SUMMARY

The present work was conducted to study the effect of chemical fertilization and some growth regulators on growth, oil yield and chemical composition of lemongrass *(Cymbopogon citratus L.)* plants.

The experimental work was carried out in the experimental station of the Faculty of Agriculture at Moshtohor, Zagazig University during the seasons of 1996 and 1997.

The study included two main parts:

The first part:

The effect of chemical fertilization on growth, oil yield and chemical composition of **lemon grass**. The first part included two experiments:

Experiment I:

The effect of each nitrogen, phosphorus and potassium fertilizers at different levels either alone or accompanied together as a complete fertilizer on growth, oil yield and chemical composition. Nitrogen rates were 0,50 or 60 kg/fed. using ammonium sulphate (20.5% N) as N source, phosphorus rates were 0,30 or 45 kg/fed. using calcium superphosphate (15.5% P_2O_5) as P source and potassium rates were 0,30 or 45 Kg/fed. using potassium sulphate (48% K_2O) as K source.

The main results were as follows:

1- Nitrogen

* N fertilization treatments advanced vegetative growth of *Cymbopogon citratus* plants measured as number of tillers, number of leaves, fresh and dry weights as well as yearly yield.
* Nitrogen fertilization treatments increased plant height in first and second seasons except the 50 kg /fed decreased it in first season.
- Essential oil percentage and oil yield / plant increased by plants treated with nitrogen fertilizer in both seasons compared to control plants.

- Chemical composition of leaves, plants treated with nitrogen fertilizer increased total carbohydrates, N, P and K percentages in the first and second cuts compared with control plants.

2- Phosphorus:

* In the first cut phosphorus application at different levels increased plant height, number of tillers, number of leaves, fresh and dry weights of both seasons except number of tillers in the first season at the low level.
* Plant height decreased at different level of P fertilizer in the second cut of the first season, also fresh and dry weights of plant decreased in the second cut by plants treated with low level of P. on the contrary in the second season the different levels of P. increased plant height, leaf number, tiller number as well as fresh and dry weights.
* Yearly yield increased in both seasons by phosphorus application compared with control plants.
- The addition of phosphorus increases oil percentage, oil yield and yearly oil yield /plant compared with control plants.

- Phosphorus at different levels increases total carbohydrates, N, P and K percentages in both cuts.

3- Potassium:

* Potassium fertilizer increased plant height, number of tillers, number of leaves as well as the fresh and dry weights/plant in most cases. Also, yearly yield of herb was increased by different levels of potassium in both seasons.

- Oil percentage, oil yield/plant and yearly oil yield /plant increased by different levels of potassium in both cuts of the two seasons.
- Potassium fertilizer also increased N, P and K percentages in plant leaves in the first and second cuts.
- Low level of potassium fertilizer decreased total carbohydrates percentage in plant leaves while high level of K increased it.

4- NPK

* Complete fertilization treatments increased greatly all vegetative growth measurements as number of tillers, number of leaves, fresh and dry weights as well as yearly yield of herb /plant in both cuts of two seasons.

- All levels of complete fertilizer increased oil percentage, oil yield/plant and yearly oil yield /plant in both seasons.
- The high level of NPK (60:45:45 kg/fed) increased citral A,B, total citral, Nerol, citronellol, linalool, geraniol and farnesol, but limonene, myrcene and dipentene were decreased compared with control plants.
- Total carbohydrates, N, P and K percentages in plant leaves were increased by all different levels of complete fertilizer in the first and second cuts.

Experiment II:

Effect of some micronutrients (Fe, Mn and Zn) on growth, oil yield and the chemical composition of **lemongrass** *(Cymbopogon citratus L)* plants.

The concentrations of Fe were (00,100 or 150 ppm), while the concentration of Mn and Zn were (00, 50 or 75 ppm).

The herb was cut twice/season (August and November) data on growth characteristics, oil yield and chemical composition of herb were recorded.

The most important results obtained were:

1- Iron (Fe):

* Spraying of Fe seemed to increase vegetative growth measured as plant height, number of tillers, number of leaves, fresh and dry weights of herb/plant compared to control plants.

- Oil percentage, oil yield/plant and yearly oil yield /plant increased by Fe addition in both seasons.

- Total carbohydrates, N, P and K percentages as well as Fe, Mn and Zn content as ppm in plant leaves increased by Fe application.

2- Manganes (Mn):

* Mn fertilizer advanced growth as plant height, number of tillers, number of leaves fresh and dry weights in both cuts of the two seasons except plant height in second cut of two seasons with low level (50 ppm).

- Mn application increased oil percentage, oil yield and yearly oil yield / plant in both seasons specially with the high level.

- The high level of the Mn (75 ppm) also increase citral A, B total citral and geraniol percentage but limonene, nerol, citronellol, linalool, Farnesol and myrcene were decreased compared with control plants.
- Application of Mn increased total carbohydrates, N,P and K percentages as well as Fe, Mn and Zn ppm.

3- Zinc (Zn):

- Zn addition at low level (50 ppm) decreased all vegetative growth measurements in both seasons, while the high one (75 ppm) increased it.
- The low level of Zn (50 ppm)also decreased oil production / plant in both cuts of the two seasons, while the high level (75 ppm) increased it.
- The low level of Zn (50 ppm) decreased total carbohydrates percentage in both cuts, while the high level (75 ppm) increased it.
- N, P, Fe, Mn and Zn content increased by the two levels of Zn except phosphorus with the low level in the first cut
- All levels of Zn decreased K percentage in both cuts except the low level in the second cut.

The Second Part:

The effect of two growth regulators GA_3 and NAA at different concentrations on the growth and oil yield of **Lemongrass** *(Cymbopogon citratus)* plants were studied the concentrations of GA_3 were (00,300 or 400 ppm), while the concentrations of NAA were (00,120 or 160 ppm).

The most important results obtained were:

1- Gibberellic acid (GA_3).

* GA_3 treatments increased all vegetative growth parameters in both seasons. The superiority in this concern was in favor of the high

concentration (400 ppm) while the low concentration (300 ppm) decreased number of tillers / plant in the first cut. Also the fresh and dry weights /plant in second cut of both seasons.

- The oil percentage was decreased by spraying plants with low level of GA_3 (300 ppm) in the first cut of both seasons compared with high level of GA_3 (400 ppm) or control plants but in the second cut all levels of GA_3 increased oil percentage in both seasons compared with control plants.
- GA_3 treatments increased oil yield/plant and yearly yield in both seasons except low level in the second cut of first season which decreased oil yield/plant.

2- Naphthalin acetic acid (NAA):

* The application of NAA spray at concentration of 120 and 160 ppm increased each of plant height, number of tillers, fresh and dry weights and yearly yield/plant compared with control plants in both seasons. The high level of NAA (160 ppm) was more effective than low level of NAA (120 ppm)on the different parameters in both cuts of the two seasons.

- The oil percentage, oil yield/plant and yearly oil yield/plant increased with NAA treatments in both seasons specially with high level 160 ppm.
- Spraying of NAA at 160 ppm increased citral B, nerol, citronellol, geraniol and myrcene percentages but decreased citral A, total citral, limonene, linalool, farnesol and dipentene.
- Comparing GA_3 and NAA regarding their effects on plant characters under study, it could be concluded that NAA was superior than GA_3 at its different concentrations.

RECOMMENDATION

The results obtained from this study under the conditions of Moshtohor may lead to the following recommendation:

To produce the best vegetative growth and the highest oil yield from **Lemongrass** *(Cymbopogon citratus L.)* it must be fertilized with NPK at the ratio 60:45:45 Kg/fed. Also, sprayed with Mn at 75 ppm and Fe at 150 ppm, as well as spray of NAA at 160 ppm and GA_3 at 400 ppm.