STUDIES ON SOME FACTORS AFFECTING PRODUCTION OF SOME MEDICINAL PLANTS AND THEIR ACTIVE INGREDIENTS

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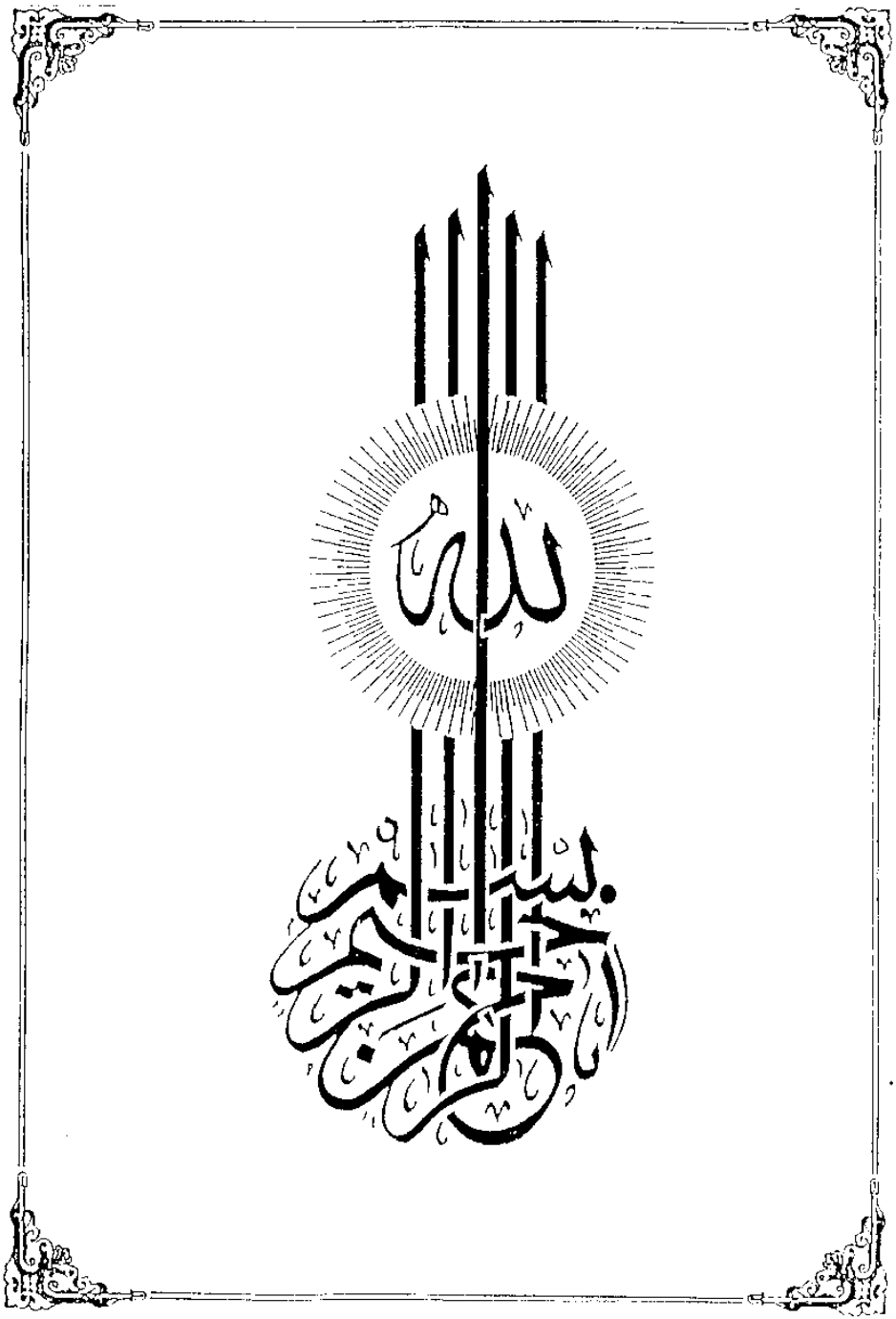

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INTRODUCTION

At the present time, the pharmaceutical industry in many countries is depending to a sizeable degree on prescribed drugs of higher plant origin, as it was long time ago. Higher plants are still an essential source of well-known drugs and are also as crude drugs. Besides, many herbs are used in the health food markets and in cosmetics and other similar products in many countries. Higher plants are continuously gaining grounds in the pharmaceutical industry.

In the Arab Republic of Egypt, attention must be paid to steady expansion in the production of the medicinal plants to satisfy the local consumption and the needs of the rapidly developing local pharmaceutical industry. Some of these plants could also be considered as strategic materials and should be available all the time.

Since there are urgent demands of the foreign markets for many of the medicinal plants as herbs or their active ingredients, a large scale production for export should always be in consideration. There are two plants

with special advantages in this regard; namely chamomile and the Egyptian henbane. The local production of chamomile flowers during the winter and early spring months gives the crop a great worldwide advantage; being the only available freshly harvested one at that time. The European production is in the summer months and the South American production is in the fall months.

The Egyptian henbane has at least four times as much as the alkaloidal content of the other international species.

The Egyptian henbane (Hyoscyamus muticus) is indigenous to and cultivated in Egypt. The drug is used, perhaps entirely, for the extraction of its alkaloids; since they are the major active principles in the plant. Hyoscyamine is an anticholinergic and also is hyoscyamine sulphate and hyoscyamine hydrobromide.

The chamomile (Matricaria chamomilla L.) was found in its wild state in Egypt (Takholm , 1974) and was well known to Ancient Egyptians as an aromatic plant and it has many medicinal uses. Mild infusion of the chamomile flower is used as a remedy against fever, indigestion,

intestinal pain, and as a mild tonic and antispasmodic. The flowers are applied externally against inflamation or irritation. The oil is also used as a flavoring agent in fine liqueurs and is also used in cosmatics. Chamazulene is responsible for the blue color of the oil.

The active ingrediants in the medicinal plants usually appear as secondary metabolites. It was seen important to study the use of a growth regulator in combination with the suitable nutrition requirements to achieve increases in plant growth, development and biosynthesis of the secondary metabolites.

The present work aims at studying the effect of different concentrations of gibberellic acid and different fertilization levels on the growth of the Egyptian henbane and the chamomile and their active constituents. That is to determine the optimum requirements of the plants, under the local conditions, from the nutrient levels and growth regulators to achieve the highest yields.

REVIEW OF LITERATURE

Since the experimental work is dealing with the nutrient requirements of two plants and also the effect of gibberellic acid as foliar sprays and seed soaking, the Review of Literature will be presented with the nutrient requirements and the gibberellic acid treatments as the main parts, and the previous research results closely related for each of the plants as subtitles.

I. Nutrient Requirements:

A. Matricaria chamomilla L. (Chamomile):

Saleh (1962) working with Chamomile, reported that, the increase in the nitrogen level resulted in an increase in the spreading area, as well as, the fresh and dry weights of the plant. In addition, a slight increase in the plant height was noticed. Raising the nitrogen level, caused an increase of 10.9% and 10.5% in the fresh and dry weights, respectively. The 200 Kgs dose of nitrogen increased the fresh weight by 30.3% and the dry

weight by 26.8%. The 300 Kgs dose gave an increase of 59.1% and 60.1% in both fresh and dry weights than the untreated plants, respectively. He also showed that increasing the nitrogen level caused an increase in both oil percent and total amount of the oil per plant. Also, Awaad, et al (1967) found that increasing the level of nitrogen fertilizer caused an increase in the yield of flower heads per both plant and feddan, but the oil and chamazulene content were slightly affected. El-Badry (1970) working on chamomile plant found that nitrogen application markedly increased the yield of flowers, and the second 150 Kgs of ammonium sulphate added was equally effective in increasing the yield of flower as the first one. But increasing the level of nitrogen fertilizer from 300 to 350 Kgs/feddan as ammonium sulphate gave an increase in yield of 30.67%, while raising the dose from 350 to 400 Kgs brought about additional increase in the yield by only 3.54%. He reported that the level of 350 Kgs per feddan of ammonium sulphate was the economical dose. The oil concentration began with a relatively high value then it showed a continuous decrease with age reaching the minimum value at maturity. The oil percentage and yield were not affected by the application of the nitrogen fertilizer. They seemed to increase considerably

in the successive picks during the season and reached the maximum value about the end of February and until the end of March. He also mentioned that nitrogen application appreciably affected the total amount of volatile oil produced. Data also showed that neither the age of the plant nor the nitrogen fertilization had any significant effect on chamazulene percent in the oil. Agena, (1974) working with Matricaria chamomilla L. reported that the addition of nitrogen increased the yield of the dry flower heads produced by chamomile plant. There were significant increases as a result of high and medium levels of nitrogen in comparison with its omission. She found that the high level of nitrogen (450 Kgs ammonium sulphate N_3) produced twice as much yield in the third picking (March 15th) as the plant deprived of nitrogen. There were also significant increases due to the addition of either the medium nitrogen (300 Kgs ammonium sulphate per feddan N_1), although not as much. The high level also gave larger yield than the medium level, this in turn was higher than the low level, but the differences were not always statistically significant. Also the addition of nitrogen increased the mean oil percentages in the flowers. The higher percent of oil was obtained with different level of nitrogen (N_3, N_2 or N_1). Also, Felklova,