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Effect of Mineral and Biofertilizer on the Yield and Constituents of Some Medicinal and Aromatic Plants Grown on Sandy Soil

By

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CONTENTS

1. INTRODUCTION

Medicinal and aromatic plants commercially produced on about 90.000 in Egypt feddans, representing an anuall export income of more than $ 110 million. Egyptian exports of medicinal and aromatic plants occupy the fifth order among all agricultural Egyptian exports. However, the exportation of these crops now faces serious problems due to using chemical fertilizers and pesticides which reduce the exports of these crops due to the concern for human health and environment. Accordingly, the strategy of biological production of medicinal and aromatic plants in desert soils has gained more and more importance during the past few years. Biological production technology of medicinal and aromatic plants can provide the basis for achieving economic and environmental sustainability in Egypt.

The development of biological production depends on the interacting factors of soils and irrigation system. Applied success in this investigation in producing "medicinal and aromatic plants biologically in the newly reclaimed soils well permit to retain the following objectives:

1- Reduce production costs owing to the low costs of bio-fertilizers compared with chemical ones.

2- Permit Egypt to retain a loading economic role as a world supplier of these crops and maintaing competitive prices for our products in an increasingly competitive global market place.

3- Increasing the fertility of desert land for the next growing crop.

4- Reduces the environmental contamination with chemicals.

5- Permit Egyptian growers a greater profit margin for these crops.

2. REVIEW OF LITERATURE

2.1. Effect of nitrogen fertilizer:-

Nitrogen is one of the major plant nutrients. It is built into the molecule of all simple and conjugated proteins that are major constituents of plant cell cytoplasm, and forms part of nucleic acids playing vital roles in the metabolism of living organisms. Nitrogen is present in chlorophyll, enzymes, nitrogenous bases, ... etc., which are of extreme importance to the plant. Accordingly, nitrogen plays an important role in the synthesis of plant constituents through the action of different enzymes.

2.1.1. Effect of nitrogen on vegetative growth:

Shelke and Morey (1979) revealed that the highest yield of green herb of (*Mentha arvensis L.*) was obtained when 40 kg N/ha was used. Increasing the rate of nitrogen up to 120 kg N/ha., led to slight effect on the yield. ***Bhardwaj et al., (1980)*** on *Mentha piperita L.* reported that nitrogen application in three equal doses, at planting, today later, and after the first cut, increased the herb yield. ***Bhardwaj et al., (1983)*** on *Mentha arvensis L.* with 150 or 160 kgN/ha, found that fresh herbage increased with N rate up to the highest rate applied. ***Hussein (1987)*** studied the effect of different nitrogen levels 0,1,2 or 3gm N/plant on some *ocimum pp.* (*O.basilicum, O.canum, O.kilimandscharicum and O.minimum*). He found that addition of nitrogen had significant effects on vegetative growth characters. ***Gelder and Van-Gelder (1988)*** investigated the influence of increasing levels of N application on *Mentha piperita* plants. They stated that higher herbage yield was associated with higher N rates (112-392 kg/ha). ***Hassan et al., (1988)*** studied the effect of 0,1,2 and 3gm of nitrogen per plant on four

species decreased all with N application level. ***Fiad (1993)*** on caraway plants stated that, the second level (400 kg/fed) followed by the first one (300 kg/fed) of nitrogen fertilization as ammonium sulfate, significantly increased plant height as compared with control.

Ughreja and Chundawal (1992) on *Coriandrum sativum* mentioned that, the effects of N at 0,30 or 60 kg/ha were investigated in arab crop of *coriandrum sativum cv. Gujarat coriander-1* in north Gujarat. They found that increasing N application resulted in an increase number of seeds /primary umbles.

Avtar et al., (1993) added different rates of N (0, 50, 75, 100 or 125 kg/ha) to dill (*Anethum graveolens L.*) they found that foliage yield was increased with increasing N up 100 kg N/ha, but decreased at 125 kg N/ha. ***El-Nakhlawy (1993)*** observed that head diameter and plant height of sunflower were increased with increasing N fertilizer at rates of 92, 115 or 138 kg N/ha. ***Ibrahim (1994)*** studied the effect of different levels of nitrogen (0-160 kg N/ha) on safflower. He found that the highest number of safflower capsules/plant was obtained by suing N at 120 kg/ha. Also, stalk yield was increased with increasing N level to 160 kg N/ha. ***Ceylan et al., (1994)*** supplied *Thymus vulgaris* plants with 0-12 kg N/da. They found that plant and leaf yield were highest with 12 kg N/da. ***Leto et al., (1994)*** found that plant height of rape was increased from approximately 95-112 cm without N to 120-125 cm with increasing N rate from 0 to 200 kg/ha. ***Lieres et al., (1995)*** found that yield of *salvia sclarea* was increased with increasing N rates from 0 to 3 gm/pot. ***El-Saeid et al., (1996)*** used different rates of N(0, 60 or 100 kg/feddan) on *Tagetes patula* plants. They found that greatest carotenoids, number of flower, flower fresh and dry weights and cut flower per plant were obtained by using 60 kg N/feddan. ***El-Sherbeeny et al., (1997)*** on *Lavandula officinalis,* showed that urea

Mentha gracilis, found that application of an N fertilizer at 0, 100, 200 and 300 kg/ha decreased the leaf/stem ratio.

Ceylan et al., (1994) supplied *Thymus vulgaris* plants with 0-12 kg N/ha. They found that plant and leaf dry matter yield were highest with 12 kg N/da. ***El-Sherbeeny et al., (1997)*** on *Lavandula officinalis*, showed that urea application of 40 kg N/fed gave the best results in terms herbage yield.

2.1.3. Seed yield:

Zaman (1988) revealed that sunflower seed yield were 1.10, 1.36 and 1.71 t/ha with using N at 0.100 and 120 kg/ha, respectively. ***Garai et al., (1989)*** found that highest seed yield of toria or mustard (764 kg/ha) was obtained at 80 kg N/ha compared with control (166 kg/ha) ***Shrivastova et al., (1989)*** reported that mustard seed yields were 0.30, 0.60, 0.89 and 1.31 t/ha with using 0, 30, 60 and 90 kg N/ha, respectively.

Madiwalar et al., (1990) found that linseed yield was increased with increasing N rates of 30, 60 or 90 kg N/ha. ***Yadav et al., (1990)*** mentioned that 1000 linseed weight was increased with increasing N rate from 0 to 90 kg/ha. ***Khargakharate and Nirwal (1991)*** observed that weight of 1000 seed and seed yield of sunflower were increased with increasing N rates between 40 and 80 kg/ha. ***Sharma (1991)*** used different rates of N (0, 40, 80 or 120 kg/ha) on mustard. He found that seed yield was increased with using N up to 80 kg/ha ***Zaman and Das (1991)*** reported that safflower seed yield was increased from 0.86 t/ha to 1.38 t/ha with increasing N application from 0-120 kg.

Omidbaigi and Hornok (1992) applied N at levels of 0, 50, 120 or 200 kg/ha as a single top dressing on fennel plants. They found that the