

Effects of Legume "Intercropping in Maize" on Linseed*

by

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Introduction: Maize (*Zea mays* L.) is the most suited *kharif* crop for the uplands of Chotanagpur. With the introduction of hybrid maize during recent years and the recommendation of 75-90 cm inter-row spacing under balanced fertilization, possibilities of growing legumes as intercrops were examined. Growing legumes as intercrops has a huge potentiality, as it not only increases the monetary return but also leaves behind a reserve of nitrogen for use by the succeeding *rabi* crop. Also legumes being a cover crop conserve the soil moisture received during the monsoon season which could be utilized by the *rabi* crop.

Material and Methods: The experiment was laid out in randomised block design with ten treatments in four replications at the Ranchi Agricultural College Farm, Kanke during the year 1965-66. The treatments were (i) Maize alone, control (Con.), (ii) Maize+Mung (*Phaseolus aureus* Roxb.) for green manuring (MG), (iii) Maize+Mung for forage (MF), (iv) Maize+Mung for grain (MS), (v) Maize+Kalai (*Phaseolus mungo* Var. *radiatus* Linn.) for green manuring (KG), (vi) Maize+Kalai for forage (KF), (vii) Maize+Kalai for grain (KS), (viii) Maize+Cowpea (*Vigna sinensis* Endl.) for green manuring (OG), (ix) Maize+Cowpea for forage (CF) and (x) Maize+Cowpea for grain (CS).

The maize crop was fertilized with nitrogen, phosphorus and potassium @ 112, 57 and 34 kg/ha respectively. After the break of monsoon, Deccan Hybrid *Makka* was sown on the 20th June 1965 at a spacing of 30 : 76 sq. cm. All the three legumes for different purposes were interseeded in the space between the rows of maize after one month of maize sowing, i. e., at the time of earthing up.

Legumes intercropped were green manured *in situ* and cut for forage after 50 days of sowing. The seed was collected at maturity. Linseed crop succeeded the maize and intercrops in *rabi* season in the experimental plot without any manurial or fertilizer treatment.

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Results and Discussion: Tillers per plant:- The effects of all the intercropping treatments were found to be highly significant in producing more number of tillers in linseed plant than the control (Table 1). The plots receiving the treatment mung for green manuring produced highest number of tillers being 4.63 followed by kalai for green manuring, numbering 4.58. These two treatments did not differ significantly between themselves but they were significantly better than other treatments.

TABLE 1. Study of Growth, Yield and Quality of Linseed

Treatments	Tiller/ plant	Capsule/ plant	Seed yield q/ha	Oil content % *	Iodine value *
Con	3.80	39.4	3.28	38.95	170.4
MG	4.63	48.3	5.02	39.47	169.2
MF	4.05	40.2	3.10	40.10	171.0
MS	4.40	46.5	3.59	38.74	169.6
KG	4.58	48.4	4.57	38.28	171.3
KF	4.38	45.6	3.74	39.04	170.1
KS	4.38	44.9	3.85	38.09	169.4
CG	4.44	46.6	4.24	39.36	168.3
CF	4.18	42.7	3.28	38.78	171.5
CS	4.33	45.3	3.48	38.54	168.9
S.E. Mean	0.028	1.200	0.379		
C.D. at 5 %	0.08	3.49	1.10		

* Composite samples were studied

Capsules per plant:- All the intercropping treatments, except cowpea and mung for forage, differed significantly over the control in producing more number of capsules per plant but these treatments did not differ significantly among themselves (Table 1). Green manuring either of *kalai*, *mung* or cowpea produced more number of capsules per plant than other treatments.

Yield of Linseed: The average yield of linseed seed varied from 3.10 to 5.02 q/ha under different treatments. The effect due to green manuring practice on the yield of linseed was found to be superior to control and other treatments. But the three legumes used for green manuring did not show any significant variation among themselves. Evidently, the addition of nitrogen in the soil due to incorporation of green matter had improved the nitrogen status of the soil which was consequently taken advantage by linseed crop. The present investigation supported the previous findings by Singh (1961), Singh and Sinha (1962) and Gautam *et al.* (1964).

Oil Content and Iodine Value of Linseed Seed: The different treatments had no effect either on oil percentage of the seed or the iodine value of the oil. The oil content in seed varied from 38.09 to 40.10 per cent whereas the iodine value ranged from 168.3 to 171.5 under different treatments. These values are little affected by nutritional changes (Gupta *et al.* 1961, and Khan *et al.* 1963).

TABLE 2. Correlation Studies in Linseed

	No. of tillers per plant	No. of capsules per plant
Yield per plant	0.7613 **	0.6999 **
No. of tillers per plant		0.8901 **

Multiple Correlation Coefficient:

$$r_{X_1, X_2} = 0.7628$$

Partial Regression Coefficients:

$$\left. \begin{aligned} b_1 &= 0.482140 ** \\ b_2 &= 0.005912 \text{ N.S.} \end{aligned} \right\} \text{Test by 't'}$$

(b_1 and b_2 = p. r. c. for X_1 and X_2 respectively)

Multiple Regression Equation:

$$Y = 0.769 + 0.482140 X_1 + 0.005912 X_2$$

** Significant at 1 % level ; N.S — Non-significant

X_1 = No. of tiller and X_2 = No. of capsule

Correlation Studies: It can be seen from Table 2 that number of tillers and capsules per plant had shown a significant positive correlation between themselves and subsequently with the seed yield per plant. That is to say, greater the number of tillers, more are the capsules and hence increased yield, which fact is well established by Dastur and Bhatt (1963), and Pathak and Bajpaye (1964). The results of the present study are particularly encouraging in view of the fact that any treatment which might bring variation in the average number of tillers and capsules per plant is likely to increase the yield per plant. Thus, it is evident that the treatment effects can be observed at tillering stage and subsequently at the capsule formation stage.

As the association between tillers and capsules with plant yield appeared to be of great importance partial regression coefficient and multiple regression equation were determined to know the real impact of these two characters on plant yield. The partial regression study indicated that number of tillers per plant was highly significant with seed yield per plant and not the number

of capsules. Obviously it was the number of tillers which made a real contribution for high seed yield per plant. The contribution of number of capsules per plant could not be significant, because the number of capsules per plant increased with the greater number of tillers per plant. The present finding is in agreement with the observation of Pathak and Bajpaye (1964). Thus, this character (capsule) could not make a real impact on plant yield. However, it is felt that, if number of capsules per tiller would have been counted, it could have brought somewhat a greater impact on the plant yield than capsules per plant.

Summary: The present investigation carried out at the Ranchi Agricultural College Farm, Kanke during the year 1965-66 indicated that: (1) Linseed can be grown successfully as a succeeding crop after the harvest of maize which was intercropped with legumes. The effect of green manuring of intercrops proved beneficial in increasing the seed yield of linseed than the legumes that were used for forage or grain production. (2) Number of tillers and capsules per plant are correlated positively with each other and with seed yield of linseed per plant. (3) Nutrient status of the soil had no effect either on oil percentage of the seed or the iodine value of the oil.

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