The Influence of Different Drying Methods on Essential Oil Content and Composition of Peppermint (Mentha piperita L.) in Çukurova Conditions

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ABSTRACT

Objective: Peppermint (Mentha piperita L.) is largely cultivated and commercialized in several countries to produce peppermint oil and its medicinal compounds, cosmetic products and food purposes.¹,² In this study, the influence of different drying methods on essential oil content and composition of peppermint was determined. Material and Methods: The plants were dried separately in the sun, shadow and oven at 38°C for 48 h. The dry material was then submitted to hydro distillation in order obtain to essential oil. The chemical composition of essential oil from the flowering aerial part of peppermint analyzed by GC/MS. Results: Plant height (22.7 – 31.8 cm), fresh (750-992 kg da⁻¹) and dry herbage yield (245 - 351 kg da⁻¹) were measured. The highest essential oil content (3.68 %) was obtained from shadow drying method, the lowest value (2.78 %) was obtained from drying under sun. The major compounds (menthone and menthol) showed no sharp difference among the three drying methods. Conclusion: The drying method affected strongly the essential oil composition of dry peppermint.

Keywords: Peppermint, Drying methods, Yields, Essential oil, Menthol.

INTRODUCTION

Peppermint (Mentha piperita L.) is a valuable essential oil and spice plant from the Lamiaceae family. Peppermint is largely cultivated with commercial purposes in several countries for the production of peppermint oil and its medicinal constituents, having applications in cosmetic and food industries.¹ Peppermint leaves are harvested several times in a year. Herbs are naturally dried under sunlight and this drying method is widely used in many countries. Herbs and spices have been exported as dried products for preservation. The method of drying usually has a significant effect on quality and quantity of the essential oils form such plants.² The aim of the present study was to determine the influence of different drying methods (sunshine, shade and oven-drying at 38 °C) on dry herbage yield and essential oil content and composition of peppermint (Mentha piperita L.).

MATERIALS AND METHODS

This study was conducted at the Department of Field Crops, Faculty of Agriculture, University of Çukurova, Adana, Turkey. Field trial was conducted in a randomized complete block design, with three replications. Plants were rooted in greenhouse from December (2015) until March (2016). The seedlings were transplanted to experimental field at 31st March, 2016. In the flowering
RESULTS AND DISCUSSION

Results of variance analysis showed that fresh and dry herbage yields and essential oil contents were affected significantly by the drying treatments (Table 1). The highest dry herbage yield (351 kg da⁻¹) was observed in the shade dried plants, while the lowest (245 kg da⁻¹) was obtained from sun-dried plants. The highest level of essential oil was observed in the shade-dried plants, with no significant differences from that of oven-dried plants. The lowest level of essential oil was observed in sun-dried plants. That results are in agreement with earlier work done by previous researchers. In spite of all technical developments, the choice of the correct drying temperature remains as central economic and ecological criterion in the drying of medicinal plants. Chemical composition of essential oils varied according to drying methods (Table 2). Content of dominant component (Menthone) was 39.138 %, along with Menthol 17.337% in the sun drying method. In the essential oil obtained from shade-dried herb, contents of menthone was 37.178 %. In the essential oil obtained from the oven-dried herb, the essential oil obtained from the oven-dried herb, the essential oil obtained from the oven-dried herb, the essential oil obtained from the oven-dried herb, the essential oil obtained from the oven-dried herb.
contents of Menthone and Menthol were 40.390 % and 16.078 %, respectively.
Many articles have reported menthol as the main component of peppermint essential oil\(^1\), according to this study, the main component of peppermint essential oil was menthone.
Changes in the concentrations of essential oil compounds during drying process depend on several factors, such as drying method, age of plants and cultivation conditions\(^2\). Quantities of the different components of essential oil were not affected by drying methods, there were little differences between the values of the first four components, the highest menthone value (40.39 %) was obtained from oven drying method. The major compounds, menthone and menthol, showed statistically non-significant difference among the three drying methods, nevertheless, a higher amount of menthone was obtained by oven-drying method.

**CONCLUSION**

From the results it can be concluded that the highest essential oil contents was observed in plant material dried under shade followed by oven drying methods. The drying methods did not affect the composition of the essential oil. However, shade-drying method could be suggested as the more convenient method to isolate peppermint essential oil.

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**CONFLICT OF INTEREST**

None

**ABBREVIATIONS USED**

GC/MS: Gas Chromatography/ Mass Spectrometry; MSTAT-C: Analysis of variance; C: Celsius; LSD: Least Significant Differences; CV: Coefficient of Variation; RT: Retention Time.

**REFERENCES**


**SUMMARY**

- This study reports the influence of different drying methods on essential oil content and composition of peppermint.
- Three drying methods (sun-drying, shade-drying and oven-drying at 38°C) were investigated in order to find the most suitable method for drying.
- The highest dry herbage yield and essential oil content were observed in the shade-dried plants.
- Chemical composition of essential oil changed in small quantities according to drying methods.

**PICTORIAL ABSTRACT**

Peppermint harvesting

Shade-drying gave the best results

Drying a sun b-shade c-oven drying

Herbage yield and essential oil content

**ABOUT AUTHORS**

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Çalışkan et al.: Drying methods of Peppermint

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Ebru Yaşa KAFKAS completed her first degree and her PhD at the Çukurova University Adana provinces of Turkey on strawberries. She currently holds the position of Professor of the University of Çukurova, Faculty of Agriculture, Department of Horticulture and also a member of Biotechnology Department at the same university. Her scientific interests focus on breeding on fruit quality characteristics especially aroma, taste and and health related phytochemicals such as phenolics and antioxidant capacity using chromatography and spectrophotometric techniques. She also focus on plant secondary metabolites and their synthesis that have an ecological role in horticultural plants. She interests biotechnological tools such as gene transformation and gene expression of berries and nuts.

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