IV RESULTS

A: Growth Characters

1) Plant height

a- At 30 days from planting:

Data on mean plant height of soybean at 30 days from planting as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 3 and 4.

Varietal effects:

In 1977, variety had a highly significant effect on plant height. Plants of Lee variety were 1.5 cm taller than Clark plants.

In 1978, plant height of Lee exceeded that of Clark by 1.3 cm, but difference in plant height at this stage of growth was not significant.

Phosphorous effects:

In 1977, P significantly increased plant height. Application of 40 and 60 Kg P_2O_5/fad. significantly increased plant height over untreated plants by 1.8 and 1.9 cm, respectively.

In 1978, the effect of P on plant height was not significant. Increase in plant height due to P were beyond the level of significance.

Table 3 : Mean plant height (cm) at 30 days from planting as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	22.0	24.6	23.2	23.0	23.2
	20	22.6	23.8	25.8	24.6	24.2
	40	22.4	24.6	25.8	25.8	24.7
	60	22.4	24.0	25.8	27.8	25.0
	Mean	22.4	24.3	25.2	25.3	24.3
Lee	0	23.2	25.0	25.2	24.6	24.5
	20	23.4	24.8	26.6	26.6	25.4
	40	24.0	26.0	27.0	29.6	26.7
	60	24.6	25.8	26.6	29.0	26.5
	Mean	23.8	25.4	26.4	27.5	25.8
Over all mean	0	22.6	24.8	24.2	23.8	23.9
	20	23.0	24.3	26.2	25.6	24.8
	40	23.2	25.3	26.4	27.7	25.7
	60	23.5	24.9	26.2	28.4	25.8
	Mean	23.1	24.8	25.8	26.4	25.0

L.S.D.	5%	1%
variety	0.7	0.9
P	1.0	1.3
N	1.0	1.3

L.S.D.	5%
V x P	NS
V x N	NS
P x N	NS
V x P x N	NS

Table 4 : Mean plant height (cm) at 30 days from planting as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	18.4	18.2	17.5	18.9	18.3
	20	18.2	19.3	18.5	19.7	18.9
	40	18.5	18.9	19.5	19.8	19.2
	60	18.4	17.4	20.7	19.9	19.1
	Mean	18.4	18.5	19.0	19.6	18.9
Lee	0	18.3	22.1	18.7	20.7	20.0
	20	20.2	19.3	19.8	20.4	19.9
	40	20.4	19.7	20.1	21.3	20.4
	60	20.5	18.3	21.5	21.3	20.4
	Mean	19.9	19.9	20.0	20.9	20.2
Over all mean	0	18.4	20.2	18.1	19.8	19.1
	20	19.2	19.3	19.1	20.0	19.4
	40	19.4	19.3	19.8	20.6	19.8
	60	19.5	17.9	21.1	20.6	19.8
	Mean	19.1	19.2	19.5	20.3	19.5

L.S.D.	5%	1%
variety	NS	NS
P	NS	NS
N	0.8	1.1

L.S.D.	5%
V x P	NS
V x N	NS
P x N	NS
V x P x N	NS

Table 5 : Mean plant height (cm) at 60 days from planting as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	48.0	34.0	45.0	47.0	45.8
	20	49.0	42.0	33.0	47.0	42.8
	40	45.0	54.0	49.0	46.0	48.5
	60	46.0	47.0	38.0	53.0	46.0
	Mean	47.0	46.5	41.3	48.3	45.8
Lee	0	65.8	66.2	71.0	70.4	68.4
	20	78.4	62.0	70.0	71.4	70.5
	40	78.6	84.6	77.4	77.0	79.4
	60	65.0	65.4	75.0	65.4	67.7
	Mean	72.0	69.6	73.4	71.1	71.5
Over all mean	0	56.9	54.6	58.0	58.7	57.1
	20	63.7	52.0	51.5	59.2	56.6
	40	61.8	69.3	63.2	61.5	64.0
	60	55.5	56.2	56.5	59.2	56.9
	Mean	59.5	58.0	57.3	59.7	58.6

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	1.5	1.9	V x P	3.0	3.9
P	2.1	2.8	V x N	3.0	3.9
N	NS	NS	P x N	4.2	5.5
			V x P x N	5.9	7.8

Table 6 : Mean plant height (cm) at 60 days from planting as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	44.2	47.7	43.6	43.8	44.8
	20	42.9	46.3	49.7	52.0	47.8
	40	48.1	45.3	47.2	49.5	47.5
	60	41.0	44.7	46.9	44.7	44.4
	Mean	44.1	46.0	46.9	47.5	46.1
Lee	0	40.7	48.6	52.6	49.0	47.7
	20	44.6	48.0	53.7	55.3	50.5
	40	41.7	48.1	49.6	53.5	48.2
	60	48.1	49.1	51.5	53.4	50.5
	Mean	43.8	48.5	51.9	52.8	49.2
Over all mean	0	42.4	48.1	48.1	46.4	46.3
	20	43.8	47.3	51.7	53.6	49.1
	40	44.9	46.7	48.4	51.5	47.9
	60	44.5	46.9	49.2	49.1	47.4
	Mean	43.9	47.3	49.4	50.1	47.7

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	NS	NS	V x P	NS	NS
P	NS	NS	V x N	2.5	3.3
N	1.8	2.4	P x N	NS	NS
			V x P x N	5.0	6.7

In 1978, Lee plants were also taller than Clark plants, but differences were not significant.

Phosphorous effects:

In 1977, the application of 40 Kg P_2O_5/fad. significantly inoreased plant height of soybean by 6.9 cm. Other P levels showed no significant effect.

In 1978, all P levels increased plant height of soybean plants, but differences were not significant.

Nitrogen effects:

In 1977, N at all levels used had no significantly effect on plant height at 60 days from planting.

In 1978, plant height of soybean was significant affected by N application. The application of 15, 30 and 45 Kg N/fad. significantly increased plant height over untreated plants by 3.4, 5.5 and 6.2 cm, respectively

Interaction effects:

In 1977, the interactions V x P, V x N, P x N and V x P x N had significant effects on plant height indicating that all experimenal factors did not act separately. Lee variety showed higher response to P than Clark, whereas Clark showed higher response to N. Plant height response to P was influenced by N level. Tallest soybean plants were obtained from both varieties

at 40 Kg P_2O_5 + 15 Kg N/fad. and shortest plants were obtaied at 20 Kg P_2O_5 + 30 Kg N/fad. for Clark variety and at 20 Kg P_2O_5 + 15 Kg N/fad. for Lee.

In 1978, the interaction effects V x N and V x P x N on plant height were significant. Lee plants showed higher response to N than Clark plants. Tallest plants were at 20 Kg P_2O_5 + 45 Kg N/fad. for both varieties and shortest plants were at 60 Kg P_2O_5 + zero Kg N/fad. for Clark variety and at the control treatment for Lee.

C. At harvest:

Data on mean plant height at harvest as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 7 and 8.

Varietal effects:

In 1977, variety had a highly significant effect on plant height of soybean. Lee plants were 31.5 cm taller than Clark plants. Similarly, in 1978, plant height of Lee variety significantly exceeded that of Clark by 9.1 cm.

Phosphorous effects:

In 1977, P application had a highly significant effect on plant height at harvest. Application of 20, 40 and 60 Kg P_2O_5/fad. increased plant height over untreated plants by 8.1, 9.8 and 12.2 cm, respectively.

Table 7 : Mean plant height (cm) at harvest as affected by variety, P andN , in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	47.0	49.6	54.0	52.6	50.8
	20	56.7	58.8	62.9	63.5	60.5
	40	60.4	63.4	67.6	67.6	64.8
	60	66.9	66.9	68.0	70.0	67.9
	Mean	57.8	59.7	63.1	63.4	61.0
Lee	0	88.8	86.5	86.3	85.0	86.6
	20	88.5	93.5	94.0	96.3	93.1
	40	88.5	89.3	94.8	96.8	92.3
	60	99.5	96.0	97.0	99.3	97.9
	Mean	91.3	91.3	93.0	94.3	92.5
Over all mean	0	67.9	68.1	70.1	68.8	68.7
	20	72.6	76.2	78.5	79.9	76.8
	40	74.5	76.3	81.2	82.2	78.5
	60	83.2	81.4	82.5	84.6	82.9
	Mean	74.5	75.5	78.1	78.9	76.7

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	1·5	2.8	V x P	1.6	2.2
P	1.2	1.6	V x N	1.2	1.6
N	0.9	1.1	P x N	1.7	2.3
			V x P x N	2.4	3.2

Table 8 : Mean plant height (cm) at harvest as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	54.6	61.1	58.3	60.4	58.6
	20	57.7	58.6	62.0	62.7	60.2
	40	65.1	63.9	66.2	65.5	65.2
	60	54.1	59.3	61.6	63.2	59.6
	Mean	57.9	60.7	62.0	62.9	60.9
Lee	0	65.7	67.7	71.8	64.6	67.4
	20	70.8	67.9	68.7	72.3	69.9
	40	69.4	72.0	72.0	73.1	71.6
	60	67.9	68.9	75.5	72.6	71.2
	Mean	68.4	69.1	72.0	70.6	70.0
Over all mean	0	60.1	64.4	65.1	62.5	63.0
	20	64.2	63.3	65.3	67.5	65.1
	40	67.3	67.9	69.1	69.3	68.4
	60	61.0	64.1	68.6	67.9	65.4
	Mean	63.1	64.9	67.0	66.8	65.5

L.S.D.	5%	1%
variety	6.4	11.7
P	3.3	4.5
N	2.5	3.3

L.S.D.	5%
V x P	NS
V x N	NS
P x N	NS
V x P x N	NS

In 1978, P showed a significant effect on plant height. Significant increase in plant height was only achieved at the rate of 40 Kg P_2O_5/fad.

Nitrogen effects:

In 1977, N had a highly significant effect on plant height. Increases of 1.0, 3.6 and 4.4 cm were shown in plant height by applying 15, 30 and 45 Kg N/ fad., respectively.

In 1978, N at the rates of 30 and 45 Kg/fad. significantly increased plant height of soybean compared with the control treatment.

Interaction effects:

In 1977, the effects of the interaction V x P, V x N, P x N and V x P x N on plant height at harvest were significant. Clark variety showed higher responses to P and N compared with Lee.

The application of N stimulated plant response to P and similarly the response of soybean plants to N was increased at higher P levels. Maximum plant height for Clark variety was at 60 Kg P_2O_5 + 45 Kg N/fad. and for Lee at 60 Kg P_2O_5 + Zero Kg N/fad. Minimum plant height for Clark variety was where no P and N were applied, and for Lee at Zero Kg P_2O_5 + 45 Kg N/fad.

In 1978, all interaction effects on plant height at harvest were beyond the level of significance.

2) Number of branches per plant

a- At 30 days from planting

Data on mean number of branches per plant at 30 days from planting as affected by variety, P , N and their interactions in 1977 and 1978 seasons are shown in tables 9 and 10.

Varietal effects:

In both seasons, no significant differences were deteoted in number of branches/plant between Clark and Lee varieties. Lee variety produced more branches/ plant than Clark but differences were beyond the level of significance.

Phosphorous effects:

In 1977, P application had no significant effect on number of branches / plant. The application of 20, 40 and 60 Kg P_2O_5/fad. increased number of branches/ plant over untreated plants by 0.4, 0.3 and 0.2, respectively.

In 1978, P at all levels used showed a significant effect on number of branches/plant. Increases of 0.3, 0.3 and 0;4 were obtained when P was applied at 20, 40 and 60 Kg P_2O_5/fad., respectively.

Table 9 : Mean number of branches per plant at 30 days from planting as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	1.4	1.6	1.8	2.2	1.8
	20	2.0	2.0	1.6	2.4	2.0
	40	1.4	1.4	2.0	2.6	1.9
	60	1.4	1.6	2.0	2.4	1.9
Mean		1.6	1.7	1.9	2.4	1.9
Lee	0	2.0	1.4	1.2	1.8	1.6
	20	2.4	2.8	2.0	1.6	2.2
	40	2.0	2.0	1.8	2.6	2.1
	60	1.6	1.0	2.2	2.8	1.9
Mean		2.0	1.8	1.8	2.2	2.0
Over all mean	0	1.7	1.5	1.5	2.0	1.7
	20	2.2	2.4	1.8	2.0	2.1
	40	1.7	1.7	1.9	2.6	2.0
	60	1.5	1.3	2.1	2.6	1.9
Mean		1.8	1.7	1.8	2.3	1.9

L.S.D.	5%	L.S.D.	5%
variety	NS	V x P	NS
P	NS	V x N	NS
N	NS	P x N	NS
		V x P x N	NS

Table 10 : Mean number of branches per plant at 30 days from planting as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	1.0	1.3	1.7	1.7	1.4
	20	1.1	1.3	1.7	1.9	1.5
	40	1.1	1.4	1.9	2.0	1.6
	60	1.1	1.4	1.9	2.0	1.6
	Mean	1.1	1.4	1.8	1.9	1.5
Lee	0	1.0	1.3	1.6	1.9	1.5
	20	1.3	1.7	2.3	2.3	1.9
	40	1.2	1.5	2.2	2.4	1.8
	60	1.3	1.9	2.3	2.6	2.0
	Mean	1.2	1.6	2.1	2.3	1.8
Over all mean	0	1.0	1.3	1.6	1.8	1.4
	20	1.2	1.5	2.0	2.1	1.7
	40	1.2	1.5	2.1	2.2	1.7
	60	1.2	1.6	2.1	2.3	1.8
	Mean	1.1	1.5	2.0	2.1	1.7

L.S.D.	5%	1%	L.S.D.	5%
variety	NS	NS	V x P	NS
P	0.2	0.3	V x N	NS
N	0.1	0.2	P x N	NS
			V x P x N	NS

Nitrogen effects:

In 1977, N at all rates showed no significant effect on number of branches / plant. Increases due to N application were beyond the level of significance.

In 1978, the effect of N on number of branches /plant was highly significant. The application of 15, 30 and 45 Kg N/fad. increased number of branches /plant by 0.4, 0.9 and 1.0, respectively.

Interaction effects:

In both seasons, all interaction effects on number of branches / plant were not significant indicating that each factor acted separately on that character at early stage of growth.

b. At 60 days from planting:

Data on mean number of branches per plant at 60 days from planting as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 11 and 12.

Varietal effects:

In 1977, varieties showed significant difference in regard to number of branches / plant. Lee variety produced 3.6 branches/plant more than Clark at 60 days from planting.

Table 11 : Mean number of branches per plant at 60 days from planting as affected by variety, P and N in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	1.0	1.4	2.0	2.4	1.7
	20	1.6	2.0	1.6	2.4	1.9
	40	1.6	1.4	1.6	2.2	1.7
	60	1.6	1.8	2.2	2.4	2.0
	Mean	1.5	1.7	1.9	2.4	1.8
Lee	0	4.0	5.8	4.4	4.0	4.6
	20	5.0	5.0	5.6	7.2	5.7
	40	4.8	5.2	6.2	6.8	5.8
	60	4.4	5.2	6.4	6.8	5.7
	Mean	4.6	5.3	5.7	6.2	5.4
Over all mean	0	2.5	3.6	3.2	3.2	3.1
	20	3.3	3.5	3.6	4.8	3.8
	40	3.2	3.3	3.9	4.5	3.7
	60	3.0	3.5	4.3	4.6	3.9
	Mean	3.0	3.5	3.8	4.3	3.6

L.S.D.	5%	1%
variety	2.2	4.8
P	0.6	0.7
N	0.6	0.7

L.S.D.	5%
V x P	NS
V x N	NS
P x N	NS
V x P x N	NS

Table 12 : Mean number of branches per plant at 60 days from planting as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	2.3	2.3	2.5	2.2	2.3
	20	2.2	2.4	2.5	2.3	2.4
	40	2.5	2.2	2.8	2.7	2.4
	60	2.3	2.4	2.5	2.4	2.4
	Mean	2.3	2.3	2.4	2.4	2.4
Lee	0	2.1	2.2	2.2	2.4	2.2
	20	2.3	2.0	2.1	2.2	2.2
	40	2.1	2.0	2.5	2.3	2.2
	60	2.7	2.1	2.3	2.5	2.4
	Mean	2.3	2.1	2.3	2.4	2.3
Over all mean	0	2.2	2.2	2.4	2.3	2.3
	20	2.2	2.2	2.3	2.3	2.3
	40	2.3	2.1	2.4	2.5	2.3
	60	2.5	2.3	2.4	2.5	2.4
	Mean	2.3	2.2	2.4	2.4	2.3

L.S.D.	5%	L.S.D.	5%
variety	NS	V x P	NS
P	NS	V x N	NS
N	NS	P x N	NS
		V x P x N	NS

In 1978, both varieties were statistically similar as for number of branches / plant.

Phosphorous effects:

In 1977, P application at all levels used significantly increased number of branches,/plant. Increases of 0.7, 0.6 and 0.8 were obtained in number of branches /plant, where, P was applied at 20, 40 and 60 Kg P_2O_5 /fad., respectively.

In 1978, P at all levels used showed no significant effect on number of branches/plant.

Nitrogen effects:

In 1977, the higher levels of N, namely, 30 and 45 Kg N/fad. significantly increased number of branches /plant. Increases of 0.5, 0.8 and 1.3 in number of branches at 60 days from planting were obtained over untreated plants at the N rates 15, 30 and 45 Kg/fad., respectively.

In 1978, N application did not affect number of branches/plant at all levels used.

Interaction effects:

In both seasons, all interaction effects on number of branches/plant were not significant.

C- At harvest:

Data on mean number of branches per plant at harvest as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 13 and 14.

Varietal effects:

In both seasons, Lee variety was superior to Clark in regard to number of branches/plant at harvest. Lee variety produced 4.7 and 3.2 branches more than Clark in 1977 and 1978, respectively. These differences were highly significant.

Phosphorous effects:

Effect of P on number of branches/ plant at harvest was highly significant in 1977 and not significant in 1978. The application of 20, 40 and 60 Kg P_2O_5/fad. increased number of branches over untreated plants by 0.2, 0.7 and 0.8 in 1977 and by 0.4, 0.2 in 1978, respectively. In 1978, differences were not great enough to reach the 5% level of significance.

Nitrogen effects:

Effect of N on number of branches/ plant at harvest was highly significant in the two successive seasons. Increases of 0.5, 1.2 and 1.9 in number of

Table 13 : Mean number of branches per plant at harvest as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	1.5	1.7	1.8	2.3	1.8
	20	1.4	1.6	1.9	2.4	1.8
	40	1.5	1.7	2.1	3.0	2.0
	60	1.9	2.1	2.8	3.4	2.5
	Mean	1.5	1.8	2.1	2.8	2.1
Lee	0	5.0	6.1	6.1	7.2	6.1
	20	5.2	5.9	7.0	8.0	6.5
	40	5.9	6.6	8.1	8.7	7.3
	60	5.9	6.0	8.2	8.3	7.1
	Mean	5.5	6.2	7.3	8.0	6.8
Over all mean	0	3.2	3.9	4.0	4.8	4.0
	20	3.3	3.8	4.4	5.2	4.2
	40	3.7	4.2	5.1	5.8	4.7
	60	3.9	4.1	5.5	5.8	4.8
	Mean	3.5	4.0	4.7	5.4	4.4

L.S.D.	5%	1%
variety	1.7	3.2
P	0.2	0.5
N	0.1	0.4

L.S.D.	5%	1%
V x P	0.3	0.4
V x N	0.2	0.6
P x N	0.3	0.7
V x P x N	0.4	0.9

Table 14 : Mean number of branches per plant at harvest as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	1.3	1.5	1.8	1.7	1.6
	20	1.7	2.0	1.8	2.2	1.9
	40	1.4	1.9	1.9	2.2	1.8
	60	1.6	1.4	1.9	2.2	1.8
	Mean	1.5	1.7	1.8	2.1	1.8
Lee	0	4.2	4.2	5.2	5.8	4.8
	20	4.1	5.4	5.8	6.2	5.3
	40	4.2	5.0	5.0	5.5	4.9
	60	4.0	4.4	5.9	5.7	5.0
	Mean	4.1	4.7	5.4	5.8	5.0
Over all mean	0	2.8	2.8	3.5	3.7	3.2
	20	2.9	3.7	3.7	4.2	3.6
	40	2.8	3.4	3.4	3.8	3.4
	60	2.8	2.9	3.9	4.0	3.4
	Mean	2.8	3.2	3.6	3.9	3.4

L.S.D.	5%	1%
variety	0.8	1.5
P	NS	NS
N	0.3	0.4

L.S.D.	5%	1%
V x P	NS	NS
V x N	0.4	0.5
P x N	NS	NS
V x P x N	0.7	0.9

branches/plant were obtained in 1977 over untreated plants as a result of applying 15, 30 and 45 Kg N/fad., respectively. The same N levels increased number of branches by 0.4, 0.8 and 1.1 in 1978.

Interaction effects:

In 1977, all interaction effects on number of branches/plant at harvest were significant. It was clear that the two varietiew showed different response to the different P levels. In regard to N, Clark variety showed higher response where the effect of N on number of branches/ plant was more evident. The application of N stimulated soybean plants to utilize applied P. In 1977, the greatest number of branches for Clark variety was obtained at 60 Kg P_2O_5 + 45 Kg N/fad. and for Lee at 40 Kg P_2O_5 + 45 Kg N/fad. The lowest number of branches was at 20 Kg P_2O_5 + zero Kg N/fad. for Clark and where no P and N were applied for Lee.

In 1978, the interaction effects V x N and V x P x N on number of branches / plant were significant. It was clear that Lee variety showed higher response to N than Clark. The greatest branches number for Clark was at 45 Kg N + 20, 40 or 60 Kg P_2O_5/fad. and for Lee at 20 Kg P_2O_5 + 45 Kg N/fad. The lowest number of branches/plant at harvest was obtained from unfertilized plants for Clark and from plants given 60 Kg P_2O_5 + zero Kg N/fad. for Lee.

3) Number of leaves per plant

a- At 30 days from planting:

Data on mean number of leaves per plant at 30 days from planting as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 15 and 16.

Varietal effects:

In both seasons, variety had no significant effect on number of leaves /plant at 30 days from planting. Both varieties produced about the same number of leaves/ plant.

Phosphorous effects:

In both season, P application had no significant effect on number of leaves/plant at 30 days from planting. None of P levels used had significant effect on this character at this stage of growth.

Nitrogen effects:

In 1977, N at the highest rate (45 Kg N/fad.) significantly increased number of leaves/ plant by 1.8 over untreated plants at 30 days from planting. Other N-levels were not effective in increasing number of leaves.

In 1978, N at all levels used had no significant effect on number of leaves/plant.

Table 15 : Mean number of leaves per plant at 30 days from planting as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/ fad. 0	15	30	45	Mean
Clark	0	7.6	7.4	9.8	13.8	9.7
	20	8.0	8.8	10.8	9.6	9.3
	40	7.8	6.0	7.2	12.4	8.4
	60	6.6	7.2	10.6	9.6	8.5
	Mean	7.5	7.4	9.6	11.4	9.0
Lee	0	11.6	8.2	6.4	9.0	8.8
	20	13.2	8.0	10.6	9.6	10.4
	40	9.6	10.0	10.0	13.4	10.8
	60	7.8	7.2	12.2	9.0	9.1
	Mean	10.6	8.4	9.8	10.3	9.7
Over all mean	0	9.6	7.8	8.1	11.4	9.2
	20	10.6	8.4	10.7	9.6	9.8
	40	8.7	8.0	8.6	12.9	9.6
	60	7.2	7.2	11.4	9.3	8.8
	Mean	9.0	7.9	9.7	10.8	9.3

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	NS	NS	V x P	NS	NS
P	NS	NS	V x N	1.5	2.0
N	1.1	1.4	P x N	NS	NS
			V x P x N	NS	NS

Table 16 : Mean number of leaves per plant at 30 days from planting as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	5.5	5.5	5.3	5.3	5.4
	20	5.7	5.6	5.4	6.0	5.7
	40	5.7	5.9	6.1	5.7	5.9
	60	5.9	6.0	5.8	6.0	5.9
	Mean	5.7	5.8	5.7	5.8	5.7
Lee	0	5.3	5.3	5.5	5.1	5.3
	20	5.3	5.7	5.5	5.7	5.6
	40	5.8	6.1	5.3	5.8	5.8
	60	5.4	5.4	6.1	6.0	5.7
	Mean	5.5	5.6	5.6	5.6	5.6
Over all mean	0	5.4	5.4	5.4	5.2	5.3
	20	5.6	5.7	5.4	5.8	5.6
	40	5.7	6.0	5.7	5.8	5.8
	60	5.7	5.7	6.0	6.0	5.8
	Mean	5.6	5.7	5.6	5.7	5.7

L.S.D.	5%	L.S.D.	5%
variety	NS	V x P	NS
P	NS	V x N	NS
N	NS	P x N	NS
		V x P x N	NS

Interaction effects:

In 1977, the interaction effects of the studied factors on number of leaves/plant were not signifioant except that of V x N. It was clear that Clark variety was more affected by N where sconsiderable increase in number of leaves/plant was obtained at 30 and 45 Kg N/fad. In Lee, N application showed no effect on leaf number.

In 1978, all interactions between the three studied factors showed no significant effect on number of leaves/plant at this stage of growth.

b- At 60 days from planting:

Data on mean number of leaves per plant at 60 days from planting as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 17 and 18.

Varietal effects:

Effect of variety on number of leaves/plant was highly significant in 1977 and not significant in 1978. I_n 1977, Lee plants produced 4.6 leaves more than Clark, whereas in 1978 Clark plants showed a slight increase in number of lraves over Lee.

Phosphorous effects:

P application in both seasons had no significant effect on number of leaves/ plant. Increases in number

Table 17 : Mean number of leaves per plants at 60 days from planting as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	11.6	16.4	11.8	14.2	13.5
	20	12.4	12.0	13.6	11.6	12.4
	40	12.4	11.8	12.6	16.2	13.3
	60	8.4	12.6	15.0	14.0	12.5
	Mean	11.2	13.2	13.3	14.0	12.9
Lee	0	17.4	17.2	15.2	17.0	16.7
	20	20.0	25.8	15.0	14.0	18.7
	40	20.0	22.4	16.2	20.4	15.3
	60	12.8	15.2	15.4	14.4	14.5
	Mean	17.6	20.2	16.0	16.5	17.5
Over all mean	0	14.5	16.8	13.5	15.6	15.1
	20	16.2	18.9	14.3	12.8	15.6
	40	16.2	17.1	15.4	18.3	16.8
	60	10.6	13.9	15.2	14.2	13.5
	Mean	14.4	16.7	14.6	15.2	15.2

L.S.D.	5%	1%	L.S.D.	5%
Variety	2.0	2.3	V x P	NS
P	NS	NS	V x N	NS
N	NS	NS	P x N	NS
			V x P x N	NS

Table 18 : Mean number of leaves per plant at 60 days from planting as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	9.7	9.9	11.2	8.9	9.9
	20	10.3	11.4	11.3	11.5	11.1
	40	11.1	10.4	10.4	13.3	11.3
	60	10.4	10.2	11.8	10.9	10.8
	Mean	10.4	10.5	11.2	11.2	10.8
Lee	0	9.6	9.1	9.5	12.1	10.1
	20	8.8	8.2	9.9	9.3	9.0
	40	8.2	8.8	10.7	10.6	9.6
	60	11.0	9.5	10.8	11.2	10.6
	Mean	9.4	8.9	10.2	10.8	9.8
Over all mean	0	9.6	9.5	10.3	10.5	10.0
	20	9.5	9.8	10.6	10.4	10.1
	40	9.7	9.6	10.6	11.9	10.4
	60	10.4	9.9	11.3	11.1	10.7
	Mean	9.9	9.7	10.7	11.0	8.3

L.S.D.	5%	1%	L.S.D.	5%
variety	NS	NS	V x P	NS
P	NS	NS	V x N	NS
N	1.0	1.6	P x N	NS
			V x P x N	NS

of leaves due to P application were not great enough to reach the 5% level of significance.

Nitrogen effects:

In 1977, N at all levels used had no significant effect on number of leaves/plant at 60 days from planting . Increases of 2.4, 0.4 and 0.8 in number of leaves/plant were shown as N was applied at the rates of 15, 30 and 45 Kg/fad., respectively. All differences were beyond the level of significante.

In 1978, N at 45 Kg/fad. significantly increased number of leaves/plant by 1.1 over untreated plants. Other N levels showed no significant effect.

Interaction effects:

In both seasons, all interactions between the studied factors showed no significant effects on number of leaves/plant indicating that each experimental factor acted separately on that character.

4) Dry weight of branches per plant

a- At 30 days from planting:

Data on mean dry weight of branches per plant at 30 days from planting as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 19 and 20.

Table 19 : Mean dry weight of branches per plant (g) at 30 days from planting as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	1.056	0.967	0.735	0.843	0.900
	20	0.841	0.854	1.245	0.923	0.966
	40	0.907	0.796	0.728	0.771	0.800
	60	0.788	0.494	1.165	0.971	0.855
	Mean	0.898	0.778	0.968	0.877	0.880
Lee	0	1.224	0.990	0.834	0.990	1.009
	20	1.381	0.692	0.864	1.114	1.013
	40	1.288	1.223	0.925	1.150	1.146
	60	0.746	1.114	0.910	0.969	0.935
	Mean	1.159	1.005	0.883	1.056	1.026
Over all mean	0	1.140	0.979	0.784	0.916	0.955
	20	1.111	0.773	1.054	1.018	0.989
	40	1.097	1.009	0.826	0.960	0.973
	60	0.767	0.804	1.037	0.970	0.895
	Mean	1.029	0.891	0.926	0.966	0.953

L.S.D.	5%	L.S.D.	5%
variety	NS	V x P	NS
P	NS	V x N	NS
N	NS	P x N	NS
		V x P x N	NS

Table 20 : Mean dry weight of branches per plant (g) at 30 days from planting as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	0.693	0.653	0.675	0.690	0.678
	20	0.760	0.817	0.767	0.768	0.778
	40	0.733	0.779	0.932	0.743	0.797
	60	0.652	0.704	0.821	0.761	0.735
	Mean	0.710	0.738	0.799	0.741	0.747
Lee	0	0.768	0.663	0.698	0.753	0.721
	20	0.661	0.764	0.684	0.705	0.703
	40	0.675	0.632	0.764	0.711	0.696
	60	0.773	0.770	0.775	0.860	0.795
	Mean	0.719	0.707	0.730	0.757	0.728
Over all mean	0	0.730	0.658	0.686	0.721	0.699
	20	0.710	0.790	0.726	0.736	0.741
	40	0.704	0.705	0.848	0.727	0.746
	60	0.713	0.737	0.790	0.810	0.765
	Mean	0.713	0.723	0.765	0.749	0.738

L.S.D.	5%	L.S.D.	5%
variety	NS	V x P	NS
P	NS	V x N	NS
N	NS	P x N	NS
		V x P x N	NS

Varietal effects:

In both experimental seasons, variety had no nignificant effect on dry weigth of branches/plant.

In 1977, dry weight of branches/plant of Lee variety was 0.146 g higher than Clark, whereas in 1978 dry weight of branches/plant of Clark variety exceeded that of Lee by 0.019 g. However, these differences were not significant.

Phosphorous effects:

In both seasons, P had no significant effect on dry weight of branches/plant at 30 days from planting. The slight increases in dry weight of branches/plant at this stage of growth due to P application were beyond the 5% level of significance.

Nitrogen effects:

Application of N had no significant effect on dry weight of branches/plant at 30 days from planting. That was true in both experimental seasons.

Interaction effects:

In both seasons, all interaction effects of the experimental factors on dry weight of branches/plant at 30 days from planting were not significant.

b- At 60 days from planting:

Data on mean dry weight of branches/ plant at 60 days from planting as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 21 and 22.

Varietal effects:

In both seasons, variety had no significant effect on dry weight of branches/plant at 60 days from planting. Both soybean varieties were statistically similar in regard to dry weight of branches/plant at this stage of growth.

Phosphorous effects:

In 1977 season, P application at 40 Kg P_2O_5/fad. significantly increased dry weight of branches/plant. Other P rates produced insignificant increases in branches dry weight.

In 1978 season, P application insignificantly increased dry weight of branches/plant. The application of 20, 40 and 60 Kg P_2O_5/fad. increased branches dry weight by 0.271, 0.350 and 0.681 g, respectively, over untreated soybean. All differences were not significant.

Nitrogen effects:

In both seasons, N significantly increased dry weight of branches/plant at 60 days from planting. The application of 30 and 45 Kg N/fad significantly increased.

Table 21 : Mean dry weight of branches per plant at(g) at 60 days from planting as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	6.10	8.58	9.88	8.10	8.17
	20	10.34	8.89	6.76	8.84	8.70
	40	5.50	8.58	10.52	9.96	8.64
	60	7.34	5.70	9.92	9.72	8.17
	Mean	7.32	7.93	9.27	9.16	8.42
Lee	0	5.90	6.32	6.88	8.52	6.91
	20	9.10	5.62	8.36	8.02	7.78
	40	9.34	10.82	8.28	10.04	9.62
	60	7.26	4.20	10.04	10.42	7.98
	Mean	7.90	6.74	8.39	9.16	8.07
Over all mean	0	6.00	7.45	8.38	8.31	7.54
	20	9.72	7.24	7.56	8.43	8.24
	40	7.42	9.70	9.40	10.00	9.13
	60	7.30	4.95	9.98	10.07	8.08
	Mean	7.61	7.34	8.83	9.20	8.25

L.S.D.	5%	1%	L.S.D.	5%
variety	NS	NS	V x P	NS
P	1.02	1.35	V x N	NS
N	1.02	1.35	P x N	NS
			V x P x N	NS

Table 22 : Mean dry weight of branches per plant (g) at 60 days from planting as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	2.360	2.599	2.325	2.607	2.473
	20	2.359	2.829	3.211	3.187	2.897
	40	2.855	2.557	3.092	3.822	3.082
	60	2.603	2.611	3.206	4.264	3.171
	Mean	2.544	2.649	2.959	3.470	2.906
Lee	0	1.869	2.640	3.007	3.692	2.802
	20	2.110	2.451	3.405	2.909	2.719
	40	1.989	2.134	3.799	3.646	2.892
	60	3.020	2.911	3.454	3.674	3.265
	Mean	2.247	2.534	3.416	3.480	2.919
Over all mean	0	2.114	2.620	2.666	3.150	2.637
	20	2.235	2.640	3.308	3.048	2.808
	40	2.422	2.346	3.445	3.734	2.987
	60	2.811	2.761	3.330	3.969	3.218
	Mean	2.396	2.592	3.187	3.475	2.912

L.S.D.	5%	1%	L.S.D.	5%
variety	NS	NS	V x P	NS
P	NS	NS	V x N	NS
N	0.466	0.626	P x N	NS
			V x P x N	NS

branches dry weight/plant by 1.220 and 1.590 g, respectively, over untreated soybean in 1977 and by 0.791 and 1.079 g in 1978. The lower N level, namly, 15 Kg N/fad. had no significant effect on that charater in both seasons.

Interaction effects:

In both seasons, all interactions between the studied factors showed no significant effect on dry weight of branches/plant at 60 days from planting. This result indicates that variety, P and N acted separately in affecting this character.

5) Dry weight of leaves per plant

a- At 30 days from planting:

Data on mean dry weight of leaves per plant at 30 days from planting as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 23 and 24.

Varietal effects:

In 1977, dry weight of leaves/plant at 30 days from planting of Lee variety was significantly higher than of Clark. Dry weight of leaves/plant of Lee exceeded that of Clark by 0.213 g.

Table 23 : Mean dry weight of leaves per plant (g) at 30 days from planting as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	1.298	1.288	0.998	1.200	1.196
	20	1.073	1.063	1.533	1.226	1.224
	40	1.189	1.014	0.912	0.784	0.975
	60	0.991	0.589	1.106	1.142	0.957
	Mean	1.138	0.989	1.137	1.088	1.063
Lee	0	1.290	1.298	1.003	1.055	1.232
	20	1.980	0.846	1.114	1.364	1.326
	40	1.577	1.114	1.270	1.354	1.329
	60	0.913	1.385	1.396	1.180	1.219
	Mean	1.510	1.161	1.196	1.238	1.276
Over all mean	0	1.434	1.293	1.001	1.128	1.214
	20	1.527	0.955	1.324	1.295	1.275
	40	1.383	1.064	1.091	1.096	1.152
	60	0.952	0.987	1.251	1.161	1.088
	Mean	1.324	1.075	1.167	1.163	1.182

L.S.D.	5%	1%
variety	0.148	0.194
P	NS	NS
N	NS	NS

L.S.D.	5%
V x P	NS
V x N	NS
P x N	NS
V x P x N	NS

Table 24 : Mean dry weight of leaves per plant (g) at 30 days from planting as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	1.073	1.023	1.078	1.011	1.046
	20	1.222	1.208	1.083	1.384	1.224
	40	1.159	1.224	1.335	1.247	1.241
	60	1.096	1.215	1.231	1.244	1.197
	Mean	1.138	1.168	1.182	1.222	1.177
Lee	0	0.979	1.158	1.097	1.138	1.093
	20	1.029	1.025	1.075	1.105	1.059
	40	1.023	1.179	1.243	1.048	1.124
	60	1.106	1.175	1.218	1.407	1.227
	Mean	1.034	1.135	1.158	1.175	1.125
Over all mean	0	1.026	1.091	1.088	1.075	1.070
	20	1.125	1.117	1.079	1.245	1.141
	40	1.091	1.202	1.289	1.147	1.182
	60	1.101	1.195	1.225	1.325	1.212
	Mean	1.086	1.151	1.170	1.198	1.151

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	NS	NS	V x P	NS	NS
P	0.097	0.137	V x N	NS	NS
N	0.064	0.085	P x N	0.110	0.148
			V x P x N	NS	NS

In 1978, no significant difference in dry weight of leaves/plant was detected between the two varieties.

Phosphorous effects:

Effect of P on dry weight of leaves/plant was not significant in 1977 and significant in 1978. The application of 20, 40 and 60 Kg P_2O_5/fad. increased dry weight of leaves/plant in 1978 by 0.071, 0.112 and 0.149 g, respectively. Significant increases were achieved at the higher P levels (40 and 60 Kg P_2O_5/fad.).

Nitrogen effects:

In 1977, N at all rates had no significant effect on dry weight of leaves/plant. On the other hand, all levels of N isignifcantly increased dry weight of leaves/plant at 30 days from planting in 1978 season. Increases of 0.065, 0.084 and 0.112 g in dry weight of leaves/plant were obtained by applying 15, 30 and 45 Kg N/fad., respectively, compared with untreated plants.

Interaction effects:

In 1977, all interactions between the experimental factors had no significant effects on dry weight of leaves/plant at 30 days from planting.

In 1978, all interactions except that of P x N, showed no significant effects on dry weight of leaves/plant. In that season the response of soybean plants

to P was clear at higher N level. Similarly N showed higher effect on dry weight of leaves/plant at higher rates of P application.

b- At 60 days from planting:

Data on mean dry weight of leaves per plant at 60 days from planting as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 25 and 26.

Varietal effects:

In 1977, the effect of variety on dry weight of leaves/plant at 60 days from planting was highly significant. The dry weight of leaves/plant of Lee variety exceeded that of Clark by 2.05 g.

In 1978, both varieties showed no significant difference in regard to dry weight of leaves/plant.

Phosphorous effects:

In 1977, P had a highly significant effect on dry weight of leaves/plant at 60 day from planting. The application of 20, 40 and 60 kg P_2O_5/fad. significantly increased dry weight of leaves/plant over untreated plants by 2.88, 3.53 and 5.41. g, respectively.

In 1978, the increases in dry weight of leaves/plant due to P application were not significant.

Table 25 : Mean dry weight of leaves per plant (g) at 60 days from planting as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	8.12	8.76	9.02	9.04	8.74
	20	10.68	11.66	12.00	12.92	11.82
	40	10.96	11.88	11.90	12.92	11.92
	60	13.42	12.74	13.60	15.46	13.81
	Mean	10.80	11.26	11.63	12.59	11.57
Lee	0	9.92	8.84	11.52	15.90	11.55
	20	7.80	11.28	16.70	21.10	14.22
	40	9.60	13.60	16.44	22.04	15.42
	60	10.52	15.62	19.38	23.68	17.30
	Mean	9.46	12.34	16.01	20.68	14.62
Over all mean	0	9.02	8.80	10.27	12.47	10.14
	20	9.24	11.47	14.35	17.01	13.02
	40	10.28	12.74	14.17	17.48	13.67
	60	11.97	14.18	16.49	19.57	15.55
	Mean	10.13	11.80	13.82	16.63	13.09

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	0.44	0.58	V x P	0.84	1.10
P	0.59	0.78	V x N	0.84	1.10
N	0.59	0.78	P x N	1.18	1.56
			V x P x N	1.67	2.20

Table 26 : Mean dry weight of leaves per plant (g) at 60 days from planting as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	4.831	5.109	4.769	5.001	4.928
	20	4.487	6.091	5.682	6.240	5.625
	40	5.876	4.615	6.355	7.729	6.144
	60	4.791	4.730	6.536	8.307	6.091
	Mean	4.997	5.136	5.835	6.820	5.697
Lee	0	3.321	4.483	6.059	6.566	5.107
	20	4.261	3.775	5.696	5.444	4.862
	40	3.165	4.542	6.786	7.249	5.436
	60	5.233	5.120	6.875	6.781	6.002
	Mean	3.995	4.480	6.422	6.510	5.352
Over all mean	0	4.076	4.796	5.414	5.784	5.017
	20	4.374	4.933	5.826	5.842	5.244
	40	4.521	4.578	6.570	7.489	5.790
	60	5.012	4.925	6.705	7.544	6.047
	Mean	4.496	4.808	6.129	6.665	5.524

L.S.D.	5%	1%	L.S.D.	5%
variety	NS	NS	V x P	NS
P	NS	NS	V x N	NS
N	0.808	1.085	P x N	NS
			V x P x N	NS

6) Dry weight per plant

a- At 30 days from planting:

Data on mean dry weight per plant at 30 days from planting as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 27 and 28.

Varietal effects:

In 1977, dry weight/plant of Lee variety was significantly higher than of Clark. The over all mean of dry weight/plant of Lee was 0.359 g higher than that of Clark . This difference was highly significant.

In 1978, no significant difference was detected in dry weight/plant of the two varieties.

Phosphorous effects:

In 1977, the effect of P on dry weight/plant at 30 days from planting was not significant. All ratew of applied P did not increase dry weight/plant.

In 1978, P at 40 and 60 Kg P_2O_5/fad. significantly increased dry weight/plant by 0.159 and 0.208 g, respectively, over untreated plants.

Nitrogen effects:

In both seasons, the application of N at all levels had no significant effect on dry weight/plant

Table 27 : Mean dry weight per plant (g) at 30 days from planting as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	2.354	2.255	1.733	2.043	2.096
	20	1.914	1.917	2.778	2.149	2.190
	40	2.096	1.810	1.640	1.555	1.775
	60	1.779	1.083	2.271	2.113	1.812
	Mean	2.036	1.767	2.105	1.965	1.943
Lee	0	2.514	2.288	1.837	2.045	2.241
	20	3.361	1.538	1.978	2.478	2.339
	40	2.865	2.337	2.195	2.504	2.475
	60	1.659	2.499	2.306	2.149	2.154
	Mean	2.669	2.166	2.079	2.294	2.302
Over all mean	0	2.574	2.272	1.785	2.044	2.169
	20	2.638	1.728	2.378	2.313	2.264
	40	2.480	2.073	1.917	2.029	2.125
	60	1.719	1.791	2.288	2.131	1.983
	Mean	2.352	1.966	2.093	2.129	2.132

L.S.D.	5%	1%	L.S.D.	5%
variety	0.200	0.260	V x P	NS
P	NS	NS	V x N	NS
N	NS	NS	P x N	NS
			V x P x N	NS

Table 28 : Mean dry weight per plant (g) at 30 days from planting as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	1.766	1.676	1.753	1.701	1.724
	20	1.982	2.025	1.850	2.152	2.002
	40	1.892	2.003	2.267	1.990	2.038
	60	1.748	1.919	2.052	2.005	1.932
	Mean	1.848	1.906	1.981	1.963	1.924
Lee	0	1.747	1.821	1.795	1.891	1.814
	20	1.690	1.789	1.759	1.810	1.762
	40	1.698	1.811	2.007	1.759	1.820
	60	1.879	1.945	1.993	2.267	2.022
	Mean	1.753	1.842	1.888	1.932	1.853
Over all mean	0	1.756	1.749	1.774	1.791	1.769
	20	1.835	1.907	1.805	1.981	1.882
	40	1.795	1.907	2.137	1.874	1.928
	60	1.814	1.932	2.023	2.135	1.977
	Mean	1.799	1.874	1.935	1.997	1.889

L.S.D.	5%	1%
variety	NS	NS
P	0.130	0.190
N	NS	NS

L.S.D.	5%
V x P	NS
V x N	NS
P x N	NS
V x P x N	NS

at this early stage of growth.

Interaction effects:

In both seasons, no significant effects were detected for all experimental factors interaction. This result indicates that each factor acted separately on dry weight /plant at 30 days from planting.

b- At 60 days from planting:

Data on mean dry weight/plant at 60 days from planting as affected by variety, P, N and their interactions in 1977 and 1978 seasons, are shown in tables 29 and 30.

Varietal effects:

In 1977, variety, had a highly significant effect on dry weight/plant. The over all mean of dry weight/ plant of Lee variety was 2.81 g higher than that of Clark at 60 days from planting.

In 1978, both varieties were statistically indifferent in regard to dry weight/plant.

Phosphorous effects:

P had a significant effect on dry weight/plant at 60 days from planting in both seasons.

Table 29 : Mean dry weight per plant (g) at 60 days from planting as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	14.21	17.37	18.88	17.34	16.94
	20	20.98	20.47	18.75	21.74	20.49
	40	16.46	20.48	20.62	22.88	20.11
	60	20.78	18.42	23.52	25.16	21.97
	Mean	18.11	19.18	20.44	21.78	19.88
Lee	0	15.82	15.16	18.40	24.42	18.45
	20	16.90	16.90	25.06	29.12	22.00
	40	18.94	24.42	24.72	32.08	25.04
	60	17.78	19.82	29.42	34.10	25.28
	Mean	17.36	19.08	24.40	29.93	22.69
Over all mean	0	15.02	16.25	18.64	20.88	17.70
	20	18.94	18.69	21.90	25.43	21.24
	40	17.70	22.45	22.67	27.48	22.57
	60	19.28	19.12	26.47	29.63	23.62
	Mean	17.73	19.13	22.42	25.85	21.28

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	0.85	1.12	V x P	1.69	2.23
P	1.20	1.58	V x N	1.69	2.23
N	1.20	1.58	P x N	2.91	3.84
			V x P x N	5.82	7.67

Table 30 : Mean dry weight per plant (g) at 60 days from planting as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	8.021	8.498	8.122	8.594	8.309
	20	7.698	9.348	10.479	11.423	9.737
	40	9.625	8.370	10.763	12.801	10.390
	60	8.858	9.737	10.864	13.761	10.805
	Mean	8.551	8.988	10.057	11.645	9.810
Lee	0	5.190	7.123	9.066	10.258	7.909
	20	6.371	6.226	9.374	8.353	7.581
	40	5.154	6.676	10.585	10.895	8.328
	60	8.253	8.031	10.329	10.455	9.267
	Mean	6.242	7.014	9.839	9.990	8.271
Over all mean	0	6.606	7.811	8.594	9.426	8.109
	20	7.035	7.787	9.927	9.888	8.659
	40	7.390	7.523	10.674	11.848	9.359
	60	8.556	8.884	10.597	12.108	10.036
	Mean	7.397	8.001	9.948	10.818	9.041

L.S.D.	5%	1%
variety	NS	NS
P	1.100	1.540
N	1.160	1.560

L.S.D.	5%
V x P	NS
V x N	NS
P x N	NS
V x P x N	NS

In 1977, the application of 20, 40 and 60 Kg P_2O_5/ fad. increased dry weight/plant over unfertilized plants by 3.54, 4.87 and 5.92 g, respectively. These increases were highly significant.

In 1978, the application of the three mentioned P rates increased dry weight/plant by 0.550, 1.250 and 1.927 g, respectively. Significant increases were shown at the rates of 40 and 60 Kg P_2O_5/fad.

Nitrogen effects:

N significantly increased dry weight/plant in both seasons.

In 1977, the application of 15, 30 and 45 Kg/ N/fad. significantly increased dry weight/plant over untreated plants by 1.40, 4.69 and 8.12 g, respectively.

In 1978, the application of the three mentioned N rates increased dry weight/plant by 0.704, 2.551 and 3.421 g, respectively, over unfertilized plants. Increases due to the two higher N levels were highly significant.

Interaction effects:

In 1977, all interaction effects on dry weight/ plant were significant. Lee variety showed higher response than Clark to P and N expressed in terms of plant dry weight. N application stimulated the

response of soybean plants to P application, and P induced N utilization by soybean plants. The highest dry weight/plant was achieved at 60 Kg P_2O_5 + 45 Kg N /fad. for both varieties, and the lowest dry weight / plant was obtained at the control treatment for Clark and at zero Kg P_2O_5 + 15 Kg/fad for Lee.

In 1978, all interactions between the experimental factors had no significant effects on dry weight/ plant at 60 days from planting indicating that each factors acted separately on this character.

B: Developmental Characters

1) Flowering date

Data on mean flowering date as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 31 and 32.

Varietal effects:

In both seasons, variety had a highly significant effect on flowering date, experessed in terms of number of days from planting to 50% emergance of the first flower.

In 1977, flowering in Clark variety occured 34.0 days earlier than in Lee. In 1978, flowering of Lee was delayed by 29.6 days compared with Clark, which is considered as an early maturing variety.

Table 31 : Mean number of days from planting to 50% emergence of the first flower as affected by variety, P and N, in 1977 season.

Vareity	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	31.3	33.3	35.5	39.8	34.9
	20	33.5	34.8	35.8	39.0	35.5
	40	33.0	32.8	36.0	38.8	35.1
	60	30.8	32.8	34.5	37.3	33.8
	Mean	32.1	33.4	35.4	38.4	34.8
Lee	0	67.3	69.5	71.5	74.3	70.6
	20	67.0	67.8	70.3	72.5	69.4
	40	66.0	68.0	69.3	71.5	68.7
	60	64.3	64.3	66.5	70.8	66.4
	Mean	66.1	67.4	69.4	72.3	68.8
Over all mean	0	49.3	51.4	53.5	57.0	52.8
	20	50.3	51.3	53.0	55.3	52.4
	40	49.5	50.4	52.6	55.1	51.9
	60	47.5	48.5	50.5	54.0	50.1
	Mean	49.1	50.4	52.4	55.3	51.8

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	0.7	1.2	V x P	0.7	0.1
P	0.5	0.7	V x N	NS	NS
N	0.6	0.8	P x N	NS	NS
			V x P x N	NS	NS

Table 32 : Mean number of days from planting to 50% emergence of the first flower as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	31.5	33.8	35.8	37.0	34.5
	20	31.5	33.0	34.3	35.8	33.6
	40	30.8	32.0	33.3	34.5	32.6
	60	29.5	30.8	33.3	35.0	32.1
	Mean	30.8	32.4	34.1	35.6	33.2
Lee	0	60.3	61.3	64.3	67.0	63.2
	20	62.0	62.5	63.8	65.5	63.4
	40	60.5	61.3	62.5	64.8	62.3
	60	60.3	61.3	62.8	65.0	62.3
	Mean	60.8	61.6	63.3	65.6	62.8
Over all mean	0	45.9	47.5	50.0	52.0	48.8
	20	46.8	47.8	49.0	50.6	48.5
	40	45.6	46.6	47.9	49.6	47.4
	60	44.9	46.0	48.0	50.0	47.2
	Mean	45.8	47.0	48.7	50.6	48.0

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	0.5	0.8	V x P	0.4	0.6
P	0.3	0.4	V x N	NS	NS
N	0.8	1.0	P x N	NS	NS
			V x P x N	NS	NS

Phosphorous effects:

Effect of P on flowering date was significant in both seasons. In 1977, the application of 20, 40 and 60 Kg P_2O_5/fad. reduced number of days from planting to 50% flowering by 0.4, 0.9 and 2.7 days, respectivly. The effect of the 20 Kg P_2O_5 rate was not signficant, whereas the effect of the two higher levels was highly significant.

In 1978, the application of 20, 40 and 60 Kg P_2O_5 /fad. induced early flowering in soybean plants by 0.3, 1.4 and 1.6 days, respectively, compared with unfertilized plants. The effect of the lower rate (20 Kg P_2O_5 /fad.) in that seasons was significant and that of the two higher levels was highly significant.

Nitrogen effects:

Effect of N on flowering date was highly significant in both seasons. N, on the contrary to P, delayed flowering date of the two studied varieties in both seasons. The application of 15, 30 and 45 Kg N/fad. increased number of days from planting to 50% flowering compared with unfertilized treatment by 1.3, 3.3 and 6.2 days and by 1.2, 2.9 and 4.8 days in 1977 and 1978, respectively.

Table 33 : Mean number of days from planting to maturity as affeoted by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	117.3	121.8	123.5	125.5	122.0
	20	120.8	121.0	123.0	124.8	122.4
	40	120.3	120.3	120.3	121.5	120.6
	60	118.0	118.8	119.8	122.3	119.7
	Mean	119.1	120.4	121.6	123.5	121.2
Lee	0	163.0	165.3	171.5	176.3	169.0
	20	162.0	164.3	165.3	174.0	166.4
	40	161.8	164.5	169.5	173.5	167.3
	60	160.3	162.5	166.3	171.5	165.1
	Mean	161.8	164.1	168.1	173.8	167.0
Over all mean	0	140.1	143.5	147.5	150.9	145.5
	20	141.1	142.6	144.1	149.4	144.4
	40	141.0	142.4	144.9	147.5	143.9
	60	139.1	140.6	143.0	146.9	142.4
	Mean	140.4	142.3	144.9	148.7	144.1

L.S.D.	5%	1%
variety	1.3	2.4
P	0.8	1.1
N	0.8	1.4

L.S.D.	5%	1%
V x P	1.2	1.6
V x N	1.1	1.5
P x N	1.6	2.1
V x P x N	2.3	2.9

Table 34 : Mean number of days from planting to maturity as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	114.5	114.5	116.8	118.8	116.1
	20	111.8	113.5	114.8	117.0	114.3
	40	110.0	111.0	113.5	115.8	112.6
	60	108.3	109.0	110.5	114.0	110.4
	Mean	111.1	112.0	113.9	116.4	113.3
Lee	0	161.3	161.0	165.8	169.3	164.3
	20	160.3	161.0	163.8	169.5	163.6
	40	160.0	160.3	164.3	167.8	163.1
	60	160.0	161.0	165.0	168.8	163.7
	Mean	160.4	160.8	164.7	168.8	163.7
Over all mean	0	137.9	137.8	141.3	144.0	140.2
	20	136.0	137.3	139.3	143.3	138.9
	40	135.0	135.6	138.9	141.8	137.8
	60	134.1	135.0	137.8	141.4	137.1
	Mean	135.8	136.4	139.3	142.6	138.5

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	0.8	1.5	V x P	0.5	0.7
P	0.4	0.5	V x N	0.5	0.7
N	0.4	0.5	P x N	NS	NS
			V x P x N	NS	NS

Phosphorous effects:

P had a significant effect on number of days from planting to maturity in both seasons.

In 1977, the application of 20, 40 and 60 Kg P_2O_5 /fad. reduced number of days from planting to maturity compared with untreated plants by 1.1, 1.6 and 3.1 days respectively.

In 1978, the application of the three P rates induced early maturity by 1.3, 2.4 and 3.1 days, respectively. Differences in maturity date were highly significant.

Nitrogen effects:

In both seasons, N had a highly significant effect on number of days from planting to maturity. N, on the contrary to P significantly delayed maturity date. The application of 15, 30 and 45 Kg N/fad. delayed maturity by 1.9, 4.5 and 8.3 days in 1977 and dby 0.6, 3.5 and 6.8 days in 1978, respectively.

Interaction effects:

In 1977, all interactions between the experimental factors showed a significant effect on maturity date. In that season, Lee variety showed higher response to P and N compared with Clark. Effects of P in inducing, and of N in delaying maturity were more clear in Lee.

It was also evident that the effect of P in inducing early maturity was more clear at the higher N levels. The earliest date of maturity was for the control plants in Clark and at 60 Kg P_2O_5 + zero Kg N/fad. in Lee. On the other hand, latest maturity was recorded for the treatment receiving zero Kg P_2O_5 + 45 Kg N/fad. in both varieties.

In 1978, the interaction effects V x P and V x N on date of maturity were significant, whereas P x N and V x P x N interactions were not significant. In that season, effect of P in inducing early maturity was more clear in Clark than in Lee. On the other hand, both varieties showed different response to the N levels used.

C. Yield Components

1) Number of pods per plant.

Data on mean number of pods per plant as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 35 and 36.

Varietal effects:

In 1977, variety had a highly significant effect on mean number of pods/plant. In that seasons, number of pods/plant of Lee variety was higher than that of Clark by 20.1 pods.

Table 35 : Mean number of pods per plant as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	11.2	14.1	16.3	16.8	14.6
	20	16.0	16.5	18.1	19.0	17.4
	40	18.1	17.9	19.9	20.2	19.0
	60	19.6	19.5	21.7	24.2	21.2
	Mean	16.2	17.0	19.0	20.1	18.1
Lee	0	24.8	30.4	35.8	42.8	33.4
	20	26.3	29.3	40.7	48.9	36.3
	40	29.6	35.1	47.8	54.4	41.7
	60	30.1	31.6	51.8	52.6	41.5
	Mean	27.7	31.6	44.0	49.7	38.2
Over all mean	0	18.0	22.2	26.0	29.8	24.0
	20	21.2	22.9	29.4	34.0	26.9
	40	23.8	26.5	33.9	37.3	30.4
	60	24.9	25.6	36.7	38.4	31.4
	Mean	22.0	24.3	31.5	34.9	28.1

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	1.7	3.2	V x P	1.5	2.1
P	1.1	1.5	V x N	1.1	1.4
N	0.7	1.0	P x N	1.5	2.0
			V x P x N	2.1	2.7

Table 36: Mean number of pods per plant as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	11.4	14.0	18.3	20.2	15.9
	20	17.8	19.7	23.2	26.2	21.7
	40	18.9	16.2	20.2	26.9	20.6
	60	13.6	15.2	24.5	26.5	19.9
	Mean	15.4	16.3	21.5	24.9	19.5
Lee	0	13.7	16.3	21.3	21.1	18.1
	20	14.8	23.9	24.1	25.6	22.1
	40	17.7	18.6	21.4	25.4	20.7
	60	15.3	18.5	25.2	26.7	21.4
	Mean	15.3	19.3	23.0	24.7	20.6
Over all mean	0	12.5	15.2	19.8	20.6	17.0
	20	16.3	21.8	23.6	25.9	21.9
	40	18.3	17.4	20.8	26.2	20.7
	60	14.4	16.8	24.8	26.6	20.7
	Mean	15.4	17.8	22.3	24.8	20.1

L.S.D.	5%	1%
variety	NS	NS
P	2.5	3.4
N	2.4	3.2

L.S.D.	5%
V x P	NS
V x N	NS
P x N	NS
V x P x N	NS

In 1978, effect of variety on number of pods/plant was not significant. Difference in number of pods/plant in that season was too small to reach the 5% level of significance.

Phosphorous effects:

P application significantly affected the number of pods/plant in both seasons.

In 1977, application of 20, 40 and 60 Kg P_2O_5/fad. significantly increased number of pods/plant over untreated plants by 2.9, 6.4 and 7.4 pods, respectively.

In 1978, the abovementioned levels produced 4.9, 3.7 and 3.7 pods/plant over untreated plants. In that seasons, the 20 Kg P_2O_5/fad. level produced the highest number of pods/plant.

Nitrogen effects:

In both season, N significantly increased number of pods/plant.

In 1977, N at all levels used showed a highly significant effect on pod number/plant. Increases of 2.3, 9.5 and 12.9 pods/plant were obtained when N was applied at 15, 30 and 45 Kg/fad., respectively.

In 1978, significant increase in pod number/plant was achieved when N was applied at 30 and 45 Kg/fad.

Increases in number of pods/plant were 2.4, 6.9 and 9.4 pods for the N levels 15, 30 and 45 Kg/fad., respectively.

Interaction effects:

In 1977, all interactions between the studied factors showed significant effects on the number of pods/plant. In that season, Clark variety responded to all P levels, where a corresponding increase in number of pods/plant was obtained with applied P. In Lee, increase in number of pods/plant was obtained when P was applied at 20 and 40 kg P_2O_5/fad.

As for V x N interaction, Lee variety showed a higher response to all N levels compared with Clark.

Application of N induced the response of soybean plants to P. On the other hand, increase in pod nnumber due to N application was more evident at the higher P levels. The highest number of pods/plant was at 60 Kg P_2O_5 + 45 Kg N/fad. for Clark and at 40 Kg P_2O_5 + 45 Kg N/fad. for Lee. The lowest pod number/plant was obtained were no fertilizers were applied.

In 1978, all effects of the interaction between the experimental factors on the number of pods/plant were not significant.

2) Number of seeds per plant.

Data on mean number of seeds per plant as affected by variety, P, N and their interactions in 1977 and 1978 are shown in tables 37 and 38.

Varietal effects:

In both seasons, variety had a significant effect on number of seeds/plant.

In 1977, Lee variety was superior to Clark where a difference of 30.5 seeds/plant was shown between the two studied varieties. In the second season, Clark, on the contrary, was superior to Lee, where number of seeds/plant in Clark exceeded that in Lee by 17.3 seeds.

Phosphorous effects:

In both seasons, P had a significant effect on number of seeds/plant.

In 1977, P application at all levels showed a highly significant effect on number of seeds/plant. The application of 20, 40 and 60 Kg P_2O_5/fad. increased number of seeds/plant over untreated plants by 6.9, 16.0 and 18.7, respectively.

In 1978, the highest increase in number of seeds /plant was obtained at the 20 Kg P_2O_5/fad. level.

Table 37 : Mean number of seeds per plant as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
	0	30.3	38.9	42.8	47.6	39.9
	20	44.7	45.7	50.6	53.7	48.7
	40	50.6	50.1	55.1	55.8	52.9
	60	55.9	54.8	60.4	67.4	59.6
	Mean	45.3	47.3	52.2	56.1	50.3
Lee	0	51.3	62.8	75.2	92.5	70.4
	20	54.0	61.5	79.7	106.2	75.3
	40	62.7	72.7	102.8	119.3	89.4
	60	62.1	65.8	111.3	113.2	88.1
	Mean	57.5	65.7	92.2	107.8	80.8
Over all mean	0	40.8	50.8	59.0	70.0	55.1
	20	49.3	53.6	65.2	79.9	62.0
	40	56.7	61.4	78.9	87.6	71.1
	60	59.0	60.3	85.8	90.3	73.8
	Mean	51.4	56.5	72.2	82.0	65.5

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	5.2	9.5	V x P	4.0	5.5
p	2.8	3.9	V x N	3.3	4.3
N	2.3	3.0	P x N	4.7	6.1
			V x P x N	6.6	8.6

Table 38 : Mean number of seeds per plant as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	27.2	32.1	42.2	48.4	37.5
	20	43.9	44.6	54.0	66.9	52.3
	40	44.0	39.0	46.1	66.0	48.8
	60	32.3	34.7	57.3	63.5	46.9
	Mean	36.8	37.6	49.9	61.2	46.4
Lee	0	20.7	24.0	33.0	32.3	27.5
	20	18.4	33.9	33.9	38.0	31.0
	40	20.2	24.2	26.7	33.7	26.2
	60	21.6	30.0	39.3	36.7	31.9
	Mean	20.2	28.0	33.2	35.2	29.1
Over all mean	0	23.9	28.1	37.6	40.4	32.5
	20	31.1	39.2	43.9	52.4	41.7
	40	32.1	31.6	36.4	49.9	37.5
	60	27.0	32.3	48.3	50.1	39.4
	Mean	28.5	32.8	41.5	48.2	37.8

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	9.7	17.9	V x P	NS	NS
P	5.1	7.0	V x N	6.7	8.7
N	4.8	6.2	P x N	NS	NS
			V x P x N	NS	NS

In that season the three P_2O_5 levels increased seed number / plant by 9.2, 5.0 and 6.9, respectively, compared with untreated plants.

Nitrogen effects:

In both seasons, N significantly increased number of seeds/plant.

In 1977, N at all levels showed a highly significant effect on that character, where 5.1, 20.8 and 31.6 more seeds/plant were obtained over unfertilized plants at the N levels 15, 30 and 45 Kg/fad.

In 1978, significant increase in number of seeds/plant was shown when N was appliod at 30 and 45 Kg/fad. The three respective N levels produced 4.3, 13.0 and 19.7 more seeds/plant over untreated plants.

Interaction effects:

In 1977, all interaction effects on number of seeds/plant were significant indicating that all experimental factors did not act separatily.

It was clear that clark showed a higher response to all P levels than Lee. In regard to V x N interation, number of seeds/plant of Lee showed higher response to N than Clark.

As for P x N interaction, effect of P on number of seeds/plant was more clear at the higher N level.

The highest number of seeds/plant was at 60 Kg P_2O_5 + 45 Kg N/fad. for Clark and at 40 Kg P_2O_5 + 45 Kg N/fad. for Lee and the lowest number of seeds/plant were for untreated plants of the two varieties.

In 1978, the interaction effect V x N on number of seeds/plant was significant. Other interactions were not significant. In that season, the response of the two studied varieties to N was quite different. For example, the lowest N level had no significant effect on number of seeds/plant in Clark but had a highly significant effect on Lee. On the contray, at the highest N level number of seeds/plant of Clark showed higher response than Lee.

3) Seed yield per plant.

Data on mean seed yield per plant as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 39 and 40.

Varietal effects:

In both seasons, Clark variety was superior to Lee in regard to seed yield/plant. The seed yield/plant in Clark exeeded that in Lee by 5.68 g in 1977 and 2.22g in 1978 season.

Table 39 : Mean seed yield per plant (g) as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	4.51	5.95	6.75	7.40	6.15
	20	6.71	7.13	8.12	9.10	7.77
	40	8.05	8.01	9.35	9.39	8.70
	60	8.92	8.73	10.20	12.08	9.98
	Mean	7.05	7.46	8.61	9.49	8.15
Lee	0	1.69	1.68	1.70	1.80	1.72
	20	2.12	2.21	2.33	2.40	2.26
	40	2.76	2.84	2.96	3.19	2.94
	60	2.51	2.61	3.35	3.41	2.97
	Mean	2.27	2.33	2.58	2.70	2.47
Over all mean	0	3.10	3.82	4.22	4.60	3.93
	20	4.42	4.67	5.22	5.75	5.02
	40	5.41	5.43	6.15	6.29	5.82
	60	5.71	5.67	6.77	7.74	6.47
	Mean	4.66	4.89	5.59	6.09	5.31

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	0.55	1.01	V x P	0.57	0.78
P	0.41	0.56	V x N	0.37	0.48
N	0.26	0.34	P x N	0.52	0.68
			V x P x N	NS	NS

Table 40 : Mean seed yield per plant (g) as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	2.67	3.49	4.81	5.31	4.07
	20	4.42	5.48	6.17	7.27	5.84
	40	4.96	3.77	4.85	7.14	5.18
	60	3.55	3.60	6.35	7.23	5.18
	Mean	3.90	4.08	5.54	6.74	5.07
Lee	0	1.91	2.32	3.14	3.21	2.64
	20	2.02	3.26	3.43	3.34	3.01
	40	1.96	2.45	2.72	3.23	2.59
	60	2.21	2.89	3.95	3.53	3.14
	Mean	2.02	2.73	3.31	3.33	2.85
Over all mean	0	2.29	2.90	3.98	4.26	3.36
	20	3.22	4.37	4.80	5.31	4.42
	40	3.46	3.11	3.78	5.19	3.89
	60	2.88	3.24	5.15	5.38	4.16
	Mean	2.96	3.41	4.43	5.03	3.96

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	1.29	2.36	V x P	0.73	0.99
P	0.52	0.71	V x N	0.91	1.18
N	0.64	0.84	P x N	NS	NS
			V x P x N	NS	NS

Phosphorous effects:

In both seasons, P at all levels used significantly increased seed yield/plant. The application of 20, 40 and 60 Kg P_2O_5/fad. increased seed yield/plant over untreated plots by 1.09, 1.89 and 2.54 g in 1977 and by 1.06, 0.53 and 0.80 g in 1978, respectively. The highest seed yield/plant was obtained at the 60 Kg P_2O_5 /fad level in 1977 and at the 20 Kg P_2O_5/fad. in 1978.

Nitrogen effects:

In both seasons, N increased seed yield /plant. Significant increase in both seasons was obtained when N was applied at 30 and 45 Kg/fad.

In 1977, increases of 0.23, 0.93 and 1.43 g were obtained over untreated plants for the N levels 15, 30 and 45 Kg/fad., respectively. These N levels increased seed yield/plant by 0.45, 1.47 and 2.07 g in 1978.

Interaction effects:

In 1977, the interactions V x P, V x N and P x N had a significant effect on seed yield/plant. In that season, Clark showed higher response to both N and P than Lee variety.

As for P x N, it was evident in that seasons that the effect of N on seed yield/plant was more clear at higher P levels.

In 1978, the interaction effects V x P and V x N were significant whereas P x N and V x P x N interactions were not significant. In that season, Clark variety showed also higher response to N and P than Lee as in the first season.

4) Weight of 100 seeds:

Data on mean 100 - seed weight as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 41 and 42.

Varietal effects:

In both seasons, Clark variety was significantly superior to Lee in regard to 100-seed weight. The difference between the two studied varieties in 100-seed weight was highly significant in 1977 (12.18 g) and significant in 1978 (1.01 g).

Phosphorous effects:

Effect of P on 100-seed weight was highly significant in 1977 and not significant in 1978.

In 1977, application of 20, 40 and 60 Kg P_2O_5/fad. significantly increased 100-seed weight over untreated plants by 0.81, 1.45 and 1.33 g, respectively. In 1978, increases in 100-seed weight due to P application were beyond the 5% level of significance.

Table 41 : Mean 100-seed weight (g) as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	15.13	15.64	16.10	15.93	15.70
	20	15.41	15.79	16.49	17.24	16.23
	40	16.95	15.95	17.43	17.79	16.80
	60	16.01	16.14	17.08	18.20	16.86
	Mean	15.64	15.88	16.77	17.29	16.40
Lee	0	3.49	3.32	3.09	2.62	3.13
	20	4.23	4.04	3.79	4.79	4.21
	40	4.86	4.32	5.38	5.16	4.93
	60	4.78	4.16	5.07	4.48	4.62
	Mean	3.74	3.85	4.60	4.69	4.22
Over all mean	0	9.3	9.48	9.59	9.27	9.41
	20	9.82	9.91	10.14	11.01	10.22
	40	10.44	10.13	11.40	11.47	10.86
	60	10.39	10.15	11.07	11.34	10.74
	Mean	9.99	9.92	10.55	10.77	10.31

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	0.64	1.17	V x P	NS	NS
P	0.43	0.59	V x N	0.45	0.59
N	0.32	0.42	P x N	0.64	0.83
			V x P x N	NS	NS

Table 42 : Mean 100-seed weight (g) as affected by variety, P and N, in 1978 season.

Variety,	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	9.18	10.54	11.37	11.30	10.60
	20	10.40	11.19	11.13	11.14	10.96
	40	10.96	9.64	10.55	10.73	10.47
	60	10.15	10.21	11.24	11.01	10.65
	Mean	10.17	10.39	11.07	11.05	10.67
Lee	0	8.90	9.56	9.40	9.31	9.29
	20	9.16	9.69	10.39	9.77	9.75
	40	9.56	10.15	10.03	9.94	9.92
	60	9.50	9.85	9.93	9.49	9.69
	Mean	9.28	9.81	9.94	9.63	9.66
Over all mean	0	9.04	10.05	10.38	10.31	9.95
	20	9.78	10.44	10.76	10.45	10.36
	40	10.26	9.90	10.29	10.33	10.19
	60	9.82	10.03	10.59	10.25	10.17
	Mean	9.73	10.10	10.50	10.37	10.21

L.S.D.	5%	1%	L.S.D.	5%
variety	0.74	1.35	V x P	NS
P	NS	NS	V x N	NS
N	0.48	0.62	V x P x N	NS

Nitrogen effects:

In both seasons, N significantly increased 100-seed weight. Significant response of 100-seed weight to N application was shown in both seasons when N was applied at 30 and 45 Kg/fad. These two levels increased 100-seed weight over untreated plants by 0.56 and 0.78 g in 1977 and by 0.77 and 0.64 g in 1978, respectively.

Interaction effects:

In 1977, the interactions V x N and P x N had significant effects on 100-seed weight, whereas V x P and V x P x N interactions were not significant. In that season, 100-seed weight in Clark showed higher response to N than in Lee. As for P x N interaction, it was clear that P application induced the response of soybean plants to N.

In 1978, all interactions between the experimental factors had no significant effects on 100-seed weight, indicating that each experimental factor acted separately.

D: Yield

1) Seed yield per faddan.

Data on mean yield of seed in Kg per faddan as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 43 and 44.

Table 43 : Mean seed yield per fad. (Kg) as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	307.5	411.0	611.0	820.0	537.4
	20	466.0	619.0	789.5	886.5	690.3
	40	540.0	649.0	969.0	1008.0	791.5
	60	554.0	822.5	1007.5	1013.0	849.3
	Mean	466.9	625.4	844.3	931.8	717.1
Lee	0	207.5	201.0	211.0	220.0	209.9
	20	266.0	219.0	289.5	296.5	267.0
	40	340.0	349.0	369.0	388.0	361.5
	60	304.0	322.5	407.0	413.0	361.6
	Mean	279.4	272.9	319.1	329.4	300.2
Over all mean	0	257.5	306.0	411.0	520.0	373.6
	20	366.0	419.0	539.5	591.5	479.0
	40	440.0	499.0	669.0	698.0	576.5
	60	429.0	572.5	707.3	713.0	605.5
	Mean	373.1	449.1	581.7	630.5	508.7

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	91.8	168.5	V x P	NS	NS
P	93.6	128.2	V x N	115.8	150.7
N	81.9	106.5	P x N	NS	NS
			V x P x N	NS	NS

Table 44 : Mean seed yield per fad. (Kg) as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	279.9	419.9	499.6	556.0	349.0
	20	351.9	449.1	622.1	618.2	510.4
	40	425.7	484.1	552.1	659.0	530.3
	60	309.1	418.0	501.6	606.5	458.9
	Mean	341.7	442.8	544.0	610.1	484.7
Lee	0	256.6	274.1	279.9	283.8	273.7
	20	270.2	266.3	311.0	386.9	308.7
	40	239.1	266.3	330.5	427.7	316.0
	60	270.2	279.9	357.7	435.5	335.9
	Mean	259.1	271.7	319.9	383.5	308.6
Over all mean	0	268.3	347.1	389.9	420.0	356.3
	20	311.1	357.8	466.7	502.6	409.6
	40	332.5	375.3	441.4	543.5	423.2
	60	289.7	349.0	429.4	521.1	397.4
	Mean	300.4	357.3	431.9	496.8	396.6

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	71.2	130.6	V x P	NS	NS
P	51.5	70.5	V x N	67.9	88.3
N	48.0	62.4	P x N	NS	NS
			V x P x N	NS	NS

Varietal effects:

Clark variety significantly outyielded Lee in both seasons.

In 1977, seed yield of Clark exeeded that of Lee by 416.9 Kg/fad. This yield increase reached 138.9 % and was highly significant.

In 1978, similarly seed yield of Clark exceeded that of Lee by 176.1 Kg/fad. or 57.1%. This difference in seed yield was highly significant.

Phosphorous effects:

In both seasons, P application significantly increased seed yield/fad. of soybean.

In 1977, P at all levels used had a highly significant effect on seed yield. The application of 20, 40 and 60 Kg P_2O_5/fad. increased seed yield over untreated plots by 105.4 (28.2 %), 202.9 (54.3 %) and 231.9 (62.1 %) Kg/fad., respectively. There was no significant difference between seed yield at 40 and 60 Kg P_2O_5/fad. levels,

In 1978, the application of 20, 40 and 60 Kg P_2O_5 /fad. increased seed yield over untreated plants by 15.0 %, 18.8 % and 11.5%, respectively. There were no significant differences in seed yield among the three P levels used.

Nitrogen effects:

In both seasons, seed yield per faddan of soybean significantly responded to N application where a consistent increase was shown with the corresponding increase in N level.

In 1977, increases of 76.0 (20.4 %), 208.6 (55.9%) and 257.4 (69.0 %) Kg/fad. in seed yield were obtained over untreated plots for the N levels 15, 30 and 45 Kg/fad., respectively. Effect of the lowest N level (15 Kg/fad) was not significant whereas those of the two higher N levels (30 and 45 Kg/fad.) were highly significant.

In 1978, N at all levels used significantly increased seed yield. Increases in seed yield of 56.9 (18.9 %), 131.5 (43.8 %) and 196.4 (65.4 %) Kg/fad. were obtained over unfertilized plots when N was applied at 15, 30 and 45 Kg/fad., respectively. The increase in seed yield at the lower N level (15 Kg/fad.) was significant and that of the two higher N levels (30 and 45 Kg/fad.) was highly significant.

Interaction effects:

In both seasons, all interaction effects on seed yield/fad. were not significant except that between V and N.

In 1977, it was clear that Clark variety showed higher response to N application than Lee. The application of 15, 30 and 45 Kg N/fad. increased seed yield by 33.9 %, 80.8 % and 99.6 % in Clark and by 2.3 %, 14.2 % and 17.9 % in Lee, respectively.

In the second season, similar trend for the varietal response to N was detected. The three N levels increased seed yield by 29.6 %, 59.2 % and 78.5 % in Clark and by 4.9 %, 23.5 % and 48.0 % in Lee, respectively.

2) Straw yield per faddan:

Data on mean yield of straw in Kg per fad. as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 45 and 46.

Varietal effects:

In 1977, variety had a highly significant effect on straw yield. In that season, straw yield of Lee exceeded that of Clark by 32 %.

In 1978, no significant difference was detected between the two studied varieties, even the straw yield of Clark in that season was higher than that of Lee.

Phosphorous effects:

P had no significant effect on straw yield/fad. in both seasons. The applications of P levels increased straw yield/fad. by 3 to 10% in 1977 and by 2 to 11% in 1978. Such increases were not significant.

Table 45 : Mean straw yield per fad. (Kg) as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad.				Mean
		0	15	30	45	
Clark	0	1263	1648	1949	1971	1708
	20	1310	1601	1984	2389	1821
	40	1440	1961	2191	2622	2053
	60	1426	2478	2522	2407	2208
	Mean	1360	1922	2162	2347	1947
Lee	0	2253	2649	2749	2750	2600
	20	2234	2590	2613	3044	2620
	40	2150	2411	2671	2932	2541
	60	2146	2258	2684	2967	2514
	Mean	2196	2477	2679	2923	2569
Over all mean	0	1758	2149	2349	2360	2154
	20	1772	2095	2298	2716	2220
	40	1795	2186	2431	2777	2297
	60	1786	2368	2603	2687	2361
	Mean	1778	2199	2420	2635	2258

L.S.D.	5%	1%	L.S.D.	5%
variety	310	573	V x P	NS
P	NS	NS	V x N	NS
N	138	180	P x N	NS
			V x P x N	NS

Table 46 : Mean straw yield per fad. (Kg) as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	2372	3038	3519	3344	3067
	20	2703	3519	4064	3228	3378
	40	2664	4219	3325	3675	3471
	60	3053	3656	3733	4647	3772
	Mean	2698	3607	3660	3724	3422
Lee	0	2489	2450	2703	3772	2853
	20	2664	2547	3053	3967	3058
	40	2567	2333	2256	3014	2542
	60	2022	2703	3247	3208	2795
	Mean	2435	2508	2815	3490	2812
Over all mean	0	2431	2742	3111	3558	2960
	20	2683	3033	3558	3597	3218
	40	2615	3276	2790	3344	3007
	60	2538	3179	3490	3928	3284
	Mean	2567	3058	3238	3607	3117

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	NS	NS	V x P	NS	NS
P	NS	NS	V x N	478	622
N	338	440	P x N	NS	NS
			V x P x N	NS	NS

Nitrogen effects:

N at all levels showed a highly significant effect on straw yield/fad. in both seasons.

In 1977, the application of 15, 30 and 45 Kg N/fad. significantly increased straw yield/ fad. by 24 %, 36 % and 48 %, respectively. The three N levels significantly increased straw yield in 1978, by 19 %, 26 % and 41 %, respectively, over untreated plots.

Interaction effects:

In 1977, all effects of the interadtion between the studied factors were not significant excepet that between V and P. In that season, Clark variety showed higher response to P where a considrable increase in straw yield was shown at all P levels. On the contrary, straw yield of Lee showed no response to all P levels.

In 1978, effect of the interaction V x N on straw yield/fad. was significant. Other interactions were not significant. In that seasons, both varieties showed different responses to the N levels used. For example, straw yield of Clark showed no further significant increase at the higher N levels (30 and 45 Kg/fad.), whereas Lee showed the highest response at the highest N level.

3) Seed/straw ratio.

Data on mean seed/straw ratio as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 47 and 48.

Varietal effects:

In 1977, variety had a highly significant effect on seed/straw ratio. Clark was superior to Lee where seed/straw ratio in Clark surpassed that in Lee by 25.1 %.

In 1978, Clark had also higher seed/straw ratio than Lee, but difference was beyond the significant level.

Phosphorous effects:

Effect of P on seed/straw ratio was highly significant in 1977 and not significant in 1978.

In the first season, the application of 20, 40 and 60 Kg P_2O_5/fad. significantly increased seed/straw ratio by 4.3 %, 7.8 %, and 8.3%, respectively.

In the second season, all P levels did not increase seed/straw ratio, even slight insignificant reductions in this ratio were shown at 20 and 60 Kg/ P_2O_5/fad. levels.

Table 47 : Mean seed / straw ratio as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	24.3	24.9	31.3	41.6	31.5
	20	35.6	38.7	39.8	37.1	37.9
	40	37.5	33.1	44.2	38.4	38.6
	60	38.8	33.2	39.9	42.1	38.5
	Mean	34.3	32.5	39.1	39.7	36.8
Lee	0	9.2	7.6	7.7	8.0	8.1
	20	11.9	8.5	11.1	9.7	10.2
	40	15.8	14.5	13.8	13.2	14.2
	60	14.2	14.3	15.2	13.9	14.4
	Mean	12.7	11.0	11.9	11.3	11.7
Over all mean	0	14.6	14.2	17.5	22.0	17.3
	20	20.7	20.0	23.5	21.8	21.6
	40	24.5	22.8	27.5	25.1	25.1
	60	24.0	24.2	27.2	26.5	25.6
	Mean	21.0	20.4	24.0	23.9	22.5

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	5.2	9.5	V x P	NS	NS
P	3.0	4.1	V x N	4.6	6.0
N	NS	NS	P x N	NS	NS
			V x P x N	NS	NS

Table 48 : Mean seed/straw ratio as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	12.8	15.9	18.2	24.0	17.7
	20	15.0	13.4	15.7	20.9	16.2
	40	16.5	13.5	17.5	21.7	16.6
	60	12.0	13.5	13.8	14.8	13.5
	Mean	14.1	14.1	16.3	19.7	16.0
Lee	0	10.7	11.5	10.9	7.9	10.2
	20	10.9	10.5	10.5	10.3	10.6
	40	9.4	12.3	15.8	13.9	12.8
	60	13.8	11.3	12.0	13.9	12.7
	Mean	11.2	11.4	12.3	11.5	11.6
Over all mean	0	11.7	13.7	14.6	15.9	14.0
	20	13.0	12.0	13.1	15.6	13.4
	40	13.0	12.9	16.6	16.5	14.7
	60	12.9	12.4	12.9	14.4	13.1
	Mean	12.6	12.7	14.3	15.6	13.8

L.S.D.	5%	L.S.D.	5%
variety	NS	V x P	NS
P	NS	V x N	NS
N	NS	P x N	NS
		V x P x N	NS

Nitrogen effects:

N showed no significant effect on seed/straw ratio in both seasons. Slight increases in seed/straw ratio were shown at the higher N levels in both seasons, but such increases were not significant.

Interaction effects:

In 1977, V x P interaction had a significant effect on seed/straw ratio, whereas other interactions showed not significant effect. In that season, seed/ratio in Clark was significantly increased by N application at 30 and 45 Kg/fad. In Lee, all N levels showed no significant effect on seed/straw ratio.

In 1978, all interaction effects on seed/straw ratio were not significant indicating that each experimental factor acted separately.

E. Chemical Contents

1) Crude protein percentage:

Data on mean crude protein percentage in soybean seeds as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 49 and 50.

Table 49 : Mean crude protein percentage in seeds as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	38.5	39.3	40.5	41.2	39.8
	20	37.4	33.6	40.8	39.8	37.9
	40	33.7	35.2	39.1	39.5	36.8
	60	34.2	36.5	38.9	39.7	37.3
	Mean	35.9	36.1	39.8	40.0	37.9
Lee	0	39.1	38.7	39.4	40.2	39.2
	20	37.2	34.8	40.0	39.5	37.8
	40	33.0	34.7	39.1	39.2	36.5
	60	35.0	36.1	39.2	40.0	37.5
	Mean	36.0	36.0	39.4	39.7	37.7
Over all mean	0	38.8	39.0	39.9	40.7	39.6
	20	37.3	37.2	40.4	39.6	38.6
	40	33.3	34.9	39.1	39.3	36.6
	60	34.7	36.3	39.0	39.8	37.4
	Mean	36.0	36.8	39.6	39.8	37.8

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	NS	NS	V x P	NS	NS
P	0.3	0.4	V x N	NS	NS
N	0.3	0.4	P x N	0.8	1.1
			V x P x N	NS	NS

Table 50 : Mean crude protein percentage in seeds as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	38.7	38.7	39.1	39.7	39.0
	20	36.9	37.4	39.7	39.8	38.4
	40	33.6	34.2	39.2	39.2	36.5
	60	34.8	36.2	40.1	40.2	37.8
	Mean	36.0	36.6	39.5	39.7	37.9
Lee	0	40.2	38.9	39.8	39.9	39.7
	20	37.1	37.6	40.2	39.7	38.6
	40	33.9	34.7	39.5	38.6	36.6
	60	34.5	35.0	38.7	40.2	37.1
	Mean	36.4	36.5	39.5	39.6	38.0
Over all mean	0	39.4	38.8	39.4	39.8	39.3
	20	37.0	37.5	39.9	39.7	38.5
	40	33.7	34.4	39.3	38.9	36.5
	60	34.6	35.6	39.4	40.2	37.4
	Mean	36.1	36.5	39.5	39.6	37.9

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	NS	NS	V x P	NS	NS
P	0.5	0.6	V x N	NS	NS
N	0.5	0.6	P x N	0.9	1.2
			V x P x N	NS	NS

Varietal effects:

In both seasons, variety had no significant effect on crude protein content in soybean seeds. Both varieties contained about the same protein percentage in both seasons. Crude protein content was 37.9 % in Clark in both seasons, and in Lee it was 37.7 % in 1977 and 38.0 % in 1978.

Phosphorous effects:

P had a highly significant effect on crude protein percentage in both seasons. The application of 20, 40 and 60 Kg P_2O_5/fad. significantly decreased crude protein percentage by 1.0%, 3.0% and 2.2%, respectively, in 1977. The same P levels significantly decreased crude protein compard with untreated soybean by 0.8 %, 2.8% and 1.9 %, in 1978.

Nitrogen effects:

Effect of N on crude protein was significant in both season. N, on the contrary to P, significantly increased crude protein content in soybean seeds. In 1977, N at 15, 30 and 45 Kg/fad. significantly increased crude protein percentage over untreated plots by 0.8 %, 3.6% and 3.8 %, respectively. In 1978, the three respective N levels increased crude protein content by 0.4 %, 3.4 % and 3.5 %.

Interaction effects:

In both seasons, the effect of the interaction P x N on crude protein percentage was significant. Other interactions showed no significant effect on protein content. In was clear in both seasons, that the application of N, particularly at higher levels, counteracted the effect of P in reducing crude protein content.

2) Oil percentage:

Data on mean oil percentage in soybean seeds as affected by variety, P, N and their interactions in 1977 and 1978 seasons are shown in tables 51 and 52.

Varietal effects:

In both seasons, variety had no significant effect on oil percentage in soybean seeds. Seeds of both tested varieties containd about the same oil percentage. It is clear that seeds of both varieties were of the same quality.

Phosphorous effects:

P showed a highly significant effect on oil percentage in soybean seeds in both seasons.

In 1977, the application of 20, 40 and 60 Kg P_2O_5/fad. significantly increased oil percentage over untreated soybean by 2.0 %, 1.9 % and 1.7 %,

Table 51 : Mean oil percentage in seeds as affected by variety, P and N, in 1977 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	18.5	20.5	20.0	20.0	19.7
	20	24.0	22.5	18.5	19.0	21.0
	40	23.5	23.0	21.5	19.0	21.7
	60	22.5	20.5	19.5	19.0	20.3
	Mean	22.1	21.6	19.8	19.2	20.7
Lee	0	18.0	20.5	18.5	19.0	19.0
	20	24.0	22.5	19.5	21.0	21.7
	40	24.5	20.0	19.5	19.0	20.7
	60	23.5	23.0	21.0	19.0	21.6
	Mean	22.5	21.5	19.6	19.5	20.7
Over all mean	0	18.2	20.5	19.2	19.5	19.3
	20	24.0	22.5	19.0	20.0	21.3
	40	24.0	21.5	20.5	19.0	21.2
	60	23.0	21.7	20.2	19.0	21.0
	Mean	22.3	21.5	19.7	19.3	20.7

L.S.D.	5%	1%	L.S.D.	5%	1%
variety	NS	NS	V x P	NS	NS
P	0.6	0.9	V x N	NS	NS
N	0.6	0.9	P x N	1.2	1.7
			V x P x N	NS	NS

Table 52 : Mean oil percentage in seeds as affected by variety, P and N, in 1978 season.

Variety	P_2O_5 Kg/fad.	N Kg/fad. 0	15	30	45	Mean
Clark	0	19.5	19.0	18.5	18.5	18.8
	20	23.5	22.0	21.0	20.0	21.6
	40	25.0	23.5	21.5	22.0	23.0
	60	24.5	22.5	22.5	20.5	22.5
	Mean	23.1	21.7	20.8	20.2	21.5
Lee	0	19.5	19.5	19.0	19.0	19.2
	20	23.0	21.0	21.5	20.0	21.3
	40	24.0	22.5	21.5	20.5	22.1
	60	24.0	23.0	22.0	19.0	22.0
	Mean	22.6	21.5	21.0	19.6	21.1
Over all mean	0	19.5	19.2	18.7	18.7	19.0
	20	23.2	21.5	21.2	20.0	21.5
	40	24.5	23.0	21.5	21.5	22.5
	60	24.2	22.7	22.2	19.7	22.2
	Mean	22.8	21.6	20.9	19.9	21.3

L.S.D.	5%	1%	L.S.D.	5%
variety	NS	NS	V x P	NS
P	0.7	1.0	V x N	NS
N	0.7	1.0	P x N	NS
			V x P x N	NS

respectively. It is clear that the three P levels were statistically similar in their effect on oil percentage.

In 1978, all P levels significantly increased oil percentage in soybean seeds. Highest increase in oil percentage was obtained by the 40 Kg P_2O_5/fad. level. The three P levels increased oil content in seeds by 2.5%, 3.5% and 3.2 % compared with untreated plots.

Nitorgen effects:

N application significantly increased oil percentage in soybean seeds in both seasons. It is clear that N had an opposite effect to that of P. The application of 15, 30 and 45 Kg N/fad. significantly decreased oil percentage by 0.8 %, 2.6 % and 3.0 %, respectively, in 1977 and by 1.2 %, 1.9% and 2.9 % in 1978.

Interaction effects:

In 1977, the interaction effect P x N on oil percentage was significant, whereas other interactions had no significant effect on that character. In that season, effect of P in increasing seed oil content was more evident where no N was applied. On the other hand, higher N levels counteracted P

effect on oil percentage to some exetent.

In 1978, all effects of the interaction between the experimental factors on oil seed content were not significant. In that season each factor affected seed oil content independantly.

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