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EFFECT OF PLANTING DATE ON THE MORPHOLOGY OF PIGEONPEA (*Cajanus cajan* L.)

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ABSTRACT

An experiment was conducted with six pigeonpea cultivars in three different sowing dates viz., in February, June and September to study the altered morphology. It was found that the first sowing (Feb) recorded higher plant height, more number of branches, leaves than the other two sowings. The total dry matter accumulation was also found to be high in the first sowing. Sowing differences were clearly exhibited in all the morphological traits.

KEY WORDS : Pigeonpea, Morphology, Planting date.

Crop growth is a complex phenomenon comprised of various morphological and physiological attributes. Morphology is the final visible expression of any crop under given environments. Since pigeonpea is a quantitative short day plant, its growth and morphology is varied under different environments (Saxena *et al.*, 1980). Experiment conducted in Trinidad revealed that sowing at May and June recorded 1.5 m height whereas December sowing recorded 1 m height. (Riollano *et al.*, 1962).

Studies conducted in North India also revealed that May sowing recorded 220 cm height as against 140 cm in June sowings (Laxman Singh and Panday, 1974). However, such studies under Tamil Nadu condition are lacking. So, an attempt has been made in the present study to find out the morphology of pigenopea as altered by sowing dates.

MATERIALS AND METHODS

Six pigeonpea cultivars comprising of three short duration (CO 5, CORG 5, UPAS 120) and three long duration (CORG 11, PLS 361/1 and SA 1) were evaluated in three different sowing dates *viz.*, 21.2.84, 21.6.84 and 21.9.84 in a randomised block design replicated thrice. Uniform cultural operations were carried out in all the three sowings. Five plants from each replication were removed at 30,40,50 days after sowing, first flowering (first flower opening), 50% flowering and harvest stages for assessing the morphological attributes. The plant was removed from the soil with least root damage and dried at 80±1°C for 24 hours and expressed as $g.m^{-2}$. The meteorological observations were also recorded during the cropping periods.

RESULTS AND DISCUSSION

Data on meteorological observations revealed that there was wide difference among the sowing dates. The first sowing (21.2.84) was associated with higher day and night temperature than the others. The relative humidity was lower whereas the evaporation was higher in the first sowing. In the second and third sowing, the tempera-

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Table 1. Shoot height (cm)

Treatments (Date of sowing)	Cultivars	Stages (Days after sowing) 30	40	50	First Flowering	50% flowering	Harvest
21.2.84	CO5	22.7	44.8	81.9	111.1	121.0	125.5
	CORG5	23.4	51.7	83.9	122.5	138.3	140.6
	UPAS120	27.4	47.3	84.6	95.6	97.1	99.3
	CORG11	24.8	50.9	86.1	279.4	298.6	305.4
	PLS361/1	28.2	53.4	92.2	297.9	303.1	306.6
	SA1	25.9	52.8	92.9	317.3	321.2	323.5
21.6.84	CO5	21.1	38.6	57.5	84.5	94.5	94.8
	CORG5	21.8	38.1	65.0	91.3	103.3	110.2
	UPAS120	24.9	40.5	61.2	80.2	85.6	95.6
	CORG11	27.6	48.1	70.5	191.3	230.8	240.6
	PLS361/1	28.0	44.8	71.5	197.7	232.8	238.4
	SA1	26.8	43.7	65.7	220.5	228.5	230.1
21.9.84	CO5	23.7	32.3	48.8	73.3	81.5	86.4
	CORG5	23.9	31.9	48.0	68.5	86.6	90.5
	UPAS120	24.5	31.5	52.3	60.8	71.9	73.6
	CORG11	23.9	36.9	60.0	120.6	138.8	141.9
	PLS361/1	25.0	38.3	60.2	124.0	136.8	141.6
	SA1	26.4	37.3	55.4	127.8	151.0	155.3

	SE	CD
Cultivar	0.865	2.422**
Sowing	0.612	1.713**
Cultivar x sowing	1.498	4.193**

Table 2. Number of branches

Treatments (Date of sowing)	Cultivars	Stages (Days after sowing) 30	40	50	First flowering	50% flowering	Harvest
21.2.84	CO5	–	4.5	8.8	9.1	9.5	9.6
	CORG5	–	4.4	7.9	8.7	9.1	10.4
	UPAS120	–	4.2	6.9	7.9	8.5	8.9
	CORG11	–	4.9	8.8	16.8	19.7	20.9
	PLS361/1	–	6.2	9.3	19.9	21.2	21.2
	SA1	–	5.8	10.0	21.1	25.1	25.3
21.6.84	CO5	–	3.1	6.2	8.5	8.5	8.5
	CORG5	–	3.5	5.7	7.2	8.0	8.3
	UPAS120	–	2.6	5.8	6.0	6.3	6.3
	CORG11	–	4.0	5.2	9.8	10.2	11.0
	PLS361/1	–	3.9	6.8	11.0	13.0	13.6
	SA1	–	4.0	6.0	12.0	13.4	13.7
21.9.84	CO5	–	2.8	3.5	3.6	4.8	5.3
	CORG5	–	2.7	3.0	3.5	5.2	5.2
	UPAS120	–	1.7	2.8	3.0	3.8	4.1
	CORG11	–	2.8	3.3	7.3	8.0	9.1
	PLS361/1	–	3.0	4.6	7.4	8.0	9.2
	SA1	–	2.6	3.6	7.0	9.0	9.6

	SE	CD
Cultivar	0.160	0.499**
Sowing	0.113	0.318**
Cultivar x Sowing	0.277	0.799**

tures decreased progressively and also associated with high humidity and low evaporation. The crop duration was also found to decrease progressively from first to third sowing. Experiment conducted in ICRISAT also revealed that the longer crop duration was associated with higher temperature, low relative humidity and high evaporation (*Anon.*, 1982).

Plant height increased as the age of the crop advanced (Table 1). The peak rate of growth was found to be between 50th day and first flowering. The highest plant height was recorded in the first sowing followed by second and third sowings. The higher plant height in this sowing was due to the higher temperature prevailed during the sowings. This was in agreement with the findings of Riollano *et al.*, (1962) who also reported that May-June sowing recorded higher plant height than the December sowings.

As it is a deep rooted crop, a maximum of 126.7 cm was recorded in PLS 361/1 in the first sowing. Rivera and Irizary (1983) recorded root length even upto 180 cm in certain cases. The decrease in root length in third sowing could be attributed to the poor assimilate supply to the root growth due to the poor canopy growth. Duration differences were clearly exhibited in the root length.

The highest number of branches was produced between 50th day and 50% flowering. The first sowing recorded significantly highest number of branches than the other sowings. The more number of branches in this sowing was due to the higher plant height and favourable agro climatic situtaions for bud initiations. The long duration cultivars exceeded the short duration at all the stages (Table 2)

The leaf production was very low in the seedling stages and reached its peak in the flowering phase and declined thereafter. Normally, higher temperature is required for the initiation of leaf primordia (*Anon.*, 1982). In the present study also, the favourable high temperature in the first sowing might be responsible for the more number of leaves in the first sowing than the others. Narayanan *et al.* (1981) also were of the similar opinion that summer sown crop produced more leaf number than the winter sown crops (Table 3).

Dry matter production as a measure of overall representation of morphological structures of a crop, increased as the age of the crop advanced (Table 4). The growth in the vegetative phase was very low as compared to the reproductive phase. The growth of plant height, number of branches and leaves were also found to be very slow in the initial vegetative phase. With regard to sowings, the first sowing recorded enormous amount of dry matter because of its vigorous vegetative growth and higher canopy growth. A well established difference could be noticed between short and long duration cultivars.

Dry matter yield as high as 23 t/ha had also been reported from Australia for a long duration cultivar cv. UQ 1 (Akinola and Whiteman, 1974). The enormously high dry matter production in the first sowing was also due to its longer cropping period. The significantly reduced dry matter in the third sowing (21.6.84) was due to its poor crop growth coupled with shorter cropping period. Chauhan *et al.*, (1982) also reported that April-May sowing recorded higher dry matter than the November-December sowings. The dry weight of the latter was only one tenth of the former.

Table 3. No. of leaves per plant

Treatment (Date of sowing)	Cultivars	Stages (Days after sowing) 30	40	50	First flowering	50% flowering	Harvest
21.2.84	CO5	7:0	18.6	102.9	259.3	298.4	230.1
	CORG5	6.8	20.7	101.5	250.5	300.5	229.0
	UPAS120	6.9	15.6	83.1	122.8	126.0	72.9
	CORG11	7.7	17.4	105.0	2285.3	2460.8	1860.9
	PLS361/1	8.0	27.7	113.4	2158.3	2432.5	1790.0
	SA1	7.8	22.5	106.9	3027.5	3119.8	2054.5
21.6.84	CO5	7.0	14.6	32.0	93.4	124.4	98.5
	CORG5	7.3	13.8	32.8	98.8	135.0	100.8
	UPAS120	7.1	11.3	21.6	51.0	57.0	42.1
	CORG11	7.8	15.6	36.5	556.0	636.9	371.7
	PLS361/1	8.0	16.3	38.5	517.0	567.7	410.4
	SA1	8.4	16.3	36.0	558.8	604.3	448.7
21.9.84	CO5	6.5	10.0	22.8	49.2	92:8	57.1
	CORG5	6.7	9.7	20.7	40.3	62.7	46.9
	UPAS120	6.2	8.8	19.6	39.0	51.8	38.3
	CORG11	6.6	13.0	26.3	260.3	364.7	297.3
	PLS361/1	7.6	12.8	30.4	264.5	380.0	330.1
	SA1	7.4	11.9	27.2	247.6	392.6	227.7

	SE	CD
Cultivar	1.618	4.259**
Sowing	1.144	3.203**
Cultivar x Sowing	2.803	7.845**

Table 4. Dry matter productions ($g.m^{-2}$)

Date of sowing	Cultivars	Stages (Days after sowing) 30	40	50	First flowering	50% flowering	Harvest
21.2.84	CO5	3.87	19.64	131.89	473.49	736.55	982.57
	CORG5	4.13	21.04	129.68	486.09	821.77	1110.02
	UPAS120	3.77	14.52	102.26	334.93	493.51	655.04
	CORG11	2.71	13.78	79.53	10497.54	11717.19	11859.95
	PLS361/1	3.54	16.40	98.31	11463.27	12512.53	12590.58
	SA1	3.40	14.61	103.74	11801.17	12882.53	12918.59
21.6.84	CO5	3.13	13.56	40.90	161.54	260.09	543.74
	CORG5	2.79	14.00	48.39	187.47	329.00	636.52
	UPAS120	4.22	10.97	36.16	105.22	171.17	423.85
	CORG11	3.06	11.12	33.15	1018.13	1135.71	1402.96
	PLS361/1	2.97	11.31	34.14	967.25	1407.90	1679.60
	SA1	3.65	10.47	31.37	968.73	1318.98	1680.59
21.9.84	CO5	2.68	7.93	21.79	57.13	120.04	340.86
	CORG5	2.57	7.63	13.71	49.72	139.31	376.43
	UPAS120	2.33	6.82	21.19	34.53	95.59	267.50
	CORG11	2.09	6.32	20.69	283.06	433.73	704.49
	PLS361/1	2.28	7.31	23.56	283.06	428.79	573.73
	SA1	2.50	6.82	20.65	249.42	552.29	825.74

	SE	CD
Cultivar	25.97	58.66**
Sowing	18.37	41.46**
Cultivar x Sowing	44.98	101.62**

From this study, it could be summarised that the the crop morphology is altered by the variations in the weather parmeters. The crop sown in summer season accumulated higher dry matter than the other seasons. Favourable weather prevailing during the summer season accelerated the growth plant height, number of branches and leaves which leads to bushy growth and higher dry matter production. The crop duration was reduced in winter sowings because of its quantitatively short day nature.

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SEED-PLANT TRANSMISSION AND CONTROL OF ALTERNARIA SPP. IN LAHI (*BRASSICA NAPUS* L.) IN KUMAUN HILLS, INDIA

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ABSTRACT

Alternaria alternata, *A. brassicae*, *A. brassicicola*, *A.radicina*, *A. raphani* and *A. tanuissima* were detected from storage and field seeds of *Brassica napus* grown under different agroclimatic conditions of Kumaun Himalaya. Of them, *A. alternata*, *A. brassicae* and *A. raphani* were fequently isolated from seeds, seedlings, leaves and pods and found to be responsible for seed and seedling infection. These species also caused necrosis of leaves and pods in later stages. The pathogenicity tests under glass house conditions proved the serious pathogenic behaviour of these species. Thiram, Captafol, Dithane M-45 and Vitavax were found most satisfactory chemicals to control the infection of *Alternaria* spp. in seeds and other organs of *Brassica napus*.

KEY WORDS: *Brassica napus*, Alternaria, Seed transmission, Chemical control.