PHYSIOLOGICAL AND POST HARVEST STUDIES ON HERB AND OIL OF SOME MINT SPECIES

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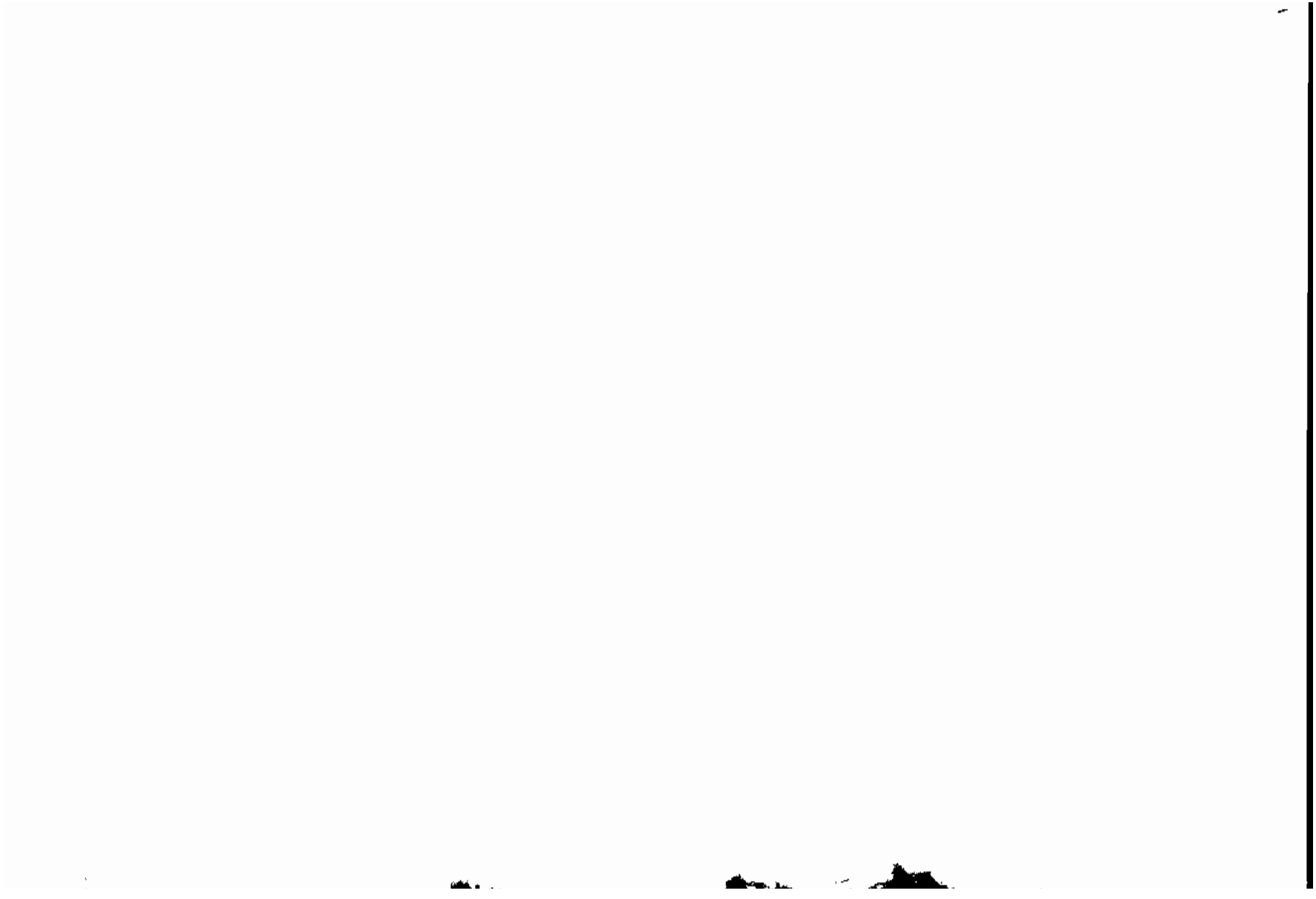

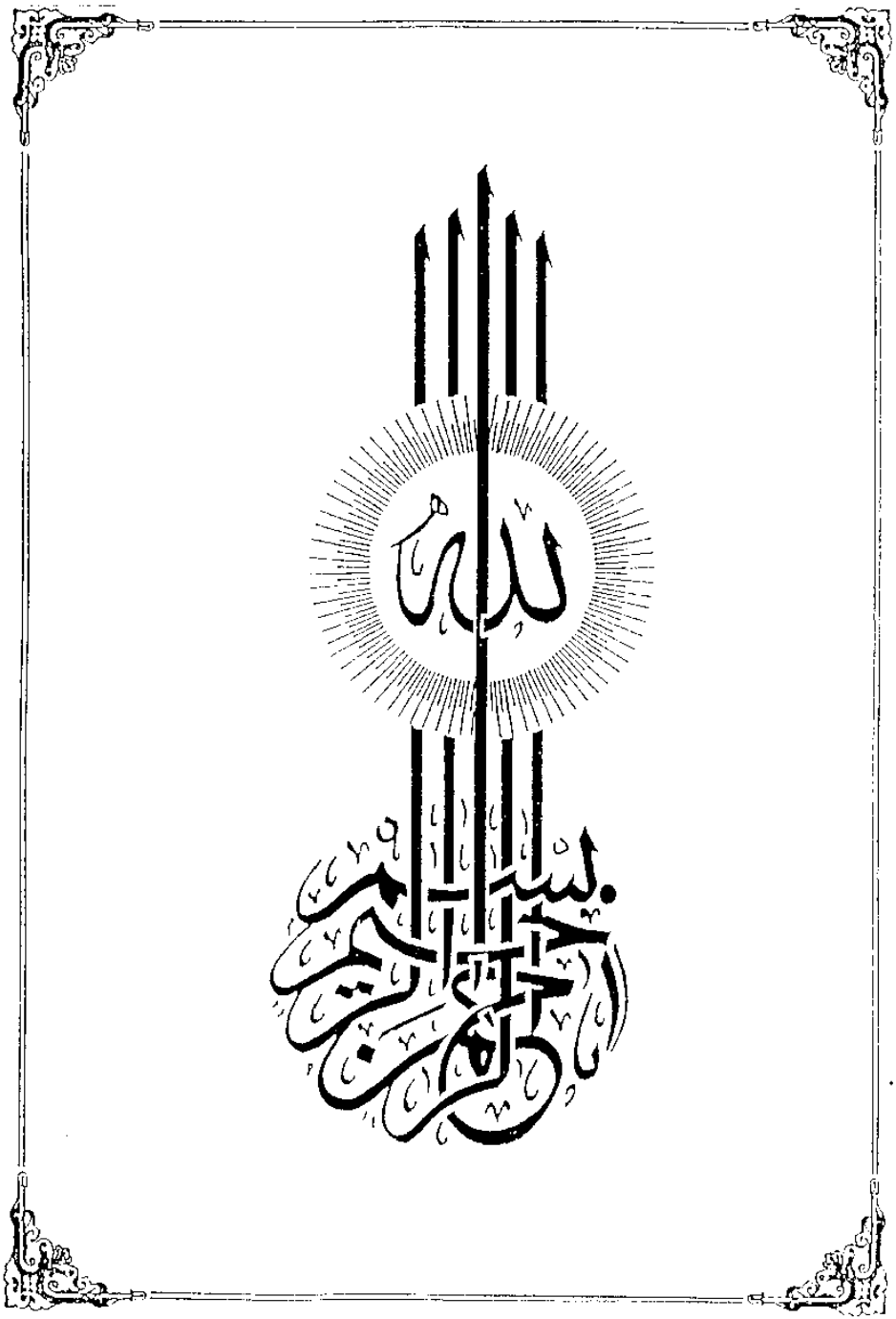

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C O N T E N T S

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INTRODUCTION

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Mint plant is one of the most important aromatic plants in The Arab Republic of Egypt, as well as in many other countries. The essential oil is obtained by distillation from herb or leaves of some special Mentha spp., particularly Mentha arvensis, L., Mentha piperita, and Mentha viridis, L. Fresh and dried herb is a popular spice and the oil of mint as a flavoring agent is extensively used in chewing gums, tooth pastes and many pharmaceutical preparations. The Egyptian farmer shows an increasing interest in cultivating mint as a profitable crop traced from increased acreage in the cropping system from which increased quantities are directed towards export. Vertical intensification in agriculture had brought to some changes in the fertility and the physiochemical properties of the rhizosphere of arable soils after Nile water flooding harness and historically after High Dam. Consequently it was necessary to conduct recurrent studies concerning the nutritional requirements of the plant under such conditions in the general sense. Therefore, one of the objectives of this study aimed to investigate the influence of fertilization methods

and levels on the growth and productivity of three mint species widely cultivated in The Arab Republic of Egypt. Due to the noticeable lack of informations concerning the suitable post harvest processes for this crop such as drying techniques and storage methods of the extracted essential oils , this study was also directed to find out the suitable methods for drying as well as storage of the herb and the oil quality as well.

REVIEW OF LITERATURE

Hornok, 1982. Some of them (Singh; and Nand, and Duhan) attributed the increases in oil content to an increased number of glands specialized in the secretion of the oil.

On the other hand, some other investigators reported that nitrogen fertilization had no effect on the oil content; (Erwin, 1959; Singh et al., 1978, and Bhardwaj et al., 1980). This contradiction is clearly detected from the statement by Ellis, 1960, stated that fertilization of mint had no effect on the oil content (%), although it increased the herb plant yield. He also concluded that, within limits, there was no relation between the total growth and the yield of oil. No element was extremely specific for increasing the production of oil and more elusive than the green or total dry matter. Skrubis, 1964 in a field experiment on mint showed that nitrogen fertilization at the rate of 14.3 g/m^2 had a significant increase on the green matter yield of the first harvest compared with the lower nitrogen levels. Atanasov et al., 1979 working on Japanese peppermint, recommended the compound fertilizer containing N_1 P_2O_5 and K_2O as 100 K_2O

each to be the most economic treatment. However, increasing levels of K-fertilizer to the double, significantly increased the herb yield about 43% than control.

Concerning the effect of nitrogen nutrition on the oil composition, the situation is the same. Some authors showed no effect of nitrogen on the oil composition, Ellis, 1960 and Bayron, 1964. Other authors attributed changes in oil composition to nitrogen nutrition; Latypov, 1960 reported that ammonium sulphate fertilizer increased the essential content 60-85% in mint. Skrubis, 1964 obtained the highest yield of essential oil when mint plants received 143 kg N/ha. Franz, 1972; and Clark and Menary, 1980 attributed such changes to the influence of the added fertilizers on plant maturity rather than on the direction of oil biosynthesis. Ramteke et al., 1975 found that oil yield was increased with increasing N manuring in both Japanese mint and English mint. The fertilization experiments conducted by many investigators included usually the utilization of treatment backages of nitrogen besides phosphorus and/or potassium. Baird, 1957 reported

that adding P an K gave negligible effects on the yield. Bayron, 1964 stated that P and K did not affect the yield but together with N, they affected the oil content but not the composition. Latypov, 1960, mentioned that addition of some mineral fertilizers included potassium sulphate, increased the essential oil content of mint leaves. Moreover, potassium sulphate and ammonium sulphate were superior to the corresponding chloride salts for essential oil formation in Mentha piperita. Skrubis, 1964 studies on peppermint showed that the essential oil yield of the first and second harvest was increased by N and K application. Since N fertilization was added as (21-0-0) at rate of 14.3 g/m^2 and K fertilizer as (0-0-46) at the rate of 17.3 g/m^2, Franz, 1972 showed that N + K did not affect the oil content or composition, Sharma, 1980 and Hornok, 1982 reported that N, P and K significantly increased herb yield as well as oil content. Slavov, 1983 stated that NPK increased the herbage yield but no significant difference was observed in the quantity or quality of essential oil. Hornok, 1973 reported that N had the greatest effect on herbage yield, K was also important, but P had a

slight effect. The nutrients did not affect the oil content. However, he added that increased N rates reduced menthol content while K raised it.

Adamovic et al., 1982 showed that 200 k/ha of NPK gave higher herbage yield than 400 kg/ha, and N alone was better for top dressing than NPK. The highest yield of herbage, essential oil and menthol were obtained with NPK at 200 kg/ha plus two top dressings splits of N at 30 kg/ha. Gupta et al., 1974 and Singh, 1979 expressed the positive effects of phosphorus on the herb and oil production of mint.

Beside the effect of the macro-nutrients, some authors had also studied the effect of the micro-elements on the productivity of mint. They have been either added with the top dressing or as foliar sprays. Sharma et al., 1980 found that herbage and oil yields were further increased with the apllication of copper, zinc,iron and boron over those received N,P and K application alone by about 32,22,27 and 20%, respectively. They added that N, P and K application increased the menthol yield over the control by about 98% whereas the application of copper, iron and boron increased the menthol yield over N, P and K application