# Effect of spacing on hybrid seed yield of pigeonpea hybrid COPH2 (Cajanus cajan L. Millsp)

K. PARAMESWARI, K. VANANGAMUDI AND S. KAVITHA

Dept. of Seed Science and Tech., Tamil Nadu Agricultural University, Coimbatore - 641 003, Tamil Nadu

Abstract: Field experiments conducted during Sep. 2000 and July 2001 with the parental lines of COPH 2 pigonpea hybrid revealed that seed yield attributes were not influenced by different spacings. However, the plants spaced at 45 x 20 cm spacing (44446 plants ha<sup>-1</sup>) recorded significantly higher seed yield of 728 kg ha<sup>-1</sup> in September sown crop, which was 7.69 per cent increase over July sown crop. The resultant seed showed nonsignificant differences in seed quality.

Keywords: Pigeonpea hybrid, Spacing, Seed yield and quality

## Introduction

The optimum plant population per unit area is an important non monetary input to decide the maximum productivity of the seed crop. Closer spacing due to competitive effect resulted in lesser yield in soybean (Kacha et al. 1990). Seed crop may require specific spacing level which may or may not be the same as commercial crops. For obtaining higher seed yield and quality seed, suitable spacing should be maintained. Influence of spacing on seed vield has been observed by many researchers. In pigeonpea, hybrid is developed by utilizing genetic male sterility system, since, half of the male fertile plants are uprooted from the female parents before anthesis in the seed production plot. Hence, information on maintenance of optimum plant population per unit area needs investigation.

### Materials and Methods

Two field trials were conducted at the Eastern block of Tamil Nadu Agricultural University, Coimbatore during September, 2000 (S<sub>1</sub>) and July, 2001 (S<sub>2</sub>) with nine spacings viz. 45 x 20 cm, 60 x 20 cm, 75 x 20 cm, 45 x 40 cm, 60 x 40 cm, 75 x 40 cm, 45 x 60 cm 60 x 60 cm and 75 x 60 cm. A planting ratio of 4:1 could be adopted and the experiment was laid out in RBD with four replications. The recommended agronomic package of practices for seed crop were followed during the entire growth period. Observations on plant height (cm) and number of branches on 60, 90 and 120 days after sowing (DAS), number

recorded in five randomly tagged plants. The days to first and 50% flowering was also recorded. The seed yield ha-1 was worked out. In the resultant seeds, 100 seed weight (g), germination (%), vigour index (Abdul-Baki and Anderson, 1973), drymatter production (mg 10 seedlings-1) and protein content (%) were evaluated. The collected data were analysed statistically by adopting the procedure described by Panse and Sukhatme (1978).

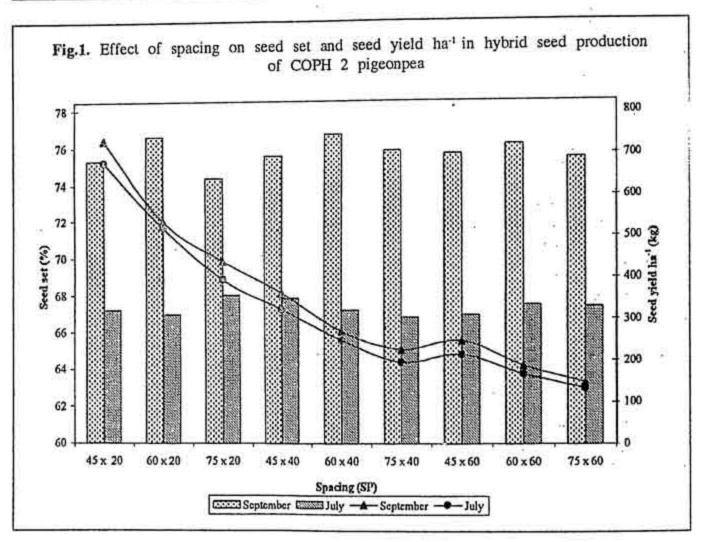
#### Results and Discussion

In the present study, during the flowering stage and before anthesis, based on the pollen colour i.e. plant with yellow fertile pollen in female parent were uprooted. The percentage of plants uprooted was around 59 per cent. The mean plant population in September and July was 44446 (45 x 20 cm), 33320 (60 x 20 cm), 26548 (75 x 20 cm), 22163 (45 x 40cm), 16554 (60 x 40 cm), 13240 (75 x 40 cm), 14738 (45 x 60 cm), 11036 (60 x 60 cm) and 8786 (75 x 60 cm) per hectare (Table 1).

The spacing of the crop significantly influenced the plant height and number of branches at 60, 90 and 120 DAS (days after sowing) in both seasons. The 45 x 20 cm spacing with a plant population of 44446 plants had recorded the highest plant height (67.8 and 53.1 cm) and least number of branches (6 and 4) at 60 DAS in both September and July sown crop (Table 2). There was a gradual increase with respect to plant height and number

Table 1. Plant population (Number of plants ha-1) in different spacing

Spacing (cm)	September, 2000	July, 2001	Mean
	11116	44446	44446
45 x 20	44446	33317	33320
60 x 20	33325	26545	26548
75 x 20	26550	22162	22163
45 x 40	22164		16554
60 x 40	16552	16557	13240
75 x 40	13240	13240	
45 x 60	14740	14737	14738
60 x 60	10992	11079	11036
75 x 60	8790	8781	8786



of branches were observed due to plant spacing from 45 x 20 cm to 75 x 60 cm in both seasons. A similar trend for plant height and number of branches was also noticed at different growth stages viz. 90 and 120 DAS.

Increased plant height under 45 x 20 cm might be attributed to competition between

the plants for light and space which inturn produced lean and lanky plants. Consequently, lanky plants would produce lesser number of branches. This result is in good agreement with the findings of Trivedi and Vyas (2000) in chickpea and Deshmukh and Bhoi (2000) in groundnut.

S1         S2         Mean         S2<	Spacing (SP)	Ple at 6	Plant heigh	(cm)	at 9	Plant height at 90 DAS (cm)	_	PI at 1	Plant height at 120 DAS (cm)	Plant height No. of branches No. of branches at 120 DAS (cm) at 60 DAS at 90 DAS at 120 DAS	No.	No. of branches at 60 DAS	nches	No.	o. of branc at 90 DAS	of branches 90 DAS	No.	o. of branch at 120 DAS	of branches
67.8 53.1 60.5 85.3 70.6 78.0 118.3 99.8 109.1 6 4 5 7 6 7 8 7 6 6 7 8 8 7 6 8 8 7 6 8 8 7 8 8 6 8 8 7 8 8 8 9 8 8 64.0 49.7 57.3 83.7 68.7 76.2 116.0 98.4 107.2 6 5 6 8 7 7 8 9 8 8 64.0 49.7 57.3 83.5 68.1 75.8 115.2 98.0 106.6 7 5 6 8 8 7 7 8 9 9 8 63.0 49.7 57.3 82.7 67.3 75.0 114.6 97.7 106.2 7 6 6 6 9 8 9 7 8 9 10 9 8 63.0 48.7 55.0 82.3 67.0 74.7 114.0 97.4 105.7 7 6 6 6 10 8 9 11 9 64.3 48.4 55.7 82.0 66.8 74.4 114.0 97.1 105.6 7 6 6 10 8 9 9 11 9 64.3 48.4 55.7 82.0 66.8 74.4 114.0 97.1 105.6 7 6 6 10 8 9 9 11 9 64.3 49.8 83.1 68.0 74.3 114.0 97.0 105.5 7 6 6 6 10 8 9 9 11 9 9 7 7 105.0 64.3 49.8 83.1 68.0 82.3 67.0 6.271 6.5 6 10 6 6 10 8 9 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	(ma)	S	.S.	Mean	s s	S	Mean	s <sub>-</sub>	S	Mean	S.	s,	Mean	S.	s,	Mean	S	S	Mean
65.2 51.6 58.4 84.0 69.1 76.6 116.9 98.8 107.9 6 4 5 7 6 7 9 8 64.0 87.2 57.5 83.7 68.7 76.2 116.0 98.4 107.2 6 5 6 8 7 6 7 9 8 8 64.0 49.7 57.3 83.5 68.1 75.8 115.7 98.0 106.9 6 5 6 8 7 7 8 9 8 8 63.0 49.0 56.3 82.7 67.3 75.0 114.6 97.7 106.2 7 6 6 9 8 9 7 8 9 10 9 8 63.0 48.4 55.7 82.0 66.8 74.4 114.0 97.1 105.6 7 6 6 10 8 9 11 9 64.3 49.8 55.7 82.0 66.8 74.4 114.0 97.1 105.6 7 6 6 10 8 9 11 9 64.3 49.8 5.7 82.0 66.8 74.3 114.0 97.0 105.5 7 6 6 6 10 8 9 11 9 64.3 49.8 5.7 82.0 66.8 74.3 114.0 97.0 105.5 7 6 6 6 10 8 9 11 9 64.3 49.8 5.7 82.0 66.8 74.3 114.0 97.0 105.5 7 6 6 6 10 8 9 11 9 64.3 67.0 67.0 67.0 105.5 7 6 6 6 10 8 9 11 9 64.3 67.0 67.0 67.0 105.5 7 6 6 6 10 8 9 11 9 64.3 67.0 67.0 67.0 105.5 7 6 6 6 10 8 9 11 9 64.3 67.0 67.0 67.0 67.0 67.0 67.0 67.0 67.0	45 x 20	8.79	53.1	60.5	85.3	70.6	78.0	118.3	866	1001	. 9	4	4	1		i	1	,	
64.8 50.2 57.5 83.7 68.7 76.2 116.0 98.4 107.2 6 5 6 8 7 8 9 8 64.0 49.7 57.3 83.5 68.1 75.8 115.7 98.0 106.9 6 5 6 8 7 8 9 8 65.7 49.0 56.4 83.0 67.8 75.4 115.2 98.0 106.6 7 5 6 6 9 7 8 9 9 8 63.0 48.7 56.0 82.3 67.0 74.7 114.0 97.1 105.6 7 6 6 6 10 8 9 11 9 63.0 48.1 55.7 82.0 66.8 74.4 114.0 97.1 105.6 7 6 6 10 8 9 7 11 9 64.3 49.8 83.1 68.0 115.4 98.0 105.5 7 6 6 10 8 9 11 9 64.3 49.8 83.1 68.0 115.4 98.0 105.5 7 5 6 6 10 8 9 11 9 9 11 9 64.3 49.8 83.1 68.0 115.4 98.0 115.4 98.0 105.5 7 6 6 10 8 9 7 11 9 9 1 9 1 9 1 9 1 9 9 1 9 9 1 9 9 1 9 9 1 9 9 1 9 9 1 9 9 1 9 9 1 9 9 9 1 9	$60 \times 20$	65.2	51.6	58.4	84.0	69.1	992	1169	88	107.0			א כ	- 1	0 \	- 1	<b>x</b>	-	00
64.0 49.7 57.3 83.5 68.1 75.8 115.7 98.0 166.9 6 5 6 8 7 8 9 8 63.7 49.0 56.4 83.0 67.8 75.4 115.2 98.0 166.6 7 5 6 9 7 8 9 8 63.6 49.0 56.3 82.7 67.3 75.0 114.6 97.7 166.2 7 6 6 6 10 8 9 11 9 63.0 48.7 55.0 82.3 67.0 74.7 114.0 97.4 105.7 7 6 6 6 10 8 9 11 9 63.0 48.1 55.7 82.0 66.8 74.4 114.0 97.1 105.6 7 6 6 10 8 9 9 11 9 64.3 49.8 83.1 68.0 115.4 98.0 115.5 7 6 6 6 10 8 9 9 11 9 9 64.3 49.8 SPS SP S SP S SPS SP S SP	$75 \times 20$	8,49	50.2	57.5	83.7	687	76.2	116.0	08.4	107.2	<b>y</b>	r v	2 (	- 0	0 (	- 0	Λ.	00	6
63.7 49.0 56.4 83.0 67.8 75.4 115.2 98.0 106.6 7 5 6 9 7 8 9 8 63.6 49.0 56.3 82.7 67.3 75.0 114.6 97.7 106.2 7 6 6 9 8 9 7 8 9 10 9 8 63.0 48.1 55.6 82.3 67.0 74.7 114.0 97.1 105.6 7 6 6 10 8 9 11 9 63.0 48.1 55.6 81.7 66.8 74.4 114.0 97.1 105.6 7 6 6 10 8 9 11 9 64.3 49.8 83.1 68.0 115.4 98.0 105.5 7 6 6 10 8 9 11 9 11 9 64.3 49.8 S. SPS SP S SP S SPS SP S SP S SPS SP S	45 x 40	64.0	49.7	573	83.5	68.1	75.8	115.7	080	10.5	<b>9</b> 4	n 4	0 (	000	- 1	000	5	00	0
63.6 49.0 56.3 82.7 67.3 75.0 114.6 97.7 106.2 7 6 6 9 8 9 10 9 6 9 6 9 10 9 6 9 10 9 6 9 10 9 6 9 10 9 6 9 8 9 11 9 9 6 9 11 9 9 6 9 8 9 9 11 9 9 6 9 8 9 9 11 9 9 6 9 8 9 9 11 9 9 6 9 8 9 9 11 9 9 6 9 8 9 9 11 9 9 6 9 8 9 9 11 9 9 6 9 8 9 9 11 9 9 6 9 9 8 9 9 11 9 9 6 9 8 9 9 11 9 9 9 9 9 9 9 9 9 9 9 9 9 9	60 x 40	63,7	49.0	56.4	83.0	829	75.4	115.2	080	100.7	9 1	n 4	0 \	000	- 1	× (	6	00	6
63.0 48.7 56.0 82.3 67.0 74.7 114.0 97.4 105.7 7 6 6 6 10 8 9 10 9 63.0 63.0 48.4 55.7 82.0 66.8 74.4 114.0 97.1 105.6 7 6 6 10 8 9 11 9 63.0 48.1 55.6 81.7 66.8 74.4 114.0 97.1 105.6 7 6 6 10 8 9 11 9 64.3 49.8 83.1 68.0 115.4 98.0 105.5 7 6 6 10 8 9 11 9 9 11 9 9 11 9 9 11 9 9 11 9 9 11 9 9 11 9 9 11 9 9 11 9 9 11 9 9 11 9 9 11 9 9 11 9 9 11 9 9 11 9 9 11 9 9 1 9 9 1 9 9 1 9 9 9 1 9	75 x 40	63.6	49.0	563	82.7	673	750	1146	0.00	20.00	- 1	0 \	٥	2	- 0	00	0	00	6
63.0 48.4 55.7 82.0 66.8 74.4 114.0 97.1 105.6 7 6 6 10 8 9 111 9 63.0 48.1 55.6 81.7 66.8 74.3 114.0 97.0 105.5 7 6 6 10 8 9 111 9 9 111 9 9 112 9 12 0.048 0.303 0.743 0.371 0.165 0.576 0.271 0.851 0.011 0.004 0.015 0.015 0.010 0.002 0.013 0.012 0.004 0.005 0.013 0.012 0.004 0.005 0.013 0.012 0.004 0.005 0.013 0.012 0.004 0.005 0.013 0.012 0.004 0.005 0.013 0.012 0.004 0.005 0.013 0.012 0.004 0.005 0.013 0.012 0.004 0.005 0.013 0.012 0.004 0.005 0.013 0.012 0.004 0.005 0.013 0.012 0.004 0.005 0.013 0.012 0.004 0.005 0.013 0.012 0.004 0.005 0.013 0.012 0.004 0.005 0.013 0.012 0.004 0.005 0.013 0.012 0.004 0.005 0.013 0.005	45 x 60	63.0	48.7	56.0	82.3	670	747	114.0	07.70	105.7	- 1	0	٥	ν \$	× 0	0 (	9	0	0
63.0 48.1 55.6 81.7 66.8 74.3 114.0 97.0 105.5 7 6 6 10 8 9 11 9 9 64.3 49.8 SPS SP S SP	60 x 60	63.0	48.4	55.7	82.0	899	74.4	1140	3.5	105.0	- 1	٥,	٥,	25	<b>x</b> (	6	= :	6	2
SP S SPS SP S	75 x 60	63.0	48.1	55.6	81.7	899	743	114.0	0.00	105.5	- 1	0 4	٥,	2,5	× 0	0	= :	6	9
SP S SPS S	Mean	643	49.8		83.1	0.89		115.4	98.0		- 1-	0 50	0	20	× 1	6	32	0 0	10
tember, 2000; S <sub>2</sub> - July, 2001	8	SP 0.486		SPS 0.743	SP 0.371	S 0.165	SPS 0.536	SP 0.576	S 0.271	SPS 0.851	SP 0.011	S 000		SP	S	SPS	8	s s	SPS
	S, - Sept	ember,	2000;	s,	July, 20	100		il il il il			6				7000	100	210.0	500	110.0

Table 3. Effect of spacing on days to first and 50 per cent flowering and number of pods and seeds plant in hybrid seed production of COPH 2 pigeonpea

pacing	Days to first	first Ac	owering	Days to		50% flowering	Num	Number of pods plant	s plant-1	Nimh	Vinmber of seeds plant!	plant-1
	s,	S	Mean	s,	S,	Mean	Š	S	Mean	S	v	Mean
0000	C	8								5	2	TAYOUT
07 X C	10	8	8	8	8	69	602	533	8%	1637	4777	1610
$0 \times 20$	8	57	e e	2	07	9	1	2	0,0	107.1	140.3	174.7
06 35	20	C	3 8	2 6	8	6	07.3	53.5	57.9	167.3	148.6	158.0
	3 1	5	8	3	8	69	62.0	53.3	587	160 5	149.5	1500
0 X 40	R	8	21	5	9	07	000			200	7.017	122.0
OFAC	23	8	5	3 8	36	8	0.50	7.00	4.60	9.691	151.2	160.4
	200	33	6	5	3	8	63.3	55.5	594	171.8	1528	163 2
0+X1	8	ጸ	21	5	63	09	3 63	600		0.11	0.77	102.7
09 x 5	33	28	C	200	5 1	6	000	200	56.60	173.3	152.3	162.8
07 (0	2	318	51	8	8	/9	£.3	26.6	60.5	173.0	155.0	1640
200 27	8	'n	2/	9	6	07	717	0/0	1	2	0.001	5
09 x g	8	55		300	2 6	3 8	0.40	20.0		174.1	155.2	164.7
	3 8	3 5	10	8	3	8	0.49	26.8	60.4	1743	1553	164.9
Call	10	2/		∞	88	2000	63.0	55.3		170.6	151.7	0.70
	SP	S	SPS	dS	v	SDC	as	6	000	100		100000
0	SN	SN	SN	SS	SS	SS	r Z	1742	SPS	d'S	S	SPS
(50.02)								7.1.1	2	2	7117	S
- Senten	-000c -oqu	•	1000 July 2001									

Table 4. Effect of spacing on pod set and seed yield plant in hybrid seed production of COPH 2 pigeonpea

Spacing		Pod set (%)		Seed	yield plant	t-1 (g)
(SP)	S	S <sub>2</sub>	Mean	S	S <sub>2</sub>	Mean
45 x 20 60 x 20 75 x 20 45 x 40 60 x 40 75 x 40 45 x 60 60 x 60 75 x 60	21.57 (27.67) 22.18 (28.10) 21.31 (27.49) 22.01 (27.98) 21.01 (27.28) 21.18 (27.40) 22.00 (27.97) 21.68 (27.65) 21.47 (27.60) 21.60 (27.69)	18.95 (25.81) 19.26 (26.03) 18.87 (25.75) 19.05 (25.88) 19.87 (26.47) 20.00 (26.57) 19.56 (26.25) 19.73 (26.37) 19.22 (26.00) 19.39 (26.13)	20.26 (26.75) 20.72 (27.08) 20.09 (26.03) 20.53 (26.94) 20.44 (26.88) 20.59 (26.97) 21.59 (27.69) 20.71 (27.07) 20.35 (26.81)	16.37 16.02 16.48 16.33 16.27 17.00 16.78 17.21 16.56 16.56	15.21 15.13 14.73 14.56 14.98 14.68 14.48 15.05 15.13 14.88	15.79 15.58 15.63 15.45 15.63 15.84 15.63 16.13 15.85
Mean CD (P=0.0	SP	S 2.573	SPS NS	SP NS	S 0.643	SPS NS

(Figures in parentheses indicate arcsine values) S, - July, 2001 S, - September, 2000;

Fig.2. Effect of spacing on hundred seed weight and germination of resultant seeds of pigeonpea hybrid COPH 2 100 98 10.5 96 10 100 seed weight (g) Germination (%) 92 9.5 90 9 88 8.5 86 45 x 20 60 x 20 75 x 20 45 x 40 60 x 40 75 x 40 45 x 60 60 x 60 75 x 60 Spacing (SP) September July - September - July

Σ
2
hyorid COP
<u>n</u>
2
5
Ξ.
pea inyorid
22
Ď,
=
Ď.
nt seeds of pigeonpea
=
₽,
=
0
v:
었.
อั
A3
-
.1
12
E3
75
1:
()
12
3
13
and protein content of recurrent
C
E
-
==
2
Ē.
2
=
35
Ť
=
-
Ξ
ır inde
our ir
gour ir
vigour ir
vigour ir
n, vigour ir
on, vigour ir
tion, vigour ir
iction, vigour ir
fuction, vigour ir
oduction, vigour ir
production, vigour ir
production, vigour ir
er production, vigour ir
ter production, vigour ir
atter production, vigour ir
natter production, vigour ir
ymatter production, vigour ir
lrymatter production, vigour ir
drymatter production, vigour in
n drymatter production, vigour in
on drymatter production, vigour in
g on drymatter production, vigour in
ng on drymatter production, vigour in
cing on drymatter production, vigour in
acing on drymatter production, vigour in
spacing on drymatter production, vigour in
spacing on drymatter production, vigour in
of spacing on drymatter production, vigour in
of spacing on drymatter production, vigour in
ct of spacing on drymatter production, vigour ir
fect of spacing on drymatter production, vigour ir
ffect of spacing on drymatter production, vigour ir
Effect of spacing on drymatter production, vigour ir
i. Effect of spacing on drymatter production, vigour in
5. Effect of spacing on drymatter production, vigour in
e 5. Effect of spacing on drymatter production, vigour ir
le 5. Effect of spacing on drymatter production, vigou
able 5. Effect of spacing on drymatter production, vigour it
le 5. Effect of spacing on drymatter production, vigou

51         S2         Mean         S1         Mean         S1         Mean         S2         Mean           45 x 20         658         608         632         3226         3176         3201         19.9 (26.49)         20.5 (26.92)         20.2 (26.71)           60 x 20         658         612         640         3189         3153         3171         20.0 (26.57)         20.3 (26.78)         20.2 (26.71)           45 x 20         660 x 40         588         624         3286         3096         3191         20.5 (26.92)         19.7 (26.35)         20.2 (26.71)           45 x 40         643         586         615         3173         3056         3115         20.6 (26.28)         20.2 (26.71)         19.9 (26.49)           60 x 40         659         518         644         3269         3157         3113         20.1 (26.57)         20.2 (26.71)         19.9 (26.49)           75 x 40         669         518         644         3269         3157         3213         20.1 (26.64)         20.1 (26.54)         20.1 (26.49)           45 x 60         648         608         623         3322         3048         3140         19.8 (26.42)         20.5 (26.92)         20.1 (26.54)	Spacing (SP)	Drymatt (mg 10	Orymatter production (mg 10 seedlings <sup>-1</sup> )	tion s <sup>-1</sup> )	11	Vigour index	×		Protein content (%)	
0         656         608         632         3226         3176         3201         19.9 (26.49)         20.5 (26.92)           0         668         612         640         3189         3153         3171         20.0 (26.57)         20.3 (26.78)           0         650         558         624         3286         3096         3191         20.5 (26.92)         19.7 (26.35)           0         643         586         615         3173         3086         3115         20.0 (26.57)         20.3 (26.78)           0         649         595         627         3256         3157         3213         20.0 (26.57)         20.3 (26.78)           0         669         518         644         3269         3157         3213         20.1 (26.64)         20.0 (26.57)           0         648         608         628         3232         3048         3140         19.8 (26.42)         20.0 (26.57)           0         656         612         639         3186         3056         3121         20.6 (26.99)         20.5 (26.92)           0         659         591         625         3199         3077         3138         20.1 (26.64)         20.1 (26.64) <td< th=""><th></th><th>s'</th><th>s,</th><th>Mean</th><th>S</th><th>S,</th><th>Mean</th><th>s,</th><th>Sz</th><th>Mean</th></td<>		s'	s,	Mean	S	S,	Mean	s,	Sz	Mean
6.68         612         640         3189         3153         3171         20.0 (26.57)         20.3 (26.78)           0         650         598         624         3286         3096         3191         20.5 (26.92)         19.7 (26.35)           0         643         586         615         3173         3086         3115         20.0 (26.57)         20.3 (26.78)           0         643         586         615         3173         3184         19.6 (26.28)         20.2 (26.71)           0         659         518         644         3269         3157         3213         20.1 (26.64)         20.0 (26.57)           0         648         608         628         3322         3048         3140         19.8 (26.42)         20.0 (26.57)           0         658         612         639         3186         3056         3121         20.1 (26.64)         20.0 (26.57)           0         659         591         625         3199         3077         3138         20.3 (26.78)         19.8 (26.42)           0         659         603         3224         3106         20.1 (26.64)         20.1 (26.64)         20.2 (26.72)           0         655	00.00	959	808	632	3226	3176	3201	19.9 (26.49)	20.5 (26.92)	20.2 (26.71)
650 598 624 3286 3096 3191 20.5 (26.92) 19.7 (26.35) 643 586 615 3173 3056 3115 20.0 (26.57) 20.3 (26.78) 659 595 627 3256 3132 3194 19.6 (26.28) 20.2 (26.71) 659 518 644 3269 3157 3213 20.1 (26.64) 20.0 (26.57) 648 608 628 3232 3048 3140 19.8 (26.42) 20.9 (2720) 656 612 639 3186 3056 3121 20.6 (26.99) 20.5 (26.92) 656 603 591 625 3199 3077 3138 20.3 (26.78) 19.8 (26.42) 659 591 625 3199 3077 3138 20.3 (26.78) 19.8 (26.42) 659 591 85 SPS SP SPS SP SPS SPS SPS SPS SPS SPS	07 7 7 7 0 7 0 7 0 7 0 7 0 7 0 7 0 7 0	3 %	613	3	3189	3153	3171	20.0 (26.57)	20.3 (26.78)	20.2 (26.71)
643 586 615 3173 3056 3115 20.0 (26.57) 20.3 (26.78) 659 595 627 3256 3132 3194 19.6 (26.28) 20.2 (26.71) 669 518 644 3269 3157 3213 20.1 (26.64) 20.0 (26.57) 648 608 628 3232 3048 3140 19.8 (26.42) 20.0 (26.57) 656 612 639 3186 3056 3121 20.6 (26.99) 20.5 (26.92) 659 591 625 3199 3077 3138 20.3 (26.99) 20.5 (26.92) 656 603 3224 3106 20.1 (26.64) 20.1 (26.64)  SP S SPS SP S SP S SPS SP S SP S SP S	75 × 20	9	288	624	3286	3096	3191	20.5 (26.92)	19.7 (26.35)	20.1(26.64)
659 595 627 3256 3132 3194 19.6 (26.28) 20.2 (26.71) 669 518 644 3269 3157 3213 20.1 (26.64) 20.0 (26.57) 648 608 628 3232 3048 3140 19.8 (26.42) 20.0 (26.57) 656 612 639 3186 3056 3121 20.6 (26.99) 20.5 (26.92) 659 591 625 3199 3077 3138 20.3 (26.78) 19.8 (26.42) 656 603 SPS SP	15 × 40	643	286	615	3173	3056	3115	20.0 (26.57)	20.3 (26.78)	20.2 (26.71)
669 518 644 3269 3157 3213 20.1 (26.64) 20.0 (26.57) 648 608 628 3232 3048 3140 19.8 (26.42) 20.9 (2720) 656 612 639 3186 3056 3121 20.6 (26.99) 20.5 (26.92) 659 591 625 3199 3077 3138 20.3 (26.78) 19.8 (26.42) 656 603 3224 3106 20.1 (26.64) 20.2 (26.71)  SP S S SPS S S S S S S S S S S S S S S	07 2 09	659	595	627	3256	3132	3194	19.6 (26.28)	20.2 (26.71)	19.9 (26.49)
648 608 628 3232 3048 3140 19.8 (26.42) 20.9 (2720) 656 612 639 3186 3056 3121 20.6 (26.99) 20.5 (26.92) 659 591 625 3199 3077 3138 20.3 (26.78) 19.8 (26.42) 656 603 3224 3106 20.1 (26.64) 20.2 (26.71)  SP S SPS SP S SP S NS NS NS NS NS NS NS NS NS	25 2.40	640	818	49	3269	3157	3213	20.1 (26.64)	20.0 (26.57)	20.1 (26.64)
656         612         639         3186         3056         3121         20.6 (26.99)         20.5 (26.92)           659         591         625         3199         3077         3138         20.3 (26.78)         19.8 (26.42)           656         603         SPS         SP         SPS         SPS         SPS         SPS           NS         65.56         NS         NS         130.683         NS         NS         NS         NS           NS         NS         NS         NS         NS         NS         NS         NS	45 2 60	S S	8	809	3232	3048	3140	19.8 (26.42)	20.9 (2720)	20.4 (26.85)
659 591 625 3199 3077 3138 20.3 (26.78) 19.8 (26.42)	00 2 6	3	63	630	3186	3056	3121	20.6 (26.99)	20.5 (26.92)	20.6 (26.99)
SP SPS SPS SPS SPS SPS SPS SPS SPS SPS	25 60	889	105	605	3199	3077	3138	20.3 (26.78)	19.8 (26.42)	20.1 (26.64)
SP SPS SPS SPS SPS SPS SPS SPS SPS SPS	Mean	88	603		3224	3106		20.1 (26.64)	20.2 (26.71)	
NS 65.56 NS NS 130.683 NS NS NS		SS.	S	SPS	SB	s		88	s	SPS
	8	SZ	65.56	SZ	Z	130.683		SS	SS	S
	(P=0.05)									
	o - Scott	- September, 2000,	2	2, - July, 2001	4					

The present study revealed that the yield attributes namely days to first and 50 per cent flowering, number of pods and seeds and pod and seed set were not significantly influenced by spacing in both seasons. Seed yield plant also did not vary with spacings (Table 3 and 4). While the seed yield had was significantly influenced by different spacing in both seasons. The highest seed yield of 728 and 676 kg ha-1 treatment were recorded by plants under 45 x 20 cm spacing (44446 plants ha-1) in September and July sown crop, respectively (Figure 1). Further, it was observed that, as the spacing increased there was a reduction in seed yield per hectare (Table 3 and 4; Figure 1). The higher seed yield in 45 x 20 cm spaced crop was due to optimum plant population per unit area, which could not be compensated by an increase in yield attributes like plant height, number of branches, number of pods and seeds plant under wider spaced crop. Ahlawat et al. (1985) and Sarvaiya et al. (1993) also reported similar results in cowpea and pigeonpea, respectively. Kauthale et al. (1995) also found that closer spacing of 45 x 10 cm could be recommended for hybrid seed production of ICPH 8 pigeonpea. Therefore, it can be concluded that, a spacing of 45 x 20 cm could be recommended for hybrid seed production of COPH 2 pigeonpea.

Seed quality parameters namely, hundred seed weight, germination, seedling vigour and protein content remained unaffected by different spacing in both seasons (Figure 2; Table 5). The result of present study is in accordance with Srivastava et al. (1992) in radish, Sarvaiya et al. (1993) in pigeonpea, Ujinaiah et al. (1995) in sunflower BSHI hybrid and in cowpea Ananthi (2001). However, the quality of seeds harvested in September sown crop was superior to July sown crop. Therefore, for hybrid seed production of COPH 2 pigeonpea September sowing was found ideal.

#### References

- Abdul-Baki, A. A. and Anderson, J.D. (1973). Vigour determination in soybean seed by multiple criteria. Crop Sci. 13: 630-633.
- Ahlawat, I.P.S., Saraf, C.S. and Singh, A. (1985). Production potential of summer and rainy season pigeonpea intercropped with cowpea and greengram. Ind. J. Agrl. Sci. 55: 565-569.
- Ananthi, R. (2001). Seed technological studies in cowpea (Vigna unguiculata L.wallp) ev. CO 5. M.Sc.(Ag.) Thesis, TNAU, Coimbatore.
- Deshmukh, G.N. and Bhoi, P.G. (2000). Effect of plant densities and fertilizer levels on growth and yield of groundnut. J. Maharashtra Agric. Univ. 24: 298-299.
- Kacha, R.P., Madhuwadia, M.M., Patel, J.C., Tawk, D.A. and Kaneria, B.B. (1990). Response to row spacing and level of N, P fertility in soybean. *Ind. J. Agron.* 35: 317-319.
- Kauthale, V.K., Patil, R.B. and Suryavanshi, Y.B. (1995). Effect of planting ratio and spacing on growth and yield of pigeonpea hybrid ICPH 8. Seed Res. 23: 36-37.

- Panse, V.G. and Sukhatme, P.V. (1978). Statistical methods for Agricultural Workers, ICAR Pub. New Delhi.
- Sarvaiya, B.G., Patel, M.P. and Patel, H.S. (1993).
  Response of pigeonpea (Cajanus cajan L.
  Millsp) to row spacing, nitrogen and
  phosphorus. Ind. J. Agron. 38: 134-135.
- Srivastava, B.K., Singh, M.P., and Jain, S.K. (1992)

  Effect of spacing and nitrogen levels or growth, yield and quality of seed crop of radish cv. Pusa Chetki. Seed Res. 20: 85-87.
- Trivedi, K.K. and Vyas, M.D. (2000). Response of Kabuli chickpea under different dates of sowing and row spacings. Crop Res. 20: 52-55.
- Ujinaiah, V.S., Shambulingappa, K.G. and Seenappa, K. (1995). Effect of different levels of nitroger and spacing on production and quality o BSHI hybrid sunflower. Mysore J Agric Sci. 29: 9-13.

(Received: February 2003; Revised: September 2003)