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Floral behaviour and yield under different sowing schedules and varieties of pigeonpea (*Cajanus cajan*) for late onset of monsoon and *rabi* pigeonpea in Tamil Nadu

K KalaichelviDOI: <https://doi.org/10.22271/chemi.2021.v9.i1p.11371>**Abstract**

Redgram variety namely CO6 sown during Aug I has recorded significantly higher grain yield (596 kg/ha) followed by Sep I (401 kg/ha). CO (Rg) 7 has recorded higher grain yield during Sep II (261 kg/ha) and Sep I (248 kg/ha) over August sowing. CO (Rg) 8 has recorded higher grain yield during Sep I sowing (225 kg/ha) however recorded very lesser yield over CO6. On overall analyzing the floral behavior of all the varieties it was observed that all the three varieties can be sown up to Sep II. Flowering was observed up to OCT I sowing, No flowering was observed in OCT II until Feb'18 (150 DAS). During OCT I, flowering was observed in CO 6 and CO (Rg) 7 whereas CO (Rg) 8 floral behavior was disturbed and remain stunted. Hence pigeonpea could not be taken during *rabi* (Oct II) in Tamil Nadu for not flowering and also lesser yield especially in CO (Rg) 8.

Keywords: Floral, sowing schedules, monsoon, DAS, CO**Introduction**

Pigeonpea is an indeterminate pulse crop mainly grown as rainfed and one of the major pulse crops of India. Assessment of sowing window for redgram is important for better flowering and yield even if it has plasticity for climatic aberrations like extremes of drought and flood. Pigeonpea is short day plant and rainfall for Tamil Nadu is only on August; hence programmed to study floral behaviour with different sowing dates (Aug I, Aug II, SepI, SepII, OctI and OctII). Sowing was programmed from August with fortnight intervals to study the yield and floral behaviour and in addition to possibility of *rabi* sowing i.e., during October in three ruling varieties of Tamil Nadu CO 6, CO(Rg)7 and CO (Rg)8.

Materials and Methods

Field experiment was conducted during 2017-2018 at Agricultural College and Research Institute, Pulse block, Coimbatore. Redgram varieties namely CO 6, CO(Rg)7 and CO (Rg)8 was raised under different sowing schedules Aug I, Aug II, Sep I, SepII, Oct I and Oct II to assess the floral behaviour and yield. The study also focusses on floral behaviour of redgram varieties and also yield in *rabi* pigeonpea (October sown). Rainfall received from the respective sowing dates and harvesting dates also worked out.

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Results and Discussion

Table 1: Performance assessment of redgram varieties under different sowing schedules

Treatments	Plant height (cm)	No. of branches/plant	No of pods/plant	Yield (kg/ha)
Co 6 Aug I	165.7	12	104	596
Co 6 Aug II	142.5	7	73	83
Co 6 Sep I	147.3	9	57	401
Co 6 Sep II	138.6	8	59	196
Co 6 OCT I	82.9	5	15	70
Co 6 OCT II	41.0	5	58	41
Co (Rg)7 Aug I	161.4	10	52	17
Co (Rg)7 Aug II	117.9	8	46	156
Co (Rg)7 Sep I	141.5	6	53	248
Co (Rg)7 Sep II	125.8	6	44	261
Co (Rg)7 OCT I	169.7	8	36	88
Co (Rg)7 OCT II	0.0	0	0	0
Co (Rg)8 Aug I	163.1	12	77	88
Co (Rg)8 Aug II	135.9	8	54	75
Co (Rg)8 Sep I	113.7	10	110	225
Co (Rg)8 Sep II	127.4	7	48	87
Co (Rg)8 OCT I	102.6	6	61	89
Co (Rg)8 OCT II	15.9	2	16	36
SEd	19.4	2.2	2.2	75.8
CD(p=0.05)	39.5	4.5	4.5	154.2

Grain yield of all the varieties were lesser (0-596 kg/ha). Redgram variety namely CO6 sown during Aug I has recorded significantly higher grain yield (596 kg/ha) followed by Sep I (401 kg/ha). CO (Rg)7 has recorded higher grain yield during Sep II (261 kg/ha) and Sep I (248 kg/ha) over August sowing. CO (Rg) 8 has recorded higher grain yield during Sep I sowing (225 kg/ha) however recorded very lesser yield over CO6. The expression of all the varieties was lesser. In Punjab, May 15 sown crop produced significantly higher grain yield (10.3 and 35.0% in 2005 and 15.6 and 18.9% in 2006, respectively) than June 1 and June 15 sown crop, respectively (Ram *et al.*, 2011) [1]. The results revealed that the better grain yields were recorded when the crop sown from 1st September to 1st October. A significant reduction in yield was observed when the crop sown beyond 15th October (Venkata Rao, 2016) [3].

Number of pods/per plant were also lesser in all the varieties. Pods/plant was significantly higher with CO 6 Aug I followed by Aug II. Pod number was in the range of 36-52 in CO (RG)7, this variety has recorded higher grain yield due to higher plant population. CO (Rg)8 has recorded more number of pods during Aug I and Sep I sowing.

Sowing during Aug I has recorded higher plant height in all the varieties CO 6 (165.7 cm), CO (Rg) 7 (161.4 cm) and CO (Rg)8 (135.9 cm). CO 6 and CO (Rg) 8 has recorded taller plants over CO (Rg) 7. Later sowing dates especially OCT I and OCT II has recorded lesser plant height, pod number and grain yield. This might be due to difference in rainfall and as well as due to photoperiodism (Redgram is short day plant).

Table 2: Rainfall received during different sowing dates

Time of sowing	Rainfall (mm)	Rainy days
10.8.2017 (Aug I)	474.7	10
22.8.2017 (Aug II)	459.6	8
7.9.2017 (Sep I)	427.4	6
18.9.2017 (Sep II)	305.3	3
10.10.2017 (Oct I)	235.9	2
13.10.2017 (Oct II)	152.4	2

The two varieties (LRG 52 and LRG 104) were sown from 2nd FN of June to 1st FN of October, total sowings adopted were eight at fortnightly intervals. The crop sown on 2 nd Fortnight (FN) of June received maximum rainfall and maximum temperature followed by sowings during 1 st and 2nd FN of July and the lowest with 1st FN of October. Based on the study sowing of pignonpea during June and July is ideal for obtaining higher yields due to favourable weather received for those days in coastal Andhra Pradesh. (Ratnam *et al.*, 2015) [2].

Table 3: Total protein content (%) in different varieties during Aug I sowing schedule

CO 6	17.22
CO (Rg)7	18.38
CO (Rg)8	23.79

Protein content of CO (Rg) 8 was very high (23.79 g) than CO 6 and CO (Rg) 7.

Table 4: Floral behavior of different varieties in different dates of sowing Dt. 10.01.2018

Varieties	Aug I			Aug II			Sep I			Sep II			OCT I			OCT II		
	RI	RII	RIII	RI	RII	RIII	RI	RII	RIII	RI	RII	RIII	RI	RII	RIII	RI	RII	RIII
CO 6	PM	PD	PD	F	PD	PD	F-PD	F	F	F	F	F	F	F	F	F	X	X
CO (RG) 7	PDM	PD	PD	PD	PD	PD	PM	F	PD	FB	F	F	FB	F	F	F	X	X
CO 8	PD	PM	PD	PD	PD	F	F	FB	F	F	F	FB	F	X	X	X	X	X

Aug I and Aug II sowing was in pod development stage whereas, Sep I and II in flowering phase. In OCT – I

flowering was initiated in CO 6 and CO (Rg)7 whereas, no flowering in CO (Rg)8.

Table 5: Floral behavior of different varieties in different dates of sowing Dt. 19.1.2018

Varieties	Date of sowing																	
	Aug I			Aug II			Sep I			Sep II			OCT I			OCT II		
	RI	RII	RIII	RI	RII	RIII	RI	RII	RIII	RI	RII	RIII	RI	RII	RIII	RI	RII	RIII
CO 6	PM	PD	PM	PD	PM	PM	PD	PD	F	PF	PF	F	F	F	F	FB	X	X
CO (RG) 7	PM	PF	PM	PM	PM	PD	PM	PD	PD	FB	PD	F	F	F-P	F	FB	X	X
CO 8	PD	PM	PD	PD	PF	F-PF	PF	PF	F	PF	PF	PF	FB	X	F	FB	X	X

PM - Pod Maturation, PD - Pod development, PF – pod formation F- Flowering, FB - Floral Bud, X - No Flowering

At weekly interval floral bud initiation is occurring during OCT I in Co (Rg)8

Table 6: Stage of redgram varieties in different sowing dates

Treatments	3.1.2018	Treatments	3.1.2018	Treatments	3.1.2018
CO 6 Aug I	Pod development stage	CO (RG)7 Aug I	Floral bud	CO(Rg)8 Aug I	Pod development stage
CO6 Aug I	Pod formation to pod development stage	CO (RG) 7 Aug I	Determinacy	CO (RG) 8 Aug I	Pod development
CO 6 Aug I	Good pod development	CO(RG)7 Aug I	Vegetative	CO (RG)8 Aug I	Pod development
Co6 Aug II	Good flowers – pod formation stage	CO (RG) 7 Aug II	Pod development	CO (RG)8 Aug II	Pod development
CO 6 Aug II	Pod formation to stage to filling stage	CO (RG) 7 Aug II	Pod filling	CO (RG)8 Aug II	Pod development
CO 6 Aug II	Pod filling drying of pods also observed - determinacy	CO (RG) 7 Aug II	Good filling pod development determinacy is there	CO (RG)8 Aug II	Floral initiates
CO 6 Sep I	Flowering	CO (Rg) 7 Sep I	Pod filling stage	CO (Rg)8 Sep I	Floral bud initiates
CO 6 Sep I	Very good flowering	Co (Rg)7 Sep I	Pod filling stage	CO (RG)8 Sep I	Flowering
CO 6 Sep I	Floral bud	CO (RG)7 Sep I	Flowered to pod development	CO (RG) 8 SEP I	No population
CO6 Sep II	Floral bud initiated	Co (Rg)7 Sep II	Floral – pod formation	CO (RG) 8 Sep II	Floral bud initiates
CO 6 Sep II	Flower bud	CO (RG)7 Sep II	Flowering to pod formation - poor performance	CO (RG)8 Sep II	Floral bud green – yellow
CO 6 Sep II	Veg – flowered	CO (RG)7 Sep II	Floral bud initiates	CO(RG)8 Sep II	Flowered initiates
CO 6 Oct I	Floral bud initiates	CO (RG) 7 Oct I	Short – floral bud to pod formation stage	Co (RG) 8 Oct I	Floral bud initiated
CO6 Oct I	Floral bud initiates	CO (RG)7 Oct I	Floral bud initiates	Co(Rg) 8 Oct I	Vegetative stage
CO 6 Oct I	Good pod development	CO (Rg)7 Oct I	FLOWERING	CO (RG) 8 Oct I	Vegetative stage
CO 6 Oct II	Vegetative	CO (RG)7 Oct II	Vegetative	Co (RG)8 Oct II	Vegetative stage
CO 6 Oct II	Vegetative	CO (Rg)7 Oct II	Vegetative	CO (RG)8 Oct II	Vegetative stage
CO 6 Oct II	Vegetative	CO (RG)7 Oct II	Floral bud	CO (RG)8 Oct II	Vegetative stage

On overall analyzing the floral behavior of all the varieties it was observed that all the three varieties can be sown up to Sep II. Flowering was observed up to OCT I sowing, No flowering was observed in OCT II until Feb'18 (150 DAS).

During OCT I, flowering was observed in CO 6 and CO (RG)7 whereas CO (Rg)8 floral behavior was disturbed and remain stunted.

Table 7: Difference in harvesting date in different sowing dates and varieties

Time of sowing	Harvesting date		
	CO 6	CO(Rg)7	CO (Rg)8
10.8.2017 (Aug I)	16.2.2018 (182 days)	16.2.2018 (182 days)	25.2.2018 (191 days)
22.8.2017(Aug II)	23.2.2018 (180 days)	23.2.2018 (180 days)	23.2.2018 (180 days)
7.9.2017 (Sep I)	23.3.2018 (196 days)	23.3.2018 (196 days)	23.3.2018 (196 days)
18.9.2017 (Sep II)	23.3.2018 (185 days)	23.3.2018 (185 days)	23.3.2018 (185 days)
10.10.2017 (Oct I)	23.3.2018 (163 days)	23.3.2018 (163 days)	23.3.2018 (163 days)
13.10.2017(Oct II)	23.3.2018 (160 days)	23.3.2018 (160 days)	23.3.2018 (160 days)

Co (Rg) 7 which is a medium duration and reported with severe sterility symptoms and also matured same as that of Co6 and Co (Rg)8.

Table 8: Sequence of insect and diseases in tested varieties of redgram

	CO 6	CO(Rg)7	CO 8
1.	Wilt & root rot	Wilt & root rot	Wilt & root rot
2.	Leaf folder damage	Leaf folder damage	-
3.	Jassids & white flies	Jassids & white flies	Jassids & white flies (infestation is higher on visual observation)
4.	-	-	Cow bug
5.	Lepidopteron (borer complexes) <i>Helicoverpa</i> sp. Blue butterfly	Lepidopteron (borer complexes) <i>Helicoverpa</i> sp. Blue butterfly	Lepidopteron (borer complexes) <i>Helicoverpa</i> sp. Blue butterfly Plume moth <i>Maruca vitrata</i>
6.	Pod bug	Pod bug	Pod bug
7.	-	-	Pod fly
8.	-	-	Minor insect pests
9.	-	-	Scales (2 plants) Mealy bugs (3 plants)
10.	SMD	Sterility is more with flower clustering modified in to leafy appendages (without flowering) - SMD	Horse gram mosaic virus infection Sterility Mosaic disease (SMD) (2 no)

* - Bolded insects and diseases are major infestation.

Interestingly cowbug infestation is found only in CO (Rg)8. Comparatively insect and disease infection is severe in CO (Rg)8. Water logging for a week during Aug I sowing at

seedling stage and then recovered. Wilt and root rot infection was observed at seedling stage in all the three tested varieties.

Conclusion

Redgram variety namely CO6 sown during Aug I has recorded significantly higher grain yield (596 kg/ha) followed by Sep I (401 kg/ha). CO (Rg)7 has recorded higher grain yield during Sep II (261 kg/ha) and Sep I (248 kg/ha) over August sowing. CO (Rg) 8 has recorded higher grain yield during Sep I sowing (225 kg/ha) however recorded very lesser yield over CO6. On overall analyzing the floral behavior of all the varieties it was observed that all the three varieties can be sown up to Sep II. Flowering was observed up to OCT I sowing, No flowering was observed in OCT II until Feb'18 (150 DAS). During OCT I, flowering was observed in CO 6 and CO (RG)7 whereas CO (Rg)8 floral behavior was disturbed and remain stunted.

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