



ISSN 1313 - 8820
Volume 3, Number 2
June, 2011

AGRICULTURAL SCIENCE AND TECHNOLOGY

2011

An International Journal Published by Faculty of Agriculture,
Trakia University, Stara Zagora, Bulgaria

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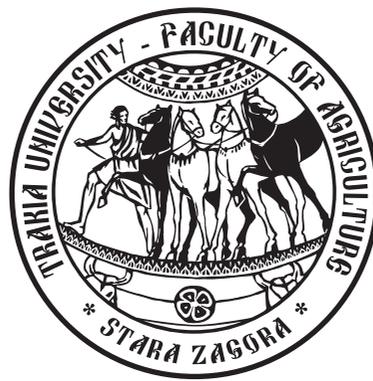
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ISSN 1313 - 8820

Volume 3, Number 2
June 2011



*AGRICULTURAL
SCIENCE AND TECHNOLOGY*

2011

An International Journal Published by Faculty of Agriculture,
Trakia University, Stara Zagora, Bulgaria

Essential oil content and composition of Thyme "German winter"

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Abstract. Thyme "German winter", thymol type was investigated for yield essential oil in four stage: buttoning, full blossom, end blossom and 7 days after blossoming period. Essential oil contents changes from 0.28 to 0.41% in fresh inflorescence. In stage buttoning it has the lowest value but during full blossom the highest. Essential oil contents after drying increases to 3.3 times and reaches 1.32–1.42%, to absolutely dry material 1.55% but essential oil yield has a decrease tendency with 5-10%. The quality and quantity composition of essential oil are saved without important change. It shows that Thyme "German winter" can be distilled fresh as well as dry form.

Keywords: *Thymus vulgaris*, German winter, thymol.

Introduction

Thymus are perennial herbaceous plants from the family Lamiaceae coming from the Mediterranean, characterising itself with wide species and intraspecific diversity. It is grown for upper ground part where is accumulated essential oil in range 0.15% - 2%. According to the component composition of essential oil they are split into three types of essential oils – whit main component respectively tymol, geranyol and citral.

The species "German winter" (*Thymus vulgaris* cv. German), French thymus (*Thymus vulgaris* cv. "French"), English thymus (*Thymus vulgaris* cv. "English") Silver thyme (*Thymus vulgaris* cv. "Silver Posie") Wild thymus (*Thymus serpyllum*) and variety Variko 3 (*Thymus vulgaris* L) belong to thymol hemotip. Widely leaves thyme (*Thymus pulegioides*), Golden thyme (*Thymus citriodorus* cv. 'Golden Queen'), variety "Slava" (*Thymus vulgaris*), variety "Pagane" (*Thymus marschillianus*) belong to the another two types (Badi, 2004; Yankulov, 2000). Essential oil of thyme is obtained by steam distillation of harvested annuals plants in dry or fresh condition. (Georgiev and Stoyanova, 2006).

Determination of optimum time for thymus gathering is main moments, which warrant obtaining height quality and profitable production from it. There is some controversial opinion about harvest time of thymus by different explorers. Best economic indicators are obtained when overhead raw material has been gathered in phase full blossoming (Arraiza et al., 2009; Hudaib et al., 2002). In some investigation are reported the best yield of essential oil has been obtained after full blossom, in the middle of vegetation and in the beginning of blossom but the lowest in seed formation. (Badi et al., 2004; Jordan et al., 2006; Ozguven and Tanci, 1998; Omidbaigi et al., 2008) Therefore optimum phase of thymus harvest have to be estimated taking into account the biological characteristics of the variety and the influence of soil and climatic factors. In Bulgaria the period of thymus blossom coincides with same of oil-bearing rose when manufacturing capacity has been occupied fully. The only possibility of its processing is by distilling of dried matterils at a later stage. Investigation by Marzouk et al. (2009)

and Yazdani et al. (2006) say that content of the basic ingredients is maintained in essential oil of dry thymus but the yield decreased.

In relation to the longer term and the possibilities for processing the raw material in this work we have studied the yield and quality of oil from dry and fresh thyme variety "German winter". The aim of this study is to determine technological maturity of that variety in the conditions of the Kazanlak valley and its possibility for manufacturing in dry form.

Material and methods

For the requirement of the survey is used thyme (*Thymus vulgaris*) variete "German winter" grown in the botanical garden of the Institute of Roses, Aromatic and Medicinal Plants, Kazanlak. The raw material is collected in summer and sunny days at lunch time during four phase: buttons forming, full blossom, end of blossom and 7 days after blossoming period. The fresh thyme is dried under atmospheric condition, on thin layer in ventilated room without direct sunlight. The moisture has been determined by drying to constant mas (Stoyanova et al., 2008). The essential oil has been obtained by water distillation for 2 hours, in laboratory glass apparatus of the British Pharmacopoeia, and modified by Balinova and Dyakov. Essential oil qualification has been carried by gas-chromatography analysis ISO 11024-1 and ISO 11024-2.

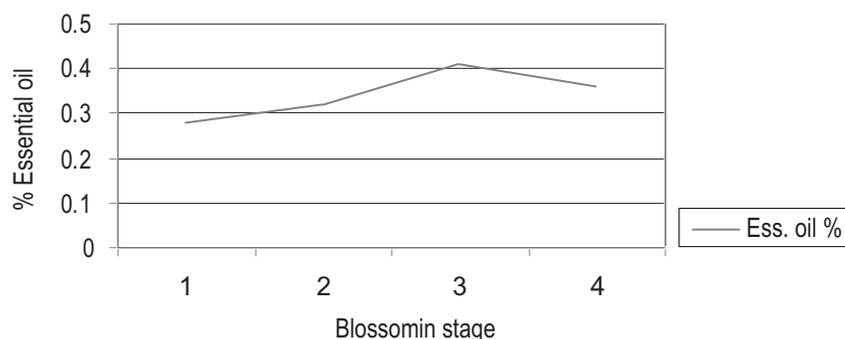
Results and discussion

In the process of variety "German winter" study, after conducted phenological observations we have been found a forms with different pace of development: Form 1 – standard, Form 2 – early blossom and Form 3 – late blossom. Dates of essential oil content and component composition are given in Table 1. In Form 1 has been made a comparison between fresh and dry material. In Form 2 and 3 the datas are from the distillation of dry material.

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Table1. Essential oil content and composition of different forms thymus "German winter" ADM - absolutely dry mass

| | Forms "German winter" | | | | |
|--------------------------|-----------------------|-------|-------------|------------|-------|
| | Form 1 | | Form 2, dry | Form 3 dry | |
| | Fresh | Dry | | 1 | 2 |
| Contents of ess. oil | 0.41 | 1.37 | 1.2 | 1.3 | 0.9 |
| Contents of ess. oil ADM | 1.71 | 1.55 | 1.36 | 1.47 | 1.02 |
| α thujone | 0.9 | 0.67 | 0.44 | 0.53 | 0.72 |
| α pinene | 0.53 | 0.44 | 0.6 | 0.67 | 0.68 |
| camphene | 0.39 | 0.34 | 1.49 | 0.76 | 0.59 |
| sabinene | 0.6 | 0.71 | 1.07 | 1.16 | 1.26 |
| β pinene | 0.22 | 0.2 | 0.19 | 0.25 | 0.32 |
| α terpinene | 4.72 | 3.84 | 0.46 | 1.69 | 0.57 |
| p-cymene | 4.6 | 4.9 | 10.87 | 7.76 | 17.02 |
| 1.8 cineol | 1.98 | 1.88 | 0.69 | 2.03 | 2.89 |
| γ - terpinene | 9.7 | 7 | 0.98 | 1.26 | 1.5 |
| borneol | 1.71 | 1.97 | 8.97 | 3.46 | 2.06 |
| terpinene -4-ol | 0.34 | 0.31 | 2.02 | 1.36 | 2.17 |
| bornyl acetate | 0.05 | 0.06 | 0.04 | 0.12 | 0.05 |
| thymol | 57.6 | 58.94 | 47.83 | 50.88 | 39.71 |
| carvacrol | - | - | 0.48 | 6.17 | 0.41 |
| β caryophyllene | 0.05 | 0.06 | 0.13 | 0.17 | 0.04 |
| α bisabolol | 0.09 | 0.09 | 0.09 | 0.25 | 0.05 |

**Figure1.** Amount essential oil in different blossoming stage. 1-buttons forming;2- beginning of blossom; 3- full blossom; 4 - end of blossom

The dates reveal that during drying of fresh drug content of essential oil increased by 3.3 times and reached 1.37 % and to absolute dry mass to 1.55%. The content of essential oil, however has tendency toward decreased by 5-10%. With respect to component composition, we can say that significant differences doesn't occur in the quantities of test substances as a result of drying the raw material. Thymol is the main component in this thyme chemotype and it is maintained in the range of 57.6 - 58.9%. There is a slight change associated with increasing of borneol, sabinene and p-cimene and reduction of α -thujone, α and γ - terpinene.

In the forms examined, except differences in the degree of development and there is a change in values of some components. The early and late forms have lower levels of thymol by the standard, as the least it is in "late 2 – 39.71% and higher content of p-cemene, which increased from 4.9% to 17.02% again in Form "late 2". These differences could be attributed by the conversion of γ -terpinene during p-cemene to thymol (Poulose), which occurs in varying degrees in the different forms. The sum of these components in the late and early form is almost identical – 58.23%–59.68%. Only in Form 2 is noticeable increase in borneol (8.97%) component with a

positive impact on problems with airways, which, like the thymol influence of bronchitis and cough. In the other forms its value is 1 to 3%.

On Figure 1 is given yields of essential oil from buttoning stage until the end of flowering. The graph shows that its amount is the least in the buttoning stage, increased intensively in early flowering and reaches a maximum at full blossoming. Towards the end of flowering period, essential oil decreased, but remains within the beginning of flowering. Consequently, the most – appropriate time to harvest Thyme "German winter" in order to obtain the best yield is during the mass flowering phase.

Conclusion

The contents of essential oil vary of 0.28% to 0.41% in fresh inflorescence. There are the lowest value in buttons forming stage and the highest in full blossom stage. The content of essential oil relative to raw material weight are increased to 3.3 time and reaches

1.32 –1.42% after fresh plants are dried, towards absolutely dry weight it is 1.55% but content of essential oil has a tendency to decreasing with 5-10%. The quality and quantity essential oil composition are kept without important change after raw material drying that means thymus “German winter” should be distills fresh as well as in dry condition.

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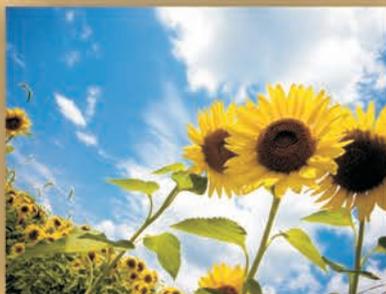
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Volume 3, Number 2
June 2011



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