FACTORS AFFECTING THE MAIN CHEMICAL CONSTITUENTS OF SOME ESSENTIAL OILS

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T H E S I S
Submitted in Partial Fulfilment for the
Degree of
M. Sc.
i n
Agricultural Chemistry

Faculty of Agriculture
University of Ain-Shams

1977

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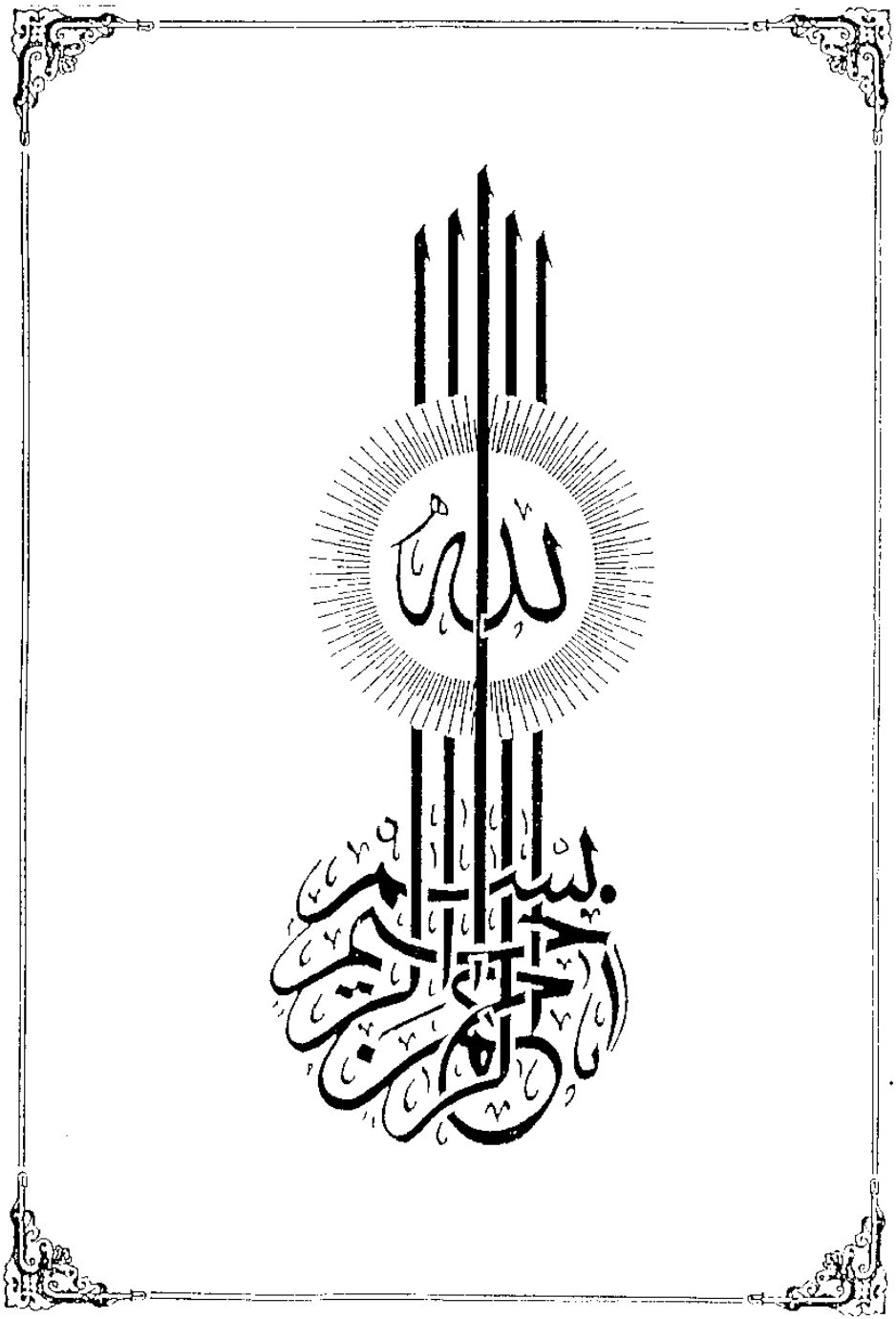
Committee in Charge

Date: / /1977



ACKNOWLEDGEMENT

The author wishes to thank Dr. Fathy A.Abdel Hafez, Professor of Organic Chemistry, Ain-Shams University, for the continuous help, and criticism during the supervision of this work.

Thanks to Dr. Ahmed E. Osman, who suggested the problem,for his kind help and assistance during the course of the present investigation.

The constant care by Dr.Shawky El-Hendawi in the section on solubility behaviour should not be overlooked.

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I- INTRODUCTION

In Egypt, aromatic plants generally occupy a prominent economical position because of the continuous demand for their volatile products from foreign markets. The local consumption of such volatile products, though limited, should not be completely overlooked. The areas cultivated with aromatic plants increased considerably in the last decade which is quite understandable in terms of the highly favorable environmental conditions prevailing in Egypt, besides other additional factors, of which the increasing demand from foreign market for certain essential oils. It should be emphasized that the whole situation must be handled very wisely since the increase in production usually leads to lower prices for such products.

The area cultivated with geranium plant amounted to 12400 Feddans in 1975, as compared with 512 Feddans in 1966 according to the Department of Statistics, Ministry of Agriculture. The production of geranium oil amounted to 100 tons in 1976. However, the prices of the oil fluctuated considerably from one year to another, owing to several factors known to producers, economists. In addition, the expansion in cultivated areas with

geranium plant does not necessarily mean a high productivity of geranium oil per unit cultivated area. This is undoubtedly important to both growers and producers, since high productivity would prove profitable to all concerned. In fact, the published data in Egypt indicated clearly that the productivity of geranium oil per unit area is comparatively small. Such a statement, places Egyptian growers of geranium plants in a very awkward position because they are not in a competitive position with growers in other parts of the world. It seems necessary to state that the vegetative crop is not the basis of comparison, because the production of the rather valuable oil is the ultimate goal. Accordingly, the oil percentage in the plant should directly affect the oil yield resulting from the steam distillation of the vegetative parts of the geranium plant. Thus the total yield of herb per unit area plus the oil percentage in the herb would directly influence the final yield of oil. A good yield of the herb with a low percentage of oil means a great loss in effort and money because the expensive distillation process is not adequately covered financially by the resulting yield of oil.

Such an information points to one of the main factors related to the total oil yield, but it should be added that the quality of the oil is of utmost importance when the oil is exported because the marketed samples must pass certain analytical determinations to satisfy the specifications concerning the quality of the oil.

The present dissertation deals primarily with the following points in connection with the geranium plant :

1- The oil percentage was determined over a period that lasted for three years to determine the best time to cut the herb for distillation.

2- The oil percentage during the day i.e. in the early morning, at noon, and at sun set.

3- The differences in yield and quality between geranium plants grown in the shade and those grown under normal field conditions.

4- The turbid water layer in the condensate from the steam distillation process, generally employed on an industrial scale, was extracted with an organic solvent and the extracted oil was examined and compared with the oil that floated on top of the water layer.

5- The application of the solvent extraction process to obtain the geranium concrete from which the absolute oil was isolated and chemically investigated.

II- REVIEW OF LITERATURE

The literature on the subject is quite immense and could hardly be covered in this thesis. It is rather essential to refer to the collective volumes of Guenther (1972) where a massive amount of data on essential oils was reviewed. The reported information covers the botanical, agricultural and chemical aspects of geranium and undoubtedly the last point includes the distillation methods employed industrially to isolate geranium oil. The presentation of this section includes a thorough review of the topics directly related the present investigation while other topics of less importance were briefly mentioned since they bear very little, if any, relationship to this work. The various topics are presented under the following main headings to facilitate the presentation of the information pertinent to the present dissertation which include :

A) Agricultural notes on geranium plant.

B) Isolation of geranium oil.