SUMMARY AND CONCLUSION

This work was carried out to study the effect of pre-planting gamma radiation and some micronutrients "Mn and Mo" on soybean "cv. Clark" and peanut "cv. Giza-4".

In this respect, two field experiments were conducted under the condition of newly reclaimed soil, namely: sandy clay loam, to study the effect of radiating soybean and peanut seeds with gamma rays (0, 5, 10, 20, 40, 80 and 160 Gry) before sowing on plant growth, nodulation, yield and yield components as well as total plant content of N and Mn. In addition, four pot experiments were carried out under the greenhouse condition to study the application effect of Mn (0, 5, 10, 15,and 20 ppm) and Mo (0, 2.5 , 5.0, 7.5 and 10 ppm) on plant growth, nodulation and total content of N and Mn of both soybean and peanut plants. The important results could be summarized as follows:

First study:

Effect of radiation on:

A- Soybean:

1- Irradiation of soybean seeds before planting with gamma rays at relatively low doses ranged from 10 to 40 Gry considerably stimulated plant growth causing a great increase in the dry matter production. Maximum growth of soybean plant was obtained by gamma rays at 20 Gry

where dry weight of the whole plant increased by 57-70% over the non-irradiated plants. Whereas, gamma rays at 160 Gry adversely affected the plant growth.

2- Nodulation of soybean plant was highly improved due to pre-planting gamma radiation over the range from 5 up to 160 Gry, particulary the dose of 20 Gry.

3- Irradiating soybean seeds with gamma rays ranged from 5 to 40 Gry before planting, greatly encouraged N uptake by plant and/or symbiotic N_2-fixation by root nodules which resulted in increasing the total accumulation of nitrogen in plant. The highest accumulation of N was found in plants which were produced from irradiated seeds with 20 Gry, whereas the dose of 160 Gry, generally reduced it.

4- Total content of plant Mn showed, to a great extent, the same trend of the total content of plant N.

5- The yield of soybean greatly increased by exposing seeds before planting to 10-40 Gry of gamma rays. The highest productivity of soybean was obtained as a result of gamma rays at 20 Gry. Dose of 160 Gry reduced the yield in comparison with the control.

6- The total content of protein and oil in soybean seeds were positively related to the yield production of beans.

7- The concentration of protein or oil in soybean seeds were

not affected by gamma rays ranged from 5 up to 160 Gry.

8- The seed index values of soybean gradually increased by increasing gamma doses from 0 up to 160 Gry.

9- The yield of soybean tented to be positively related to the rate of plant growth, nodulation and totaI nutrient content.

B- Peanut

1- Plant growth of peanut was stimulated as a result of pre-planting gamma radiation ranged from 10 to 40 Gry. The highest dry matter production was obtained by gamma rays at 20 Gry, whereas the dose of 160 Gry depressed it when compared with the non-irradiated plants.

2- Gamma rays ranged from 5 to 40 Gry resulted in a significant increase in nodules number and the highest average was obtained at 20 Gry. Significant increase in dry weight of nodules was obtained by gamma rays at 10-40 Gry. The dose of 160 Gry tended to be retard nodules number and dry weight.

3- Absorption of N by peanut roots and/or symbiotic N_2-fixation by root nodules considerably increased as a result of pre-planting gamma radiation at 5-40 Gry, particularly at 20 Gry. Whereas, dose of 160 Gry reduced them.

4- The total Mn uptake by peanut plants produced from irradiated seeds with 5-80 Gry of gamma rays was higher than that obtained from the control plants. The dose of gamma rays at 160 Gry resulted in decreasing the accumulatation capacity of Mn by peanut plants.

5- The yield of peanut seeds considerably increased by pre-planting gamma radiation at 5-80 Gry, but it decreased by the dose of 160 Gry. The maximum yield was obtained from gamma rays at 20 Gry. It was clear that the increase was 58-68% over the control.

6- The total amount of protein and oil in peanut seeds were highly related to the yield of seeds.

7- The levels of protein and oil in peanut seeds were not affected by gamma rays which are considered as radio-resistant character to gamma rays up to 160 Gry.

8- Seed index values of peanut tended to increase as the gamma doses increased from 0 to 160 Gry.

9- A positive relationship between seed yield and peanut and plant growth, nodulation and nutrients uptake could be observed.

In general, soybean and peanut exhibited, to a great extent, the same response to pre-planting gamma radiation as far as plant growth, nodulation, nutritional status , yield and yield components were concerned.

Second study:

Effect of manganese on:

(A) Soybean

1- The dry matter yield of soybean plant was considerably stimulated by soil application of $MnSO_4$ at 5-15 ppm Mn and the rate of 5 ppm gave the highest average. Manganese at 20 ppm reduced the dry matter production of soybean plant.

2- Supplying soybean plant with 5 or 10 ppm Mn resulted in increasing the nodules number per plant, Mn at 15 ppm had no significant effect, whereas 20 ppm of Mn caused a decrease in nodules number. The dry weight of nodules increased when received Mn at 5-15 ppm and was slightly declined by 20 ppm Mn.

3- Application of $MnSO_4$ at rates of 5,10 and 15 ppm remarkably resulted in increasing the total accumulation of N in soybean plant derived either from soil or from fixed N. Mn at 20 ppm caused a slight effect on plant N.

4- Total Mn content of soybean plant greatly increased by supplying plants with Mn SO_4 over the range from 5 up to 20 ppm, but the greatest amount of accumulation Mn was obtained in plants which were treated with 5 ppm Mn.

(B) Peanut

1- Soil application of $MNSO_4$, particularly at 10 ppm Mn to

peanut plant, greatly resulted in increasing the production of dry matter yield indicating that Mn had a stimulative effect on plant growth.

2- The nodules number of nodules dry weight exhibited a considerable response to $MnSO_4$ in particular at 10 ppm Mn. Moreover, the maximum increase in nodules number was relatively higher than that of nodules dry weight.

3- The total content of N in peanut plant was markedly increased by soil application of $MnSO_4$ indicating that Mn stimulated N uptake by plant and/or symbiotic N_2-fixation by root nodules.

4- The total uptake of Mn by peanut plant was greatly increased when received $MNSO_4$ from 5 to 20 ppm Mn. However, the rate of increase in Mn uptake was not proportional to the applied Mn where the highest accumulation of it in peanut plant was obtained at 10 ppm.

Third study:

Effect of molybdenum on:

(A) Soybean

1- The production of dry matter yield of soybean plant considerably increased by soil application of Mo ranged from 2.5 to 10 ppm. The highest average was obtained at 7.5 ppm Mo.

2- The nodules number and nodules dry weight of soybean increased due to Mo fertilization especially at the rage of 7.5 ppm Mo.

3- Molybdenum application to soybean plants significantly increased the total N content in plant and the greatest amount of N was accumulated in plants at 7.5 ppm Mo.

4- The total uptake of Mn by soybean plant was greatly enhanced by soil application of Mo, in particular at 7.5 ppm Mo.

(B) Peanut

1- Soil application of Mo to peanut plant resulted in a remarkable stimulation of plant growth. The highest dry matter yield was produced by peanut palnts received 5 ppm Mo.

2- Nodulation of peanut plant as represented by nodules number and nodules dry weight showed a great response to Mo application particulary at 5 ppm.

3- Total N contents of peanut plant, including uptake N from soil and fixed N by root nodules, were enhanced by Mo application, in particular at 5 ppm.

4- Total accumulation of Mn in peanut plant was greatly increased by Mo application, particularly at 7.5 ppm, indicating the Mo exerted a synergetic effect on Mn absorption and translocation.

Finally, the requirements of soybean plant, under the conditions of sandy clay loam soil, to Mo was higher than to Mn and vice versa for peanut plant.