RESULTS & DISCUSSION

RESULTS AND DISCUSSION

PART : I

SOYBEAN

The effect of soybean sowing dates and plant density under intercropping with maize on yield components and yield :

A- Effect of sowing dates :

The average values of yield components and yield of soybean at harvesting time as affected by soybean sowing dates under intercropping with maize in 1980 and 1981 seasons are presented in Table 4.

1- Plant height :

Data in Table 4, show that sowing dates of soybean did not significantly affect the plant height of soybean in both seasons.

The maximum plant height was obtained by the treatment D_0 (i.e. sowing soybean on the same date of sowing maize), whereas the minimum plant height values were obtained by the treatment D_2 (i.e. sowing soybean early 4 weeks before sowing maize).

These results are true in both seasons. It was clear that sowing soybean earlier before maize resulted in decreasing the plant height.

The results may be due to the good utilization of light intensity at the early growth stages of soybean plants when the shading effect of maize plants was never been found yet.

The increase in the plant height of soybean which resulted by sowing soybean on the same date of sowing maize may be due to the shading effect of maize and the competition between plants for light.

Pendleton et al. (1963) and Metwally (1978), indicated that soybean plants adjacent to corn ridges and in partial shade lodged more than solid plantings, this is expected because of shading effect and stem elongation .

The results were in agreement with those obtained by Metwally (1978) and Eid et al. (1980, b).

2- Weight of plant without pods :

The results in Table 4, show that the differences between the average values of soybean plant weight without pods were significant in both seasons.

The maximum weight of soybean plant was obtained by sowing soybean early 4 weeks before sowing maize, whereas the minimum weight of soybean plant was obtained by sowing soybean in the same date of sowing maize in 1980 and 1981 seasons.

These results indicate that the weight of soybean plant increased by sowing soybean early 2 or 4 weeks before sowing maize under intercropping.

These results may be attributed to the sufficient light, water and nutrients uptake by soybean plants before maize germination and before the begining of competition between the two crops.

In this respect Bowes and Ogren(1970), noted that under maximum light intensity the photosynthetic rates were increased, therefore it is expected that growing soybean plants under tall corn plants may affect light intensity, prevailing in the micro environment of intercropped soybean as compared with soybean pure stand.

These results agree with those obtained by Metwally (1978) and Eid et al. (1980, a).

3- Number of pods / plant :

Data recorded in Table 4, show that the sowing dates of soybean significantly affected the number of pods/plant of soybean which was intercropped with maize in both seasons.

Sowing soybean early 4 weeks before maize gave the highest average value of pods number/ plant of soybean, whereas sowing soybean on the same date of sowing maize gave the lowest one in two successive seasons.

It was clear that the number of pods/ plant of soybean reduced by sowing soybean on the same date of sowing maize, whereas the early sowing of soybean before maize by 2 or 4 weeks increased it.

These results may be due to shading effect of maize on soybean plants and the competition between the two crops for water and nutrients.

The pods set reduced by 57 to 71 % light stress (shading to 5- 16 KLX) also induced severe abscission (Mann and Jaworski, 1970).

These results agree with those reported by El-Sebaie (1970), Omar (1977), Metwally (1978), Eid et al. (1980, a) and El- Shouny et al. (1984).

4- Weight of pods / plant :

The results presented in Table 4, indicate that the average values of soybean pods weight/ plant were significantly affected by soybean sowing dates under intercropping with maize in both seasons.

The maximum weight of pods/ plant of soybean was obtained from the treatment D_2 , whereas the treatment D_0 gave the minimum weight of pods/ plant of soybean in 1980 and 1981 seasons.

These results show that the weight of pods/ plant of soybean increased by sowing soybean early 2 or 4 weeks before sowing maize.

These results may be attributed to enough light , water and nutrients utilized by soybean plants for about four or two weeks before maize germination and before shading and competition of maize plants.

The most ecological factor in intercropping is light intensity and the yield of soybean was found to be sensitive to light intensity (Pendleton et al., 1963).

Also, the increase in pods weight/ plant of soybean for the treatments D_1 and D_2 may be attributed to the increase in pods number/ plant for the same treatments.

These results agree with that reported by Eid et al. (1980, a).

5- Number of seeds/ plant :

The data in Table 4, show that soybean sowing dates significantly affected the number of seeds/ plant of soybean under intercropping with maize in both seasons.

The treatment D_2 gave the maximum numbers of seeds/ plant of soybean which were 127.4 and 135.8, whereas the treatment D_0 gave the minimum numbers of seeds/plant of soybean which were 60.7 and 44.0 in 1980 and 1981 seasons, respectively.

The reduction in the number of seeds/ plant resulted when soybean was sown on the same date of sowing maize may be due to the severe competition between maize and soybean for light, water and nutrients or may be due to the few number of pods/ plant obtained from the same treatment.

In this respect Metwally (1978), reported that the most reduction of soybean yield in intercropping occured mainly due to shading effect of corn and that light intensity is an important factor in soybean production.

These results agree with those obtained by El - Sebaie (1970), Omar (1977), Metwally (1978) and Eid et al. (1980, a).

6- Weight of seeds/ plant :

Table 4, shows that soybean sowing dates significantly affected the weight of seeds/ plant of soybean in 1980 and 1981 seasons.

Soybean sowing date D_2 resulted in increasing the weight of seeds/ plant to 17.4 and 20.5 gm. as compared with 6.6 and 7.5 gm. resulted from soybean sowing date D_0 in 1980 and 1981 seasons, respectively.

Sowing soybean early 2 or 4 weeks before maize increased the weight of seeds/ plant of soybean.

These results may be attributed to more light intensity, water and nutrients utilized by soybean plants for four weeks or more before maize germination and before maize competition.
These results agree with those obtained by Metwally (1978), Eid et al. (1980, a) and El- Shouny et al. (1984).

7- 100 - seed weight :

The data reported in Table 4, show that the differences between the average values of 100- seed weight were significant in one season out of two.

Soybean sowing date treatment D_2 gave the highest average values of 100- seed weight of soybean which were 15.5 and 17.7 gm., whereas the treatment D_0 gave the lowest average values of 100- seed weight of soybean which were 13.2 and 14.7 gm. in 1980 and 1981 seasons, respectively.

It was clear that sowing soybean early before maize by 2 or 4 weeks increased the 100- seed weight of soybean.

The reduction in 100- seed weight of soybean for the treatment D_0 may be due to the severe competition between soybean plants and maize plants for light, water and nutrients which were never found yet for a month or more in the treatment D_2 .

These results are in agreement with those found by Omar (1977), Metwally (1978) and El- Shouny (1984).

8- Seed yield in (kg. / fad.) :

The average values of seed yield/ fad. of soybean as affected by soybean sowing dates under intercropping with maize are presented in Table (4).

It was clear that seed yields of soybean were significantly affected by sowing dates in 1980 and 1981 seasons.

The maximum seed yield of soybean in kg./ fad. was obtained by soybean sowing date treatment D_2 then seed yield reduced by 57.9 and 54.6 % when soybean sowing date delayed to the treatment D_1 in 1980 and 1981 seasons , respectively.

The minimum seed yield of soybean in kg./fad. was obtained by soybean sowing date treatment D_0 and the reduction in seed yield reached 72.9 % and 75.3 % in 1980 and 1981 seasons, respectively as compared with soybean sowing date treatment D_2 .

These results show that the seed yield in kg./fad. of soybean intercropped with maize significantly reduced by delaying the soybean sowing date to the date of sowing maize.

This reduction in seed yield/ fad. may be attributed to the severe competition between soybean and maize for light, water and nutrients when the two crops were sown in the same date.

In this respect Pendleton et al.(1963), reported that corn, a taller growing crop benefited from patterns planting because of the penetration of more light, whereas the soybean a shorter growing crop was at a disadvantage.

Also, Johnston et al. (1969), found that increasing photosynthesis increased yield, they provided supplemental irradiance to the lower partly - shaded leaves of a canopy and increased their photosynthesis. Yield was increased because more nodes were produced on branches.

The seed yield of soybean is principally a function of seed number produced except in the case of stress, delayed planting and factors limiting high yield (Chas, 1971).

These results are in a harmony with those obtained by El- Sebaie (1970), Yusuf et al. (1971), Vetiorets and Zhenzhebir (1975), Metwally (1978) and Eid et al. (1980,[a]).

Table 4: The mean values of yield components and yield of soybean at harvesting time as affected by soybean sowing dates under interoropping with maize in 1980 and 1981 seasons.

Soybean sowing dates	Yield components and yield							
	1980							
	Plant height in cm.	Weight of plant without pods in gm.	Number of pods/ plant	Weight of pods/ plants in gm.	Number of seeds /plant	Weight of seeds/ plant in gm.	100-seed weight in gm.	Seed yield in kg./fad.
D_0 x	82.5	19.5	25.8	12.5	60.7	6.6	13.2	221.6
D_1	70.5	23.2	31.6	13.5	67.8	10.9	13.5	343.7
D_2	66.6	56.9	73.0	36.5	127.4	17.4	15.5	817.2
Mean	73.2	33.2	43.4	20.8	85.3	11.6	14.0	460.8
L.S.D. 5 %	--	12.9	14.1	11.5	40.4	3.9	-	106.6
L.S.D. 1 %	-	19.6	21.3	17.5	-	5.9	-	161.4
	1981							
D_0	64.8	17.0	23.6	11.6	44.0	7.5	14.7	191.0
D_1	64.3	24.0	29.2	13.1	58.3	8.9	15.0	352.0
D_2	59.6	50.3	67.2	29.3	135.8	20.5	17.7	775.3
Mean	62.9	30.4	39.6	18.0	79.4	13.2	15.8	439.4
L.S.D. 5 %	-	6.7	11.5	5.6	12.9	3.6	1.3	284.5
L.S.D. 1 %	-	10.1	17.4	8.4	19.6	5.4	1.7	431.1

x D_0 = on the same date of sowing maize. D_1 = Early 2 weeks before sowing maize.
D_2 = Early 4 weeks before sowing maize.

B- Effect of plant density :

The average values of yield components and yield of soybean at harvesting time as affected by soybean plant density under intercropping with maize in 1980 and 1981 seasons are shown in Table 5.

1- Plant height :

Table 5, shows that soybean plant density under intercropping with maize significantly affected the plant height of soybean in both seasons.

The maximum plant height of soybean was obtained by the plant density P_1 (i.e. 140,000 soybean plants/ fad.), whereas the minimum plant height values were obtained by the lowest plant density P_4 (i.e. 35,000 soybean plants / fad.). These results are true in both seasons.

These results indicate that the soybean plant height significantly increased by increasing soybean plant density under intercropping with maize.

These results may be attributed to the shading effect of maize which increase soybean internodes elongation (Metwally, 1978). Also, may be attributed to the competition between the soybean and maize plants for light, water and nutrients.

Moursi et al. (1983, a), found that the competition between maize and soybean plants was less than the competition between soybean plants itself and less than the competition between maize plants in the pure stand of different densities.

These results are in agreament with those obtained by Basnet et al. (1974), Doss and Thurlow (1974), Metwally (1978), and Moursi et al. (1983, a).

2- Weight of plant without pods :

Results presented in Table 5, cleared that soybean plant density significantly affected the weight of plant without pods in both seasons.
Increasing soybean plant density intercropped with maize from 35,000 plants/ fad. (P_4) to 70,000 plants/ fad. (P_2) decreased the plant weight of soybean by 11.8 and 7.5 gm. in 1980 and 1981 seasons, respectively.

Further increase in soybean plant density up to 140,000 plants/ fad. resulted in more reduction in the weight of plant without pods by 14.3 and 15.5 gm. in both seasons, respectively.

These results indicate that the weight of soybean plant without pods was significantly increased by reducing soybean plant density intercropped with maize.

These results may be due to the severe competition between soybean and maize plants in high densities for light, water and nutrients which cause less accumulation of dry matter and less dry weight of soybean leaves and stalks (Knipmeyer et al., 1962 and Williams et al., 1968). In the same respect Anber (1979), reported that in high densities the competition between plants led to smallest leaf blade and then leaf became more errect.

These results agree with those reported by Enyi (1973) and Hefni et al. (1984).

3- Number of pods/ plant :

Data in Table 5, show that the average values of the number of pods/ plant of soybean were significantly affected by soybean plant density intercropped with maize in one season out of two.

The maximum number of pods/ plant of soybean was obtained by the plant density P_4 then reduced gradually by increasing soybean plant density to P_3 or P_2 treatments.

The minimum number of pods/ plant of soybean was obtained by the highest plant density treatment P_1. These results were true in both seasons.

These results indicate that the number of pods/ plant of soybean increased as plant density decreased under intercropping with maize.

These results may be attributed to the shading effect and the competition between soybean and maize plants for water, nutrients and less photosynthetic rates in the closed canopy of soybean in high densities.

In this respect Mann and Jaworski (1970), reported that light stress of 51- 70 % (shading to 5 - 16 KLX) reduced pod setting and induced severe abscission of pods.

These results agree with those obtained by Enyi (1973), Basnet et al. (1974), Luechen and Hicks (1977) , Metwally (1978), Wahua and Miller (1978).

4- Weight of pods/ plant :

The date in Table 5, show that the average values of pods weight/ plant of soybean were significantly affected by soybean plant density intercropped with maize in one season out of two.

The weight of pods/ plant of soybean increased from 17.9 to 24.1 gm. and from 13.8 to 22.6 gm. by decreasing soybean plant density under intercropping with maize from 14,000 plants/ fad. to 35,000 plants/ fad. in 1980 and 1981 seasons, respectively.

It was observed that the weight of pods/ plant of soybean increased by reducing the soybean plant density intercropped with maize.

These increase may be due to the less competition between soybean plants and less competition between soybean and maize plants for the same environmental factors as compared with the high densities. The weight of pods/ plant seems to be proportional to pods number/ plant of soybean.

These results were in agreement with those obtained by Basnet et al. (1974), El- Habbak (1980), and Hefni et al. (1984).

5- Number of seeds/ plant :

The results in Table 5, show that the plant density of soybean, intercropped with maize significantly affected the number of seeds/ plant of soybean in the two successive seasons.

The soybean plant density treatment P_4 gave the maximum number of seeds/ plant, whereas the soybean plant density treatment P_1 gave the minimum number of seeds / plant. These results are true in the two seasons.

The trend of these results showed that the number of seeds/ plant of soybean increased by reducing soybean plant density, intercropped with maize.

These results may be attributed to the competition between maize and soybean plants for light, water and nutrients. On the other hand the closer canopy of soybean and shading effect of maize may cause more shedding to soybean flowers, therefore the plants produced fewer pods as compared with open canopy.

In this connection Moursi et al. (1983), found that the aggressivity value for soybean, intercropped with maize was positive when soybean plant density was 135,135 plants /fad., whereas it was negative when plant density was reduced to 75,117 plants/ faddan.

The results agree with those obtained by Basnet et al. (1974) and Metwally (1978).

6- Weight of seeds/ plant :

Table 5, shows that the differences between the average values of seed weight/ plant of soybean were significant due to the plant density treatments under intercropping with maize in one season out of two .

The maximum weight of seeds/ plant of soybean was obtained by the soybean plant density treatment P_4 ,whereas the minimum one was obtained by the plant density treatment P_1 . These results are true in both seasons.

These results indicate that the weight of seeds/ plant of soybean increased by reducing soybean plant density, intercropped with maize. These results may be attributed to the high number of pods/ plant, high weight of pods/ plant and the high number of seeds/ plant of soybean produced by the treatment P_4 . In lower densities the competition between soybean and maize plants became less than higher ones.

In this respect Vidovic and Pokoryny (1973), found that the efficiency of leaf unit area surface to form photosynthetes is falling down when the stand density increased .

These results agree with those obtained by Lehman and Lambert (1960), Basnet et al. (1974) and Hefni et al., (1984).

7- 100 - seed weight :

The data presented in Table 5 , show that soybean plant density , intercropped with maize significantly affected the 100- seed weight of soybean in both seasons .

The maximum 100- seed weight of soybean was obtained by soybean plant density equal to 35,000 plants/ fad., whereas the minimum 100- seed weight was obtained by soybean plant density equal to 140,000 plants/ faddan. These results are true in both seasons.

These results indicate that the 100- seed weight of soybean increased as plant density of soybean reduced under intercropping with maize.

These results may be due to the competition between soybean plants in the higher densities and between maize and soybean plants for light, water and nutrients.

These results are in a harmony with those reported by Zahran (1970), Basnet et al. (1974), El- Boray (1978), Metwally (1978) and Hefni et al. (1984).

8- Seed yield in kg. / fad. :

The results in Table 5, show that the plant density of soybean under intercropping with maize significantly affected the seed yield in both seasons.

The maximum seed yield of soybean was obtained by soybean plant density of 140,000 plants/ fad. which gave the averages of 588.2 and 515.3 kg. / fad. in 1980 and 1981 seasons, respectively.

The minimum seed yield of soybean was obtained by soybean plant density of 35,000 plants/ fad. The reduction in the seed yield of soybean reached 40.9 % and 30.6 % in 1980 and 1981 seasons, respectively as compared with the yield of P_1 treatment .

These results indicate that the soybean seed yield increased as plant density of soybean increased when intercropped with maize.

These results may be due to the high number of seeds produced from the high plant population density of the whole unit area. On the other hand in the low plant population density although the plants get more light, water and nutrient which in turn gave high average of number of pods/ plant, number and weight of seeds/ plant, the lowest number of plants in the unit area affected the whole seed yield.

These results are in agreement with those reported by Pendleton et al. (1963), Weber et al. (1966), Zahran (1970), Silva et al. (1972), Enyi (1973), Basnet et al., (1974), James et al. (1983) and Hefni et al. (1984).

Table 5: The mean values of yield and yield components of soybean at harvesting time as affected by soybean plant density under intercropping with maize in 1980 and 1981 seasons.

Soybean plant density plants/ fad.	Yield and yield components							
	Plant height in cm.	Weight of plant without pods in gm.	Number of pods/ plant	Weight of pods/ plants in gm.	Number of seeds / plant	Weight of seeds/ plant in gm.	100-seed weight in gm.	Seed yield in kg./fad.
1980								
P_1 - 140,000	78.4	27.9	35.4	17.9	65.8	9.4	12.7	588.2
P_2 - 70,000	74.6	30.4	42.7	19.9	80.4	10.8	13.6	534.7
P_3 - 46,600	72.5	32.2	46.9	21.3	89.8	12.4	14.1	392.1
P_4 - 35,000	67.3	42.2	48.8	24.1	105.1	13.8	15.8	328.2
Mean	73.2	33.2	43.4	20.8	85.3	11.6	14.0	460.8
L.S.D.5 %	6.3	8.3	7.0	-	17.0	-	1.5	149.4
L.S.D.1 %	-	11.2	9.4	-	23.0	-	2.0	201.7
1981								
P_1 - 140,000	69.5	42.8	33.9	13.8	63.2	9.4	14.9	515.3
P_2 - 70,000	66.4	50.8	35.1	17.0	72.6	11.7	15.5	468.9
P_3 - 46,600	62.6	56.2	40.5	18.7	85.1	13.4	15.9	426.0
P_4 - 35,000	52.9	58.3	50.4	22.6	96.5	14.6	16.2	347.3
Mean	62.9	52.0	39.6	18.0	79.4	12.3	15.8	439.4
L.S.D.5 %	10.3	5.7	-	5.9	19.5	3.5	1.3	78.7
L.S.D.1 %	-	7.7	-	-	26.3	-	-	106.3

C- The effect of interaction between soybean sowing dates and plant density under intercropping with maize on :

1- Weight of plant without pods :

The average values of the plant weight without pods of soybean as affected by the interaction between soybean sowing dates and plant density in 1981 season are presented in Table 6.

The results in Table 6, show that the interaction significantly affected the weight of soybean plant without pods only in 1981 season.

The maximum weight of soybean plant without pods was (65.5 gm.), obtained under the interaction between sowing soybean early 4 weeks before sowing maize with soybean plant density equal to 35,000 plants/ fad., whereas the minimum one was 14.2 gm., recorded under the interaction between sowing soybean in the same date of sowing maize with soybean plant density equal to 140,000 plants/ faddan.

These results indicate that sowing soybean early 2 or 4 weeks before sowing maize with plant density of 35,000 plants/ fad. increased the weight of soybean plant without pods.

These results may be due to more light intensity , water and nutrients utilized by soybean plants sown early

two or four weeks before sowing maize. Also, in low plant density of soybean the competition between soybean plants will be less than in high densities.

2- Seed yield :

The average values of soybean seed yield in Kg./fad. as affected by the interaction between soybean sowing dates and plant density in 1980 season are presented in Table 7.

The results show that the interaction between soybean sowing dates and plant densities, intercropped with maize significantly affected the seed yield/ fad. of soybean in 1980 season.

The maximum seed yield of soybean equal to 1108.7 kg. /fad. was obtained by the interaction between the early sowing date treatment namely D_2 and the highest soybean plant density treatment namely P_1 .

The minimum seed yield of soybean / fad. equal to 180 kg./ fad. was obtained when soybean was sown on the same date of sowing maize (D_0 treatment)with the lowest plant density namely 35,000 plants /fad. (P_4 treatment).

These results indicate that sowing soybean early before maize with plant density equal to 140,000 plants/ fad., under intercropping increased seed yield/ fad. of soybean.

These results may be due to more light, water and nutrients utilized by soybean plants before the shading of maize plants which resulted in increasing pods number and weight/ plant, seeds number and weight/ plant and therefore seed yield increased. On the other hand although the high density of soybean plants produced the lowest number and weight of pods/ plant, the lowest number and weight of seeds/ plant of soybean, the high number of plants/ fad. compensated this reduction.

Table 6: The mean values of the weight of plant without pods in gm. of soybean as affected by the interaction between soybean sowing dates and plant density under intercropping with maize at harvesting time in 1981 season.

Soybean sowing dates	Soybean plant density*			
	P_1	P_2	P_3	P_4
D_0- On the same date of sowing maize	14.20	14.90	18.30	20.60
D_1- Early 2 weeks before sowing maize	22.98	23.60	24.60	25.00
D_2- Early 4 weeks before sowing maize	41.40	43.80	50.30	65.50
Mean	26.19	27.40	31.06	37.03
L.S.D. of interaction dates x densities 5 %		9.86		
L.S.D. of interaction dates x densities 1 %		n.s.		

*Where :

P_1 = 140,000 plants / fad.

P_2 = 70,000 plants / fad.

P_3 = 46,600 plants/ fad.

P_4 = 35,000 plants/ fad.

Table 7: The mean values of the seed- yield in kg/ fad. of soybean as affected by the interaction between soybean sowing dates and plant density under in inter-cropping with maize at harvesting time in 1980 season .

Soybean sowing dates	Soybean plant density*			
	P_1	P_2	P_3	P_4
D_0- On the same date of sowing maize	247.2	232.2	226.8	180.0
D_1- Early 2 weeks before sowing maize	408.6	356.4	304.8	304.8
D_2- Early 4 weeks before sowing maize	1108.7	1015.5	644.7	499.9
M e a n	588.2	534.7	392.1	328.2
L.S.D. of interaction dates x densities 5 %		258.7		
L.S.D. of interaction date x densities 1 %		n.s.		

* Where : P_1 = 140,000 plants / fad. P_3 = 46,600 plants/ fad.
P_2 = 70,000 plants / fad. P_4 = 35,000 plants/ fad.

PART : II

MAIZE

The effect of soybean sowing dates and plant density under intercropping with maize on yield components and yield :

A- Effect of sowing dates :

Table 8 and Table 9, show the average values of yield components and yield of maize at harvesting time as affected by soybean sowing dates under intercropping with maize in 1980 and 1981 seasons .

1- Plant height :

The results in Table 8, indicate that the differences between the average values of plant height of maize were not significant in both seasons.

The maximum plant height of maize was obtained by the soybean sowing date treatment D_0 (i.e. sowing soybean on the same date of sowing maize) , whereas the sowing date treatment D_2 (i.e. sowing soybean early 4 weeks before sowing maize) gave the minimum values of plant height in 1980 and 1981 seasons.

These results indicate that sowing soybean early before sowing maize by 2 or 4 weeks resulted in decreasing the plant height of maize.

The reduction in plant height reached 15.3 % and 3.6 % in 1980 and 1981 seasons, respectively for the treatment D_2 as compared with D_0 treatment.

These results may be due to the shading effect of soybean plants on the early growth stages of maize and the competition between vigour growth of soybean plants , cultivated early 4 weeks before maize. Pendleton et al., (1963), reported that the most ecological factor in inter-cropping is light intensity.

These results were in agreement with that found by Metwally (1978).

2- Stem diameter :

The results presented in Table 8, show that the sowing dates of soybean significantly affected the stem diameter of maize in both seasons.

The maximum stem diameter of maize was obtained by sowing date treatment D_0 , whereas the minimum one was obtained the sowing date treatment D_2 . These results are true in both seasons.

The reduction in the stem diameter of maize for the sowing date treatment D_2 reached 28.1 % and 20.3% in 1980 and 1981 seasons, respectively as compared with D_0 treatment .

These results indicate that the stem diameter of maize significantly reduced by sowing soybean early 2 or 4 weeks before sowing maize under intercropping. These results may be attributed to the shading effect of soybean plants which were grown up early before maize seedlings. These results agree with that found by Hefni et al. (1984).

3- Weight of plant without ears :

Table 8, shows that the average values of plant weight of maize were significantly affected by soybean sowing dates under intercropping with maize in both seasons.

The sowing date treatment namely D_0 produced the maximum average value of maize plant weight without ears, whereas the sowing date treatment namely D_2 resulted in decreasing the weight of plant without ears and reached the minimum average value.

This reduction reached 62.5 % and 25.5 % in 1980 and 1981 seasons, respectively as compared with the plant weight of the treatment D_0 .

These results indicate that the plant weight without ears of maize significantly reduced by sowing soybean early 2 or 4 weeks before sowing maize under intercropping.

These results may be due to the shading effect of soybean plants on maize when soybean was sown before maize and this in turn reducesthe accumulation of dry matter in

maize plants.

In this connection Bowes and Ogren (1970) reported that photosynthetic rates increased under maximum light intensity.

Singh et al. (1974), indicated that the increasing in specific leaf dry weight of maize may be due to increasing light intensity received during the growing season .

These results agree with that found by Hefni et al., (1984).

4- Ear position :

The results in Table 8, indicate that the sowing dates of soybean did not significantly affect the ear position of maize in both seasons.

The sowing date treatment namely D_0 gave the highest averages (142.3 and 143.3 cm.) in 1980 and 1981 seasons, respectively.

The sowing date treatment namely D_2 gave the lowest averages (119.0 and 131.7 cm.) in 1980 and 1981 seasons, respectively.

The ear position of maize was lower when soybean was sown early 2 or 4 weeks before sowing maize under intercropping.

These results may be attributed to the reduction in plant height for the same treatments.

These results agree with those reported by Mahmoud and Khalifa (1983) and Hefni et al., (1984).

5- Ear length :

The data presented in Table 8, show that the sowing dates of soybean significantly affected the average values of ear length of maize in one season out of two .

The ear length of maize decreased by sowing soybean early 2 or 4 weeks before sowing maize under intercropping.

The maximum ear length of maize was obtained by the sowing date treatment D_0 , whereas the minimum one was obtained by the sowing date treatment D_2 in both seasons.

The reduction in ear length of maize for D_2 treatment reached 8 % and 6.3 % in 1980 and 1981 seasons, respectively as compared with D_0 treatment.

These results may be due to the shading effect of soybean plants on maize when soybean was sown 2 or 4 weeks before maize which affected maize growth and this in turn gave shorter ears.

These results agree with that found by Mahmoud and Khalifa (1983).

6- Ear diameter :

The data illustrated in Table 8, indicate that the sowing dates of soybean did not significantly affect the ear diameter of maize under intercropping in both seasons.

The results indicate that the ear diameter of maize reduced by sowing soybean early 2 or 4 weeks before sowing maize under intercropping.

It was clear that the treatment D_0 (i.e. sowing soybean on the same date of sowing maize) gave the highest averages of ear diameter of maize which were 51.5 and 51.0 mm. , whereas the treatment D_2 (i.e. sowing soybean early 4 weeks before sowing maize) gave the lowest ones which were 50.6 and 49.1 mm. in 1980 and 1981 seasons, respectively.

These results may be attributed to growing soybean alone for a month or more before the germination of maize for the treatment (D_2) which caused shading of soybean plants on maize in the early growth stages. This in turn gave less dry matter accumulation and weak plants of maize.

These results agree with that observed by Hefni et al. (1984).

7- Ear weight without husk :

Table 8, shows that the differences between the average values of ear weight without husk of maize were not significantly affected by soybean sowing dates in both seasons.

The maximum ear weight without husk of maize was obtained by sowing soybean n the same date of sowing maize (D_0 treatment) whereas the minimum values of ear weight without husk of maize were obtained by sowing soybean early 4 weeks before sowing maize (D_2 treatment) in both seasons.

The reduction in the weight of ear of maize without husk reached 20.5 and 36.1 gm. for the treatment D_2 in 1980 and 1981 seasons, respectively as compared with the treatment D_0 .

These results indicate that the ear weight of maize without husk reduced by sowing soybean early before maize by 2 or 4 weeks under intercropping.

These results may be due to the shading effect of soybean plants of the treatment D_2 which grow up separately for a month or more on maize seedlings. This resulted in shorter, thinner ears and less dry matter accumulation in maize plants. This may cause the reduction in ear weight of maize.

These results are in agreement with that observed by Hefni et al. (1984).

Table 8: The mean values of yield components and yield of maize at harvesting time as affected by soybean sowing dates under intercropping with maize in 1980 and 1981 seasons.

Soybean sowing dates	Yield components and yield						
	1980						
	Plant height in cm.	Stem diameter in mm.	Weight of plant in gm.	Ear position in cm.	Ear length in cm.	Ear diameter in mm.	Ear weight without husks in gm.
D_0- On the same date of sowing maize	236.3	28.8	688.3	142.3	21.0	51.5	238.3
D_1- Early 2 weeks before sowing maize	221.1	25.9	569.3	133.8	20.6	50.9	228.1
D_2- Early 4 weeks before sowing maize	200.5	20.7	258.6	119.0	19.3	50.6	217.8
Mean	219.3	25.1	505.5	131.7	20.3	50.9	228.1
L.S.D. 5 %	-	1.3	138.5	-	-	-	-
L.S.D. 1 %	-	1.9	209.7	-	-	-	-
D_0- On the same date of sowing maize	235.1	26.0	964.0	143.3	20.4	51.0	255.0
D_1- Early 2 weeks before sowing maize	234.4	24.8	822.0	138.7	20.3	49.1	242.4
D_2- Early 4 weeks before sowing maize	226.5	20.7	728.0	131.7	19.1	49.1	218.9
Mean	231.9	23.8	838.4	137.9	19.9	49.8	238.8
L.S.D. 5 %	-	2.5	176.0	-	0.9	-	-
L.S.D. 1 %	-	3.8	-	-	-	-	-

8- Number of rows / ear :

The results in Table 9, show that the sowing dates of soybean under intercropping with maize had no significant effect on the number of rows / ear of maize in both seasons.

The maximum number of rows/ ear of maize was obtained by soybean sowing date treatment D_0 , whereas the sowing date treatment D_2 gave the minimum number of rows / ear of maize in 1980 and 1981 seasons.

These results indicate that the number of rows/ear of maize reduced by sowing soybean early 2 or 4 weeks before sowing maize under intercropping.

These results may be attributed to the shading effect of soybean plants on maize early growth when soybean was sown before maize.

These results are in agreement with those reported by Mahmoud and Khalifa (1983) and Hefni et al. (1984).

9- Number of grain / ear :

The data presented in Table 9, show that the sowing dates of soybean did not significantly affect the number of grains / ear of maize in both seasons.

The number of grains/ ear of maize reduced by sowing soybean early before sowing maize by 2 or 4 weeks. It was clear that the treatment D_0 (i.e. sowing soybean n the same date of sowing maize) gave the higher averages of the number of grains / ear of maize (534.6 and 544.5) as compared with the treatment D_2 (i.e. sowing soybean early 4 weeks before sowing maize) which gave the lowest averages of the number of grains/ ear of maize (451.3 and 477.7) in 1980 and 1981 seasons, respectively.

These results may be due to the reduction in the ear length, ear diameter and the number of rows/ ear for the same treatment namely D_2 .

These results agree with that found by Mahmoud and Khalifa (1983).

10- Weight of grains / ear :

The results in Table 9, show that the differences between the average values of grains weight / ear of maize were not significant in both seasons .

It was clear that sowing soybean early 2 or 4 weeks before sowing maize under intercropping reduced the weight of grains / ear of maize.

The maximum weight of grains/ ear of maize was obtained by the soybean sowing date treatment D_0 , whereas the minimum one was obtained by the soybean sowing date treatment D_2 . The reduction in the weight of grains / ear of maize for the treatment D_2 reached about 10.8 %and 16.0 % in 1980 and 1981 seasons, respectively.

This reduction in the weight of grains/ ear of maize for the treatment D_2 may be due to the reduction in ear length, ear diameter, number of rows/ ear and number of grains/ ear resulted for the same treatment.On the other hand sowing soybean in the same date of sowing maize gave maize plants a good chance to grow faster and stronger and be able to compete soybean .

These results agree with those obtained by Metwally (1978) and Hefni et al. (1984).

11- 100- grain weight :

The data presented in Table 9, show that the sowing dates of soybean under intercropping with maize did not significantly affect the 100- grain weight of maize in both seasons.

The 100- grain weight of maize decreased by sowing soybean early 2 or 4 weeks before sowing maize under intercropping.

The higher average values of 100- grain weight of maize (37.0 and 37.6 gm.) were obtained by soybean sowing date D_0 , whereas the minimum ones were (33.4 and 35.4 gm.), obtained by soybean sowing date treatment D_2 in 1980 and 1981 seasons, respectively.

This reduction in the 100- grain weight of maize resulted for the treatment D_2 may be due to the shading effect of soybean plants on maize seedlings in the early growth stages.

These results agree with that found by Hefni et al., (1984).

12- Shelling %:

The results in Table 9, show that the sowing dates of soybean did not significantly affect the shelling percentage of maize in both seasons.

The sowing date of soybean namely D_0 treatment gave the higher average values of shelling % which were 79.9 % and 79.2 % , whereas the lower ones were 76.7 % and 77.4 % , obtained from D_2 treatment in 1980 and 1981 seasons, respectively.

These results indicate that the shelling % of maize decreased by sowing soybean early 2 or 4 weeks before maize.

The reduction resulted by the treatment D_2 may be attributed to the shading effect of soybean plants on maize or may be due to the low weight of ears, low weight of grains/ ear and low weight of 100- grain for the same treatment.

13- Grain yield / fad. :-

The average values of grain yield of maize as affected by soybean sowing dates under intercropping with maize are presented in Table 9.

The results show that the sowing dates of soybean significantly affected the grain yield of maize in both seasons.

The maximum grain yield of maize was obtained by sowing soybean with maize in the same data D_0. treatment which gave averages of 3309.0 and 3587.0 Kg./fad. in 1980 and 1981 seasons, respectively.

It was clear that sowing soybean early two weeks before sowing maize reduced the grain yield of maize by 10.42 % and 20.10 % in 1980 and 1981 seasons, respectively.

More reduction resulted by sowing soybean early four weeks before sowing maize (D_2) treatment which gave the minimum average values of grain yield of maize. The reduction reached 43.3 % and 42.9 % in 1980 and 1981

seasons, respectively as compared with soybean sowing date treatment namely D_0 .

These results indicate that the grain yield of maize reduced significantly by sowing soybean early 2 or 4 weeks before sowing maize.

These results may be attributed to the shading effect of soybean plants on maize seedlings when soybean was cultivated early 4 weeks before sowing maize. Also, sowing maize 4 weeks after sowing soybean gave the lower values of plant height, stem diameter, ear length, ear diameter, grains number and weight/ ear, 100- grain weight and shelling % of maize. The reduction of all these yield components affected the grain yield as compared with sowing soybean on the same date of sowing maize.

These results are in agreement with those reported by Metwally (1978), and Hefni et al. (1984).

Table 9: The mean values of yield components and yield of maize at harvesting time as affected by soybean sowing dates under intercropping with maize in 198 0 and 1981 season.

Soybean sowing dates	Yield components and yield					
	1 9 8 0					
	Number of rows / ear	Number of grains / ear	Weight of grains /ear in gm.	100-grain weight in gm.	Shelling %	Grain yield in kg/ faddan
D_0- On the same date of sowing maize	15.8	534.6	189.6	37.0	79.9	3309.0
D_1- Early 2 weeks before sowing maize	14.9	512.6	176.8	35.2	77.6	2964.0
D_2- Early 4 weeks before sowing maize	14.6	451.3	169.0	33.4	76.7	1874.5
Mean	15.1	499.5	178.5	36.3	78.1	2715.8
L.S.D. 5 %	-	-	-	-	-	655.7
L.S.D. 1 %	-	-	-	-	-	993.3
	1 9 8 1					
D_0- On the same date of sowing maize	15.3	544.5	201.3	37.6	79.2	3587.0
D_1- Early 2 weeks before sowing maize	15.3	511.6	190.8	35.8	78.3	2866.0
D_2- Early 4 weeks before sowing maize	15.2	477.7	168.9	35.4	77.4	2045.0
Mean	15.3	511.2	187.0	35.2	78.3	2833.0
L.S.D. 5 %	-	-	-	-	-	666.8
L.S.D. 1 %	-	-	-	-	-	1010.1

B- Effect of plant density :

The average values of yield components and yield of maize at harvesting time as affected by soybean plant density under intercropping with maize in 1980 and 1981 seasons are presented in Tables 10 and 11.

1- Plant height :

The results in Table 10, show that the plant density of soybean significantly affected the plant height of maize in one season out of two.

The maximum plant height of maize was obtained by soybean plant density treatment P_4 (i.e. 35,000 plants / fad.).

It was observed that the plant height of maize decreased gradually by increasing soybean plant density, intercropped with maize and reached the minimum values of plant height by the plant density treatment P_1 (i.e. 140,000 plants/ fad.). These results are true in both seasons.

These results indicate that the plant height of maize increased by decreasing the plant density of soybean, intercropped with maize.

These results may be due to the competition between soybean and maize plants for light, water and nutrients.

In this respect Moursi et al. (1983), reported that the aggressivity value for soybean was positive when soybean plant density was 135,135 plants/ fad., whereas it was negative when the plant densities of soybean were 75,117 and 56,338 plants/ fad. under intercropping with maize .

These results agree with those obtained by Metwally (1978), Ainer (1983) and Hefni et al. (1984).

2- Stem diameter :

The data recorded in Table 10, show that the differences between the average values of the stem diameter of maize as affected by soybean plant density were significant in one season out of two.

It was clear that the stem diameter of maize increased by decreasing the plant density of soybean, intercropped with maize.

The maximum stem diameter of maize was obtained by the plant density of soybean namely P_4 , whereas the minimum one was obtained by the plant density of soybean namely P_1 , the results are true in both seasons.

These results may be attributed to the competition between soybean plants and between soybean and maize plants for light, water and nutrients in the high density which resulted in decreasing the stem diameter of maize. In this

connection Moursi et al.(1983),reported that the competition between soybean and maize plants was less than the competition between soybean plants itself as well as between maize plants itself in higher densities.

These results are in agreement with those reported by Attia (1980), Othman (1982) and Hefni et al. (1984).

3- Weight of plant without ears :

The results illustrated in Table 10, show that the average values of the weight of maize plant without ears were not significantly affected by the different plant densities of soybean, intercropped with maize in both seasons.

It was clear that the plant weight of maize without ears increased by decreasing plant density of soybean ,intercropped with maize.

The results indicate that the treatment P_4 (i.e. 35,000 soybean plants/ fad.) gave the highest averages which were 546.5 and 899.8 gm., whereas the treatment P_1 (i.e. 140,000 soybean plants/ fad.) gave the lowest ones 461.8 and 775.3 gm. in 1980 and 1981 seasons, respectively.

These results may be attributed to the severe competition between the plants of maize and soybean for light, water and nutrients.

In this connection Knipmeyer et al. 1962) reported that the dry weights of leaves and stalks of all hybrids, planted at the rate of 8 plants/ hill were less than those planted at one plant / hill. Singh et al. (1974), found that the increase in specific leaf dry weight of maize was due to the increase in light intensity received during the growing season

These results agree with those obtained by Ibrahim (1965) and Hefni et al. (1984).

4- Ear position :

The results presented in Table 10, show that the plant density of soybean significantly affected the ear position of maize under intercropping in one season out of two.

The maximum ear position values of maize were obtained by the plant density of soybean namely P_4, whereas the minimum ones were obtained by the plant density of soybean namely P_1. These results are true in the two seasons.

The results indicate that the ear position of maize increased by decreasing the plant density of soybean, intercropped with maize. These results may be due to the increase in the plant height, obtained in low plant density of soybean, intercropped with maize.

These results agree with those found by Hamza (1969), Sorour (1977), Ainer (1983), Mahmoud and Khalifa (1983) and Hefni et al. (1984).

5- Ear length :

The data in Table 10, show that the plant density of soybean, intercropped with maize did not significantly affect the ear length of maize in both seasons.

The highest average values of ear length were 21.0 and 20.6 cm., obtained by soybean plant density equal to 35,000 plants/ fad. in 1980 and 1981 seasons, respectively, whereas the minimum ones were 19.4 and 19.2 cm., obtained by soybean plant density equal to 140,000 plants/ fad. in 1980 and 1981 seasons, respectively.

The ear length of maize increased by decreasing the plant density of soybean, intercropped with maize.

This reduction in the ear length of maize may be attributed to the severe competition between the plants of soybean and maize for light, water and nutrients.

Anber (1979), reported that in the high density the competition between plants gave smallest leaves blades.

These results are in agreement with those obtained by Attia (1980), Ewies (1980), Anier (1983) and Moursi et al. (1983, b).

6- Ear diameter :

The data illustrated in Table 10, show that the plant density of soybean, intercropped with maize significantly affected the ear diameter of maize in one season out of two.

The ear diameter of maize increased by decreasing the plant density of soybean, intercropped with maize.

It was clear that the plant density of soybean equal to 35,000 plants/ fad. gave the highest average values of ear diameter which were 52.8 and 50.6 mm. in 1980 and 1981 seasons, respectively.

The plant density of soybean which were 140,000 plants/ fad. gave the lowest average values (49.2 and 49.0 mm.) in 1980 and 1981 seasons, respectively.

The reduction in the ear diameter of maize resulted from the high density may be attributed to the severe competition between the plants of soybean and maize for light, water and nutrients.

These results agree with those reported by Abd-el - Raouf (1973), Attia (1980), Moursi et al. (1983, b) and Hefni et al. (1984).

7- Ear weight without husk :

The results presented in Table 10, show that the differences between the average values of the ear weight of maize without husk as affected by the plant density of soybean, intercropped with maize were not significant in both seasons.

The maximum ear weight without husk was obtained by reducing the plant density of soybean to 35,000 plants / fad., intercropped with maize, whereas the minimum one was obtained by increasing the plant density of soybean up to 140,000 plants/ fad. during the two seasons.

These results indicate that the ear weight of maize increased by reducing the soybean plant density, intercropped with maize.

This reduction resulted due to the high density which induced the severe competition between the plants of soybean and maize for light, water and nutrients.

Moursi et al. (1983, a), found that the relative crowding coefficient of maize increased by increasing the plant density of soybean, intercropped with maize and the aggressivity value for soybean becomes positive.

These results are in agreement with those obtained by Ainer (1983), Moursi et al. (1983, b) and Hefni et al.(1984).

Table 10: The mean values of yield components and yield of maize at harvesting time as affected by soybean plant density under intercropping with maize in 1980 and 1981 seasons.

Soybean plant density plants / faddan	Yield components and yield						
	Plant height in cm.	Stem diameter in mm.	Weight of plant in gm.	Ear position in cm.	Ear length in cm.	Ear diameter in mm.	Ear weight without husk in gm.
1980							
P_1 - 140,000	203.3	23.1	461.8	122.9	19.4	49.2	215.0
P_2 - 70,000	214.3	25.2	494.3	127.9	20.2	50.7	223.8
P_3 - 46,600	227.3	25.9	519.2	136.8	20.6	51.3	233.1
P_4 - 35,000	232.2	26.3	546.5	139.1	20.0	52.8	240.3
Mean	219.3	25.1	505.5	131.7	20.3	50.9	228.1
L.S.D. 5 %	16.4	1.4	-	11.2	-	2.5	-
L.S.D. 1 %	22.1	1.9	-	-	-	-	-
1981							
P_1 - 140,000	224.9	23.2	775.3	132.4	19.2	49.0	219.3
P_2 - 70,000	229.1	23.7	819.3	136.1	19.8	49.7	230.9
P_3 - 46,600	233.0	23.9	858.6	139.3	20.0	49.7	245.6
P_4 - 35,000	242.4	24.6	899.8	143.8	20.6	50.6	259.1
Mean	231.9	23.8	838.4	137.9	19.9	49.8	238.8
L.S.D. 5 %	-	-	-	-	-	-	-
L.S.D. 1 %	-	-	-	-	-	-	-

8- Number of rows / ear :

The results in Table 11, show that the number of rows/ ear of maize was not significantly affected by the plant density of soybean, intercropped with maize in both seasons.

The maximum number of rows/ ear of maize was obtained by the plant density of soybean equal to 35,000 plants /fad., whereas the minimum one was obtained by increasing soybean plant density up to 140,000 plants/ fad., intercropped with maize in 1980 and 1981 seasons.

These results indicate that the number of rows/ ear of maize increased by decreasing the soybean plant density, intercropped with maize.

These results may be attributed to the severe competition between the plants of soybean and maize for the environmental factors at the high density which resulted in less ear diameter.

These results agree with those reported by Attia (1980), Othman (1982), Mahmoud and Khalifa (1983) and Hefni et al. (1984).

9- Number of grains / ear :

The data in Table 11, show that the differences between the average values of the grains number/ ear of maize as affected by the plant density of soybean, intercropped with maize were significant in one season out of two.

The maximum averages of the grains number/ ear of maize were 558.4, obtained by the plant density of soybean namely P_4 treatment in 1980 and 1981 seasons, respectively.

The minimum number of grains/ ear of maize was obtained by the plant density of soybean namely P_1 treatment. It was observed that the reduction in the number of grains /ear of maize reached 20.1 % and 19.3 % in 1980 and 1981 seasons, respectively.

It was clear that the number of grains/ ear of maize increased by decreasing the plant density of soybean, intercropped with maize.

The reduction in the number of grains/ ear of maize which resulted from the high density of soybean plants may be due to the reduction in ear length, ear diameter, number of rows/ ear obtained from the same treatment.

These results are in agreement with those obtained by Downey (1971), Attia (1980) and Moursi et al. (1983,b).

10- Weight of grains / ear :

The results presented in Table 11, show the plant density of soybean, intercropped with maize did not significantly affect the weight of grains/ ear of maize in both seasons.

The results indicate that the weight of grains/ear of maize increased by reducing the plantdensity of soybean, intercropped with maize.

The plant density of soybean which was 35,000 plants /fad. gave the highest average value of grains weight of/ ear of maize, whereas the lowest one was obtained by soybean plant density equal to 140,000 plants/ fad. during the two seasons.

The reduction in the weight of grains/ ear of maize resulted from the decrease in weight of ear, ear size,grains number/ ear, and rows number/ ear. These results are probably due to the competition between the plants of maize and soybean for light, water and nutrients, as well as the increase in aggressivity value of soybean and relative crowding coefficient of maize by increasing the plant density of soybean, intercropped with maize (Moursi et al.1983,a).

These results agree with those obtained by Ali (1976), Metwally (1978), Ainer (1983) and Hefni et al. (1984).

11- 100- grain weight :

The results in Table 11, show that the differences between the average values of the 100- grain weight of maize as affected by the plant density of soybean, intercropped with maize were significant in both seasons.

The highest 100- grain weights of maize were 36.3 and 38.3 gm., obtained by the lowest plant density of soybean equal to 35,000 plants/ fad., intercropped with maize in 1980 and 1981 seasons, respectively.

The lowest averages of 100- grain weight of maize were 34.1 and 34.9 gm., obtained from the highest density of soybean equal to 140,000 plants /fad., intercropped with maize in 1980 and 1981 seasons respectively.

It was clear that the 100- grain weight of maize significantly decreased by increasing the soybean plant density intercropped with maize.

These results may be due to the severe competition between the plants of maize and soybean for light, water and nutrients.

These results are in agreement with those observed by Colville et al. (1964), Attia (1980) and Mahmoud and Khalifa (1983).

12- Shelling

The data illustrated in Table 11, show that the shelling percentage of maize was not significantly affected by the plant density of soybean, intercropped with maize in both seasons.

The maximum shelling % of maize were 80.2 % and 80.3 %, obtained by the plant density namely P_4 treatment, whereas the minimum ones were 76.2 % and 76.2; obtained by the plant density of soybean namely P_1 treatment in 1980 and 1981 seasons, respectively.

These results indicate that the shelling percentage of maize increased by reducing the plant density of soybean, intercropped with maize.

These results may be attributed to the increase in the weight of ear, number of rows/ ear, number of grains / ear and weight of grains/ ear, obtained from low densities.

These results agree with those reported by Ewies (1980), Othman (1982) and Mahmoud and Khalifa (1983).

13- Grain yield in kg:/ Fad. :

The results presented in Table 11, show that the average values of grain yield of maize were significantly affected by the different plant densities of soybean, intercropped with maize in the two successive seasons.

The plant density namely P_4 treatment gave the highest averages of grain yield/ faddan (3135.8 and 3156.5

kg.) in 1980 and 1981 seasons, respectively.

Increasing the plant density of soybean, intercropped with maize from 35,000 plants/ fad. (P_4) treatment to 14,000 plants/ fad. (P_1) treatment reduced the grain yield of maize by 28.6 % and 20.6 % in 1980 and 1981 seasons , respectively.

These results indicate that the grain yield of maize increased by decreasing the plant density of soybean, intercropped with maize.

The reduction in grain yield of maize resulted from the high density of soybean plants may be due to the reduction in ear length,diameter, number and weight of grains/ ear, 100- grain weight and shelling % resulted from the same treatment.

The higher densities induced severe competition between the plants of maize and soybean for light, and nutrients.

In this connection Finlay (1974), found that corn yields were 93.0 %, 64 % and 55 % from the solid planting when soybean intercropped with maize on the same ridges, in 1 : 1 alternating ridges and 2 : 2 ridges, respectively. The accumulation of dry matter decreased, leaf blade became small and photosynthetic rates reduced due to the competion between the plants in the higher densities (Anber, 1979).

These results agree with those obtained by Verma and Singh (1971), Metwally (1978), El- Rahim and Morshidy (1979), Attia (1980), Moursi et al. (1983, b) and Hefni et al. (1984).

able 11: The mean values of yield components and yield of maize at harvesting time as affected by soybean plant density under intercropping with maize in 1980 and 1981 seasons.

Soybean plant density plants/ faddan	Yield components and yield					
	1 9 8 0					
	Number of rows/ear	Number of grains/ear	Weight of grains/ear in gm	100-grain weight in gm.	Shelling %	Grain yield in kg/ faddan
P_1 - 140,000	14.4	445.9	164.4	34.1	76.2	2239.0
P_2 - 70,000	15.1	481.5	172.5	34.8	77.3	2594.0
P_3 - 46,600	15.3	512.1	184.6	35.6	78.7	2894.7
P_4 - 35,000	15.6	558.4	192.4	36.3	80.2	3135.8
Mean	15.1	499.5	178.5	35.2	78.0	2715.8
L.S.D. 5 %	-	-	-	1.6	-	638.8
L.S.D. 1 %	-	-	-	--	-	-
P_1 - 140,000	15.1	455.1	167.3	34.9	76.2	2505.1
P_2 - 70,000	15.2	491.6	179.1	35.8	77.6	2753.7
P_3 - 46,600	15.3	533.8	194.1	36.1	79.1	2916.8
P_4 - 35,000	15.6	564.4	207.5	38.3	80.3	3156.5
Mean	15.3	511.2	187.0	36.3	78.3	2838.0
L.S.D. 5 %	-	67.6	-	2.32	-	606.9
L.S.D. 1 %	-	-	-	-	-	--

C- The effect of interaction between soybean sowing dates and plant density under intercropping with maize on :

Stem diameter (mm.) :

The average values of the stem diameter of maize as affected by the interaction between the sowing dates and the plant density of soybean under intercropping with maize in 1980 season are presented in Table 12.

The results in Table 12, show that the interaction between the sowing dates and plant densities of soybean significantly affected the stem diameter of maize plant only in 1980 season.

The maximum stem diameter of maize plant was 29.0 mm., obtained from the interaction between the sowing date D_0 treatment and the plant density of soybean namely P_4 treatment.

The minimum stem diameter of maize plant was 16.6 mm., obtained from the interaction between the sowing date treatment namely D_2 and the plant density treatment of soybean namely P_1 .

These results indicate that the stem diameter of maize plant reduced by sowing soybean early 4 weeks before sowing maize with plant density equal to 1400,000 plants/ fad. under intercropping with maize.

These results may be due to the shading effect of soybean plants on maize at the early growth stages when soybean sown early 4 weeks before maize. On the other hand the high density of soybean induced severe competition for light, water and nutrients which resulted in thinner stems of maize plants.

These results agree with those obtained by Attia (1980), and Hefni et al. (1984).

Table 12: The mean values of the stem diameter of maize plant in mm. at harvesting time as affected by the interaction between sowing dates and plant densities of soybean under intercropping with maize in 1980 season.

Soybean sowing dates	Soybean plant density*			
	P_1	P_2	P_3	P_4
D_0- On the same date of sowing maize	28.5	28.7	28.9	29.0
D_1- Early 2 weeks before sowing maize	24.2	26.0	26.5	27.0
D_2- Early 4 weeks before sowing maize	16.6	21.0	22.2	23.0
Mean	23.1	25.2	25.9	26.3
L.S.D. of interaction (dates x densities) 5 %		2.4		
L.S.D. of interaction (dates x denisties) 1 %		n.s.		

*Where : P_1 = 140,000 plants/ fad. P_3 = 46,600 plants/ fad.

P_2 = 70,000 plants/ fad. P_4 - 35,000 plants/ fad.