SUMMARY

The investigation included two studies i.e. the first one was field experiment , whereas the second study was carried out in pots .

First study

Two field experiments were performed in the Agricultural Experimental Station of the National Research Center at Shalakan , Kalubia Governorate during 1983 and 1984 seasons to investigate the effect of nitrogen and phosphorus fertilization on growth , yield and its components , and chemical contents of soybean calland cultivar . The levels of nitrogen fertilization were , zero ,20,40,60,80,100 and 120 Kg N/feddan , and the levels of phosphorus fertilization were , zero,30 and 60 Kg P_2O_5/feddan .A split-plot design with six replications was used . The nitrogen levels occupied the main plots, whereas the phosphorus levels represented as sub-plot treatments .

Ten plants were taken as random at 55,76 and 97 days after sowing to take the data of growth measurements .

I- Growth measurements :-

1- Plant height (cm).
2- Number of branches/plant.
3- Number of leaves/plant.
4- Number of flowers/plant .

5-Number of pods/plant. 6-Dry weight of stems in g /plant.

7-Dry weight of leaves in g /plant .

8-Dry weight of pods in g /plant .

9-Leaf area(L.A.)"cm^2" . 10-Leaf area index (L.A.I.)"cm^2/cm^2" .

11-Specific leaf weight (S.L.W.) "mg/cm^2".

12-Specific leaf area (S.L.A.) "cm^2/cm^3" .

At maturity, ten plants were taken at random from the three middle ridges to take the data of yield components, whereas the seed and straw yield were calculated from the yield of whole plots .

II- Yield and yield components :-

1- Plant height "cm" . 2- Number of branches/plant .

3- Number of pods/plant . 4- Number of seeds/pod .

5- Number of seeds/plant. 6- Weight of pod "g" .

7- Weight of seeds in g /pod. 8- Weight of seeds in g /plant.

9- Weight of 100 seeds "g". 10- Seed yield in "ton /feddan".

11-Straw yield in "ton /feddan".

III- Chemical contents :-

1-Photosynthetic pigments. 2-Nitrogen percentage .

3-Phosphorus percentage . 4-Oil percentage .

5-Crude protein percentage was calculated by multiplying nitrogen content by 6.25 .

6- Oil yield "kg/feddan" (calculated by multiplying oil percentage by seed yield/feddan) .

7- Protein yield "Kg/feddan" (calculated by multiplying protein percentage by seed yield/feddan) .

The important results were summarized as follows .

I- Growth Characters

A- The effect of nitrogen fertilizer levels :-

1- There was a significant differences between the averages of number of leaves/plant and dry weight of leaves/plant when the nitrogen levels increased up to 100 Kg/feddan, at 55 days after sowing .

2- The nitrogen fertilization resulted in increasing significantly the number of flowers/plant as well as the number of pods/plant when received 80 Kg N/feddan, at 76 days after sowing .

3- The dry weight of pods/plant became great by increasing the nitrogen level up to 100 Kg/feddan, at 76 days after sowing.

4- At 97 days after sowing , the number of pods/plant and dry weight of pods/plant were affected significantly when received 100 Kg N/feddan .

5- The differences between the averages of leaf area (L.A) ,

leaf area index (L.A.I.) and specific leaf area (S.L.A.) were significant due to the level of nitrogen 120 Kg N/ feddan , at 55 days after sowing .

6- There was a significant increase in leaf area (L.A.), leaf area index (L.A.I.) , and specific leaf area (S.L.A.) when nitrogen was added at the rate of 60 Kg/feddan, at 76 days after sowing as compared with the control .

7- There was insignificant effect for nitrogen fertilization on leaf area (L.A.) , leaf area index (L.A.I.) and specific leaf area (S.L.A.) , at 97 days after sowing .

B- <u>The effect of phosphorus fertilizer levels</u> :-

1- The phosphorus had no significant effect on the plant height, number of branches, leaves, flowers, and pods/plant , dry weight of stems and leaves of soybean plant at 55, 76 and 97 days after sowing . Similar trend was also achieved concernning dry weight of pods/plant , at 76 and 97 days after sowing .

2- Application of phosphorus exhibited insignificant effect on leaf area (L.A.), leaf area index (L.A.I.) , specific leaf weight (S.L.W.) , and specific leaf area (S.L.A.) at 55 and 97 days after sowing . There was a significant decrease in leaf area index (L.A.I.), at 76 days after sowing by increasing the phosphorus level .

C- The effect of interaction :-

There was a significant effect on number of pods/plant due to the interaction between nitrogen and phosphorus fertilizers , at 55 and 97 days after sowing .

II- Yield and yield components

A- The effect of nitrogen fertilizer levels :-

1- The nitrogen resulted in increasing significantly the weight of pod and weight of seeds/pod .

2- Weight of seeds/plant and seed index reached their peaks when received nitrogen fertilizer up to 100 Kg/feddan .

3- There was a tendency to insignificant increase in plant height , number of pods/plant , and number of seeds/plant with increasing nitrogen level .

4- Seed yield of soybean as well as straw yield increased significantly up to the highest level of applied nitrogen , and this was true for different years and the combined analysis except straw yield in 1984

B- The effect of phosphorus fertilizer levels :-

1- Phosphorus levels showed insignificant effect concernning different yield components of soybean plant at time harvest.

2- Seed yield of soybean reached the significant level at 5% in 1983 season as well as the combined analysis . The highest seed yield was obtained with 30 Kg P_2O_5/feddan .

C- The effect of interaction :-

The interaction of nitrogen and phosphorus on seed yield was significant . The highest seed yield (1.900 ton/feddan) was achieved under 120 Kg N and 60 Kg P_2O_5/feddan .

III- Chemical contents

A- The effect of nitrogen fertilizer levels :-

1- Chlorophyll "a" in soybean leaves increased gradually and significantly with increasing nitrogen up to 120 Kg/feddan, at 55 and 76 days after sowing .

2- Carotenoides became great as nitrogen level increased up to 120,100 and 80 Kg N/feddan for 55,76 and 97 days after sowing respectively .

3- Chlorophyll "b" reached its maximum value when nitrogen was applied at the rate of 80 Kg/feddan .

4- There was insignificant differences between the averages of nitrogen and phosphorus percentage in stems and pods of soybean plant owing to nitrogen application .

5- Phosphorus percentage in leaves trended to decrease significantly by increasing nitrogen level .

6- The highest values of oil percentage and protein percentage in soybean seeds were detected at 40 and 80 Kg N/feddan . Furthermore the nitrogen resulted in decreasing these values.

7- There was a significant and gradually increase in oil yield as well as protein yield Kg/feddan when received 120 Kg N/ feddan .

B- The effect of phosphorus fertilizer levels :-

1- Different photosynthetic pigments showed insignificant trend owing to different levels of phosphorus .

2- The nitrogen and phosphorus percentage in stems leaves and pods of soybean were not affected due to phosphorus application .

3- The oil and protein percentage in seeds of soybean were not significantly affected due to application of phosphorus .

4- The highest value of oil yield was 343.1 Kg/feddan and protein yield was 517.9 Kg/feddan, obtained from 30 Kg P_2O_5 / feddan .

C- The effect of interaction :-

1- The differences between the averages of chlorophyll "a" and carotenoides were significant due to the interaction between N x P fertilization at 76 days after sowing .

2- The highest value of chlorophyll "a" achieved with 80 Kg N and 30 Kg P_2O_5/feddan , whereas carotenoides reached its maximum value with 100 Kg N and 60 Kg P_2O_5/feddan.