Ceylon Cocon. Q., (1980) **31**, 134–137
Printed in Sri Lanka

EFFECT OF SOWING DATE ON GROWTH, YIELD AND ITS COMPONENTS OF COWPEA (Vigna unguiculata (Burm) Walp) GROWN UNDER COCONUT

M. de S. LIYANAGE

Coconut Research Institute, Lunuwila, Sri Lanka

ABSTRACT

Liyanage, M. de. S. (1980). Effect of sowing date on growth, yield and its components of cowpea (Vigna unguiculata (Burm) *Ceylon Cocon. Q.* **31**, 134–137.

An experiment was conducted with four sowing dates commencing from the onset of rains during the 1976/77 Maha season, to determine the optimum time of sowing the local cowpea variety, MI–35, under coconut at Kirimetiyana Estate, Kirimetiyana.

The study indicated that plants attained the maximum vegetative and reproductive growth when seeds were sown with the onset of rains, as indicated by a reduction in plant height, weight of shoots, number of pods and number of seeds per pod with delayed sowing. Plants established with the onset of rains also gave the highest yield of seed and the low seed yield due to later sowing resulted mainly from a reduction in the number of pods per plant rather than from a reduction in the number of seeds per pod and seed size. Results also reveal that a substantial seed yield could be obtained when seeds are sown within a period of three weeks from the onset of rains.

INTRODUCTION

In recent years, cowpea has evolved as a potential grain legume crop in this country. Of the locally grown cultivars, MI-35 (also known as Lanka parippu) is popular among farmers because of its short duration life cycle and improved cooking quality of seeds, rich in protein. Past investigations carried out at the Coconut Research Institute suggest that MI-35 is a suitable intercrop to be grown under mature coconut plantations in the Intermediate Zone (Anon., 1975).

Abrams and Julia (1973) showed that the date of sowing pigeon pea, *Cajanus cajan* (L.), had a definite influence upon plant height, flowering time and seed yield. It has been reported that in cowpea, *Vigna unguiculata* (Burm. Walp) water stress during the seedling and pre-flowering stages can significantly reduce the final seed yield (Summerfield *et al.* 1976). Since annual crops including cowpea are generally grown under rainfed conditions, the date of sowing may have an important bearing on the overall performance of these crops. There is a lack of quantitative data on the effects of the date of sowing on the growth and seed yield of cowpea, especially when it is grown under coconut. The present study was designed to provide such information.

MATERIALS AND METHODS

This experiment was conducted during the 1976/77 Maha season at Kirimetiyana Estate situated in the Intermediate Zone, on a well drained sandy loam soil. The weekly mean rainfall data at Bandirippuwa Estate, Lunuwila (latitude 7^0 23^1 elevation 30.8 m above sea level) presented in Table I, approximate the rainfall pattern at Kirimetiyana (situated 4 km from Bandirippuwa estate, Lunuwila).

The experimental layout was a randomized block design with four replications, the size of each plot was 33.5 m^2 located between two coconut rows 1.8 m away from the bole of the palm on each side and the entire experiment occupied an area of 0.05 hectares. Seeds were first sown with the onset of Maha rains on 5 October, 1976 and thereafter at three weekly intervals extending over a period of eight weeks. Two to three seeds of uniform size were dibbled at each planting hole along the rows and at two weeks the seedlings were thinned to a spacing of 45 cm between and 15 cm within the row. A fertilizer mixture at the rate of 50 kg ha^{-1} each of ammonium sulphate, super phosphate and muriate of potash was applied to cowpea at the time of sowing. Plants were top dressed with ammonium sulphate at the rate of 50 kg ha^{1} four weeks later. The coconut palms were fertilized separately with a CRI-"C" NPK mixture at the rate of 4.5 kg per a palm during yala 1976. The cowpea crop was harvested when more than 50 percent of the pods had turned yellow. Data were collected from five randomly selected plants in each plot to quantify the following agronomic characters, except for estimating the plant stand where the total plant count per plot was taken: plant stand (expressed as a percentage of the total number of seeds sown per plot) period taken for 50 per cent flowering (when 50 per cent of plants reach anthesis), plant height (cm) at 50 per cent flowering, shoot dry weight at 50 per cent flowering, determined after plants had been dried for 48 h at 80° C in an oven, period taken for maturity (number of days from sowing to the date of first harvest of mature pods), seed yield per plant (g) and per hectare (kg), number of pods per plant, number of seeds per pod, seed size (g/100 randomly selected seeds) and seeds of undesirable market quality (as a percentage of the total number of seeds per plant).

RESULTS AND DISCUSISONS

Plant Growth and Development

Effects of sowing date on vegetative growth, time of flowering and maturity of cowpea plants are summarized in Table 2. Results show that the percentage of plant stand was significantly higher ($P<0.05$) when seeds were sown with the onset of rains (S_1) than when sown later (S_3 and S_4). The data further indicate that the percentage of plants established with the first sowing (S_1) was not significantly different from those of the second sowing (S_2) and ranged between 79 and 71 respectively (Table 2). This suggests that cowpea plants are able to utilize the available soil moisture if sown within a period of three weeks from the onset of rains, as seen from the rainfall figures given in Table 1. Sur *et al.* (1966) reported that in Bengal gram (*Cicer arietinum* L.) later sowings adversely affected the plant stand and attributed this to inadequate moisture retained in the soil. Results in Table 2 also show that plants established with the onset of rains (S_1) produced flowers earliest (ie., in 38 days) and conversely flowering time was delayed significantly ($P<0.05$) with later sowing (S_3 to S_4 Table 2). The height of plants at the flowering stage was also greater at the first sowing (S_1) than at other sowing times (Table 2). Abrams and Julia (1973) reported a similar trend in plant height and flowering of pigeon pea due to differing sowing dates. Furthermore, plants established with the onset of rains (S_1) attained the highest shoot dry weight ($P< 0.01$) and grew more vigorously than those established during the rest of the sowing times. This may be

attributed, at least in part, to the adequate supply of soil moisture available to plants during the seedling and preflowering stages (Table 1). As a consequence of the rapid development of plants in the first sowing (S_1), pods from these plants matured earlier than plants of the later sowings.

Table 1. *Mean weekly rainfall (mm) at Bandirippuwa Estate, Lunuwila for the experimental period (October, 1976 to February, 1977)*

	1976			1977	
Days	*October*	*November*	*December*	*January*	*February*
1 – 7 ..	102.5	148.0	72.7	0.0	1.2
8 – 14 ..	109.5	118.5	1.2	0.0	0.0
15 – 21 ..	34.3	84.7	86.5	0.0	12.4
22 – 31 ..	59.2	163.0	3.7	0.0	0.4 (22–28)
Total ..	305.5	514.2	164.1	0.0	14.0

Table 2. *Effect of sowing date on growth and development of cowpea*

Sowing date	*Plant stand per plot (%)*	*50% flowering (days after sowing)*	*Plant height at 50% flowering (cm)*	*Shoot dry weight at 50% flowering (g)*	*Physiological maturity (days after sowing)*
S_1 (October 5) ..	79.48	8.0	26.9	8.25	62.0
S_2 (October 27) ..	71.78	44.0	22.9	4.13	65.0
S_3 (November 17) ..	68.89	48.0	20.6	3.88	69.0
S_4 (December 8) ..	60.84	53.0	9.6	1.88	73.0
C D 5% ..	10.3	5.63	3.44	1.99	4.92

Seed yield and components of yield

Effects of sowing date on the seed yield and its components and on the market quality of seeds are presented in Table 3. It would appear from the results that plants established with the onset of Maha rains (S_1) gave the highest seed yield per plant (15.5 g) and per hectare (417.3 kg). Plants established three weeks later than the first sowing (S_2) gave only a 15 per cent reduction in yield, which was considerably reduced with subsequent sowings (60% (S_3) and 86.0% (S_4) in Table 3). Similarly, Abrams and Julia (1973) obtained the highest seed yield in pigeon pea with early sowing dates. The overall yield in this experiment was much reduced (50% to 80% reduction) when seeds were sown later than the last week of October. This may have been due partly to the limitation in moisture experienced by plants after December (Table 1). These results compare favourably with those of Sur *et al.* (1966) who reported that in Bengal, the seed yield of gram declined considerably in sowings made after the 28th of October.

The number of pods per plant and the number of seeds per pod were similarly reduced as a result of delayed sowings (Table 3). The reduction in the number of mature pods per plant due to delayed sowing time was more than the reduction in the number of seeds per pod. (c.f. 27% vs 16.8% in S_2. Table 3). This suggests that the sowing time has an indirect influence on the number of flowers developing into pods rather than on the number of seeds developing within a pod. In contrast, seed size was not markedly reduced due to early sowing dates

Table 3. *Effect of sowing date on seed yield, components of yield and market quality of cowpea seeds*

Sowing date	*Seed yield per plant (g)*	*Seed yield per hectare (kg)**	*Number of pods per plant*	*Number of seeds per pod*	*Seed size (g/100)*	*Percentage of markr-table seeds*
S_1 (October 5)	15.5	417.3	15.0	15.8	9.6	89.3
S_2 (October 27)	12.9	358.2 (15.0)	11.0 (27.0)	13.2 (16.8)	9.0 (7.0)	85.4
S_3 (November 17)	8.4	167.4 (60.0)	8.0 (47.0)	12.0 (24.0)	8.1 (16.0)	79.6
S_4 (December 8)	7.0	60.3 (86.0)	3.0 (80.0)	9.2 (42.0)	7.7 (20.0)	76.5
CD 5%	2.49	22.23	3.72	1.14	0.64	3.36

* Computed from the seed yield per plot (g/m^2)

Note: Figures given in parentheses represent percentage reduction relative to the first sowing

(S_1 and S), although there was a substantial reduction in seed size with subsequent sowing dates (16% (S_8) and 20% (S_4) in Table 3). These results are supported by those of Abrams and Julia (1973) who reported that seed size was least affected by early sowing dates.

Data show that the number of pods per plant and to a lesser extent the number of seeds per pod are the major components of yield contributing to a considerable reduction in the seed yield due to delayed sowing (Table 3). Results also show that the percentage of seeds of undesirable market quality due mainly to pest and disease incidences, was markedly less with early sowing dates (S_1 and S_2) than with later sowings (S_3 and S_4). Sur *et al.* (1966) report a similar deterioration in the quality of seeds in Bengal gram with delayed sowing.

The results show that the most desirable time to sow cowpea seeds is with the onset of Maha rains. This agrees with Smartt (1976) who stated that the optimum time of sowing pulses as a group in monsoon climates is as close as possible to the onset of rains. He (Smartt 1976) attributed this mainly to the prevalence of favourable environmental conditions for the vigorous growth and development of such crops.

ACKNOWLEDGEMENTS

I wish to express my thanks to Mr. K. P. C. Fernando for capable technical assistance during the trial and to Mr. D. T. Mathes for statistical analysis of the data. I am grateful to Dr. M. P. L. D. Martin for reading the manuscript and making valuable suggestions. Further thanks are due to Mrs. N. Wijeratne for typing the manuscript.

REFERENCES

Abrams, R, Julia, F. J. (1973), Effect of Planting time, plant population and row spacing on yield and other characters of pigeon pea *Cajanus Cajana* (L). *J. Agric., Univ. Puerto Rico* **57** (4) : 275–285.

Anon. (1975), Ann. Rp., Agrostology Division, *Ceylon Cocon. Q.*, **26** ,**9** , 43-50.

Sen. S. Sen Gupta, K and Mukherjee, D. (1964), A study, on the effect of differed sowing of gram. *Indian Agriculturist*, **8** (1) 6-20.

Smartt, J. (1976), Tropical pulses, Published Longman Ltd., London.

Summerfield, R. J., Huxley, P. A., Dart P. J. and the late Hyghes, A. P. (1976). Some effects of environmental stress on seed yield of cowpea. Plant and soil, **44** : 527–546.

Sur, S. C., Sen Gupta, K. and Sen, S. (1966) Optimum time of sowing gram in West Bengal. *Indian J. Agric. Sci.*, **36** (4) : 173–179.