culinary and medicinal applications, largely due to its essential oil content. Natural products derived from medicinal and aromatic plants have been extensively used for centuries due to their therapeutic properties[1] Purple basil (Ocimum basilicum var. purpurascens), belonging to the Lamiaceae family, is an important medicinal and aromatic plant known for its distinct purple leaves and strong aromatic fragrance [2]. In recent years, local cultivars such as the Arapgir Purple Basil have gained attention for their potential in sustainable aromatic plant production in Türkiye [3]. Recognized for its favorable microclimate and deep-rooted cultivation tradition, Arapgir in Malatya province has emerged as Türkiye's foremost production site for Arapgir Purple Basil [3]. Battalgazi, a district within the same agroecological zone, was selected for comparative analysis to explore the potential for achieving equivalent agronomic and quality outcomes under similar environmental conditions. This study aimed to assess the influence of location specifically, Arapgir and Battalgazi districts on the agronomic performance and essential oil properties of this cultivar.

2 Materials and Methods

The field study was conducted during the 2021 growing season under comparable agricultural management practices in two regions: Arapgir, known for its cooler, highland climate, and Battalgazi, characterized by a warmer and more temperate environment. At harvest, the following parameters were measured: fresh herb yield (kg ha^{-1}), dry herb yield (kg ha^{-1}), dry leaf yield (kg ha^{-1}), essential oil rate (%), and essential oil yield (L ha^{-1}). The essential oil content was determined using 1 L Clevenger distillation apparatus. The data were statistically analyzed and presented as mean ± standard error.

3 Results and Discussion

The data demonstrate a distinct yield advantage for Battalgazi across all biomass parameters (Figure 1.). This can be attributed to its more favorable climatic conditions for vegetative growth. On the other hand, Arapgir showed a slightly higher essential oil concentration, potentially due to environmental stress factors such as cooler nights and lower humidity, which can enhance secondary metabolite synthesis.

The higher essential oil yield in Battalgazi is primarily due to the larger biomass, despite a slightly lower oil concentration (Figure 2.). These findings align with previous reports suggesting that total biomass plays a dominant role in oil yield under commercial production scenarios [4].

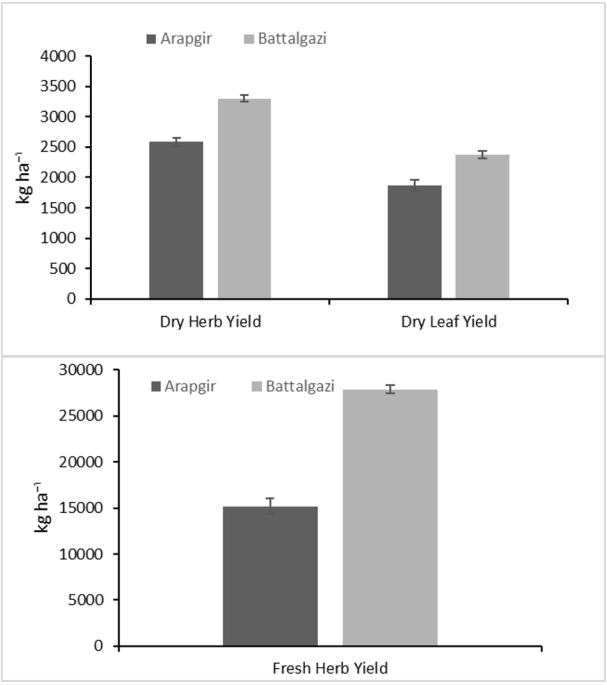

Fig. 1. Dry herb and leaf yield, and fresh herb yield (kg ha^{-1}) of Arapgir Purple Basil (*Ocimum basilicum* var. purpurascens.) in two different locations (Arapgir and Battalgazi)

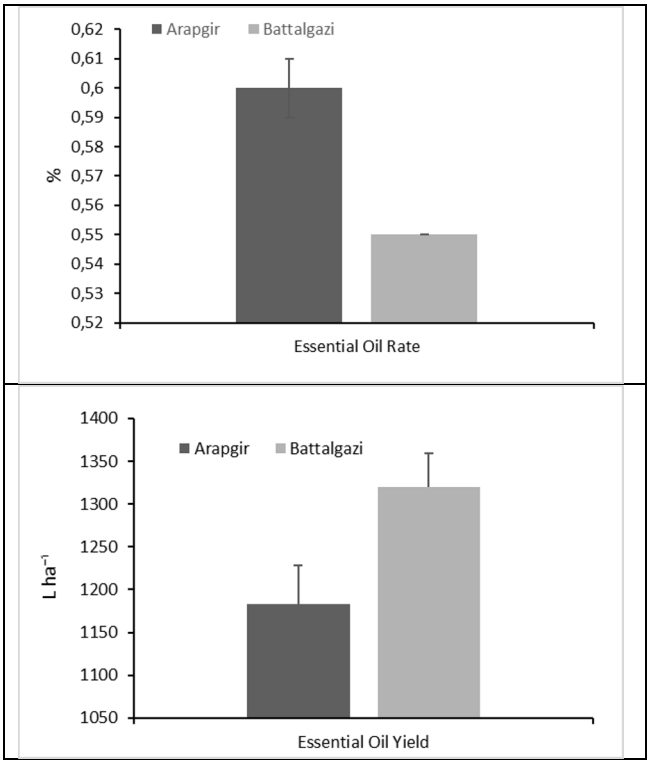

Fig 2. Essential oil rate (%) and yield L ha^{-1}) of Arapgir Purple Basil (*Ocimum basilicum* var. purpurascens.) in two different locations (Arapgir and Battalgazi)

4 Conclusion

The Arapgir Purple Basil cultivar demonstrated notable adaptability to both Arapgir and Battalgazi regions. While Battalgazi proved superior in terms of total yield, Arapgir may be preferred for producing high-quality oil with a slightly higher concentration. This research provides region-specific insights that can inform cultivation strategies for farmers, extension services, and the herbal product industry in Türkiye.

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References

1. Genç, N., Yıldız, İ., Karan, T., Eminağaoğlu, Ö., Erenler, R. Antioxidant activity and total phenolic contents of Galanthus woronowii (Amaryllidaceae). Turkish Journal of Biodiversity, ***2***(1), 1-5. (2019)
2. Loughrin, J. H., Kasperbauer, M. J. Light reflected from colored mulches affects aroma and phenol content of sweet basil (*Ocimum basilicum* L.) leaves. *Journal of agricultural and food chemistry*, ***49***(3), 1331-1335.(2001)
3. Altay, K., Dirim, S. N., Hayaloglu, A. A. Effects of different drying processes on the quality changes in Arapgir purple basil (Ocimum basilicum L.) leaves and drying-induced changes in bioactive and volatile compounds and essential oils. *Journal of Food Science*, ***89***(12), 9088-9107 (2024)
4. .Tüfekçi, C., Gunduz, K., Uğur, Y. (2023). The effects of location and harvest period interaction on yield and some quality traits in arapgir purple basil. (2023)