www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(11): 123-126

www.thepharmajournal.com
Received: 02-09-2023
Accepted: 07-10-2023

Gaikwad SV
M.Sc. Scholar, Department of Agricultural Meteorology, College of Agriculture, VNMKV, Parbhani, Maharashtra, India

Mahude SV
M.Sc. Scholar, Department of Agricultural Meteorology, College of Agriculture, VNMKV, Parbhani, Maharashtra, India

Jadhav SS
Ph.D. Scholar, Department of Agronomy, Post Graduate Institute, MPKV, Rahuri, Maharashtra, India

Awasarmal VB
Associate Professor, Department of Agronomy, College of Agriculture, VNMKV, Parbhani, Maharashtra, India

Corresponding Author:
Gaikwad SV
M.Sc. Scholar, Department of Agricultural Meteorology, College of Agriculture, VNMKV, Parbhani, Maharashtra, India

Response of pigeon pea (*Cajanus cajan* (L.) Millsp.) varieties to different sowing windows

Gaikwad SV, Mahude SV, Jadhav SS and Awasarmal VB

Abstract
A experimental research trial "Response of pigeon pea (*Cajanus cajan* (L.) Millsp.) varieties to different sowing windows" was conducted at Farm of AICRP on Agrometeorology, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani during *kharif* season 2021. The research field was laid out in split-plot design with three replications and four sowing windows and three varieties. The best sowing window of pigeon pea was observed during 25th SMW (18th to 24th June). Among the three varieties, BSMR-736 performed better throughout the crop growth phases and recorded higher yield. The meteorological variables rainfall, rainy days, minimum temperature, RH-I, RH-II and wind speed only exhibited significant positive link with seed yield during branching to 50% flowering (P_4) stage of variety BDN-711 and BSMR-736. The meteorological variables maximum temperature, minimum temperature and RH-I exhibited significant correlation with seed yield during branching to 50% flowering (P_4) stage of variety BDN-716.

Keywords: Pigeon pea, *Cajanus cajan* (L.) Millsp., meteorological

Introduction
Pigeonpea [*Cajanus cajan* (L.) Millsp.] is the second most important pulse crop of India after chickpea. Pigeonpea have been cultivated for human and livestock consumption in many parts of the world as one of the most important leguminous and subsistence crop. Climate and weather are significant factors affecting agriculture production around the world. Both seasonal and regional variability in weather directly influence crop yield potential. Pigeon pea phenology is strongly affected by temperature (Hodges 1991; Ritchie and Ne Smith 1991) [2, 7] and photoperiod (Omanga *et al.* 1996) [4] emphasized that the effect of temperature on the rates of pigeon pea development can be similar in magnitude to those of photoperiod. The optimum range of temperature for proper growth and development of pigeon pea is 18–38 °C. Whereas in the controlled environment showed that warm (>28 °C) and cool (<20 °C) temperature delay flower initiation and that the optimal temperature for flowering for early maturing type is close to 24 °C (Turnbull *et al*. 1981) [10]. Variability in weather causes substantial fluctuations in pigeon pea productivity. Therefore, weather-yield relationship may help to determine the best time to apply specific agronomic practices in order to maximize yield. Production potential for a given crop is often strongly related to crop phenology which is largely sensitive to temperature variations (Patel *et al.* 2000) [5]. Same as that of weather parameters, weather indices also has an significant effect on phenophase stages of pigeon pea crop which affects the yield of that crop. The indices which study the extent and comparative utilization of the natural resources (weather parameters like sunshine hrs., rainfall and heat measured as temperature) and which helps in studying the comparative efficacy of applied agronomic practices in utilizing these natural resources are called as "Weather Indices".

Materials and Methods
A field experiment was conducted during the *kharif* season of 2020-21 on the Experimental Farm, Department of Agricultural Meteorology, College of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani (M.S.). The research field was laid out in split-plot design with three replications and four sowing windows *viz*. dates of sowing D_1 (25th MW), D_2 (26th MW), D_3 (27th MW), D_4 (28th MW) and varieties V_1 (BDN-711), V_2 (BSMR-736) and V_3 (BDN-716) sown with the spacing of 90 x 20 cm^2 using 12 treatments and 36 plots to study the crop weather relationship. Five randomly selected plants of pigeon pea from each net plot and those selected plants were numbered for recording biometric observations at various stages of crop growth.

Number of days required from emergence to 50 percent flowering recorded when three of the plants from five randomly selected plants attended flowering phase, is called as 50% flowering stage. Number of days required form emergence to 50 percent pod formation of plant in a plot were recorded when three of the plants from five randomly selected plants attended that phase, is called as 50% pod formation stage. Numbers of days required from emergence to physiological maturity of grain were recorded when three of the plants from five randomly selected plants attended that phase, is called as physiological maturity. Criteria for physiological maturity are leaves starts becoming yellow, colour of pod changes from green to pale yellow, grain moisture level decrease and easy breaking of peduncle.

Results and Discussion

Dry matter response to sowing windows and varieties

Data on the average total dry matter plant^{-1} (g) that accumulates over time among the various plant sections as a result of various treatments are shown in Table 1. exhibited in Fig. 1.

The sowing windowD$_4$ (28th SMW) provided the lowest dry matter plant^{-1}. Crop sown at 25th SMW date of sowing recorded highest dry matter plant^{-1} which was significantly superior over D$_3$ and D$_4$ date of sowings window. This could be as a result of moisture stress and moisture variation, temperature variation that predominated during various treatments at various phenophases. In a similar vein, Singh *et al*. (2016) [9] and Nagamani *et al.* (2015) [3] both indicated that variations in growth attributes and yield attributes were seen over time as a result of various weather conditions. Variety BSMR-736 found superior against the varieties BDN-711 and BDN-716 and produced significantly higher dry matter production. It was found that the sowing date and variety had no statistically significant interactions regarding dry matter accumulation plant^{-1}.

Table 1: Phenological response of 50% flowering, 50% pod formation and days to maturity to sowing windows and varieties

Treatment	Dry matter plant^{-1} (g)	50% Flowering	50% Pod formation	Days to maturity
Date of Sowing				
D1 (25th SMW)	195.31	129.22	137.22	177.89
D2 (26th SMW)	185.10	128.11	135.78	176.89
D3 (27th SMW)	168.07	127.74	135.11	172.11
D4 (28th SMW)	167.02	122.71	129.44	158.11
S.E. ±	3.16	0.42	0.46	0.46
C. D. at 5%	11.15	1.46	1.6	1.6
Variety				
V1 (BDN-711)	184.01	125.67	132.67	160.25
V2 (BSMR-736)	185.36	127.58	135.33	176.92
V3 (BDN-716)	167.26	127.58	135.17	176.58
S.E. ±	2.49	0.2	0.2	0.2
C. D. at 5%	7.53	0.59	0.61	0.61
Interaction (D x V)				
S.E. ±	5.15	0.52	0.56	0.56
C. D. at 5%	NS	NS	NS	NS
G. mean	178.88	126.94	134.39	171.25

Phenology of pigeon pea varieties of different sowing windows

The influence of various sowing windows and various varieties on the number of days needed for maturity, days needed for 50% flowering and days needed for 50% pod formation are reported in Table 1. Sowing window D$_1$ (25th SMW) had the significantly highest average number of days needed to reach 50% flowering (129.22 days), which was found at par with D$_2$ than other date of sowings, while the fourth date of sowing D$_4$ (28th SMW) had the lowest average number of days needed. Similar trend was found in days needed to 50% pod formation and maturity. This is due to the fact that delayed sowings generally experience greater temperatures, soil moisture stress, and longer hours of bright sunshine than original sowings. This was consistent with the findings of Gwata and Siambi (2009) [1] and Nagamani *et al.* (2015) [3]. The variety BDN-711 flowered earlier (125.67 days) as compared to variety BSMR-736 (127.58 days) and BDN-716 (127.58 days). It may be because of the varietal characteristics of BDN-711, which exhibited early maturity, and BSMR-736 and BDN-716, which showed mid-late maturity and required lower and lower days, respectively, that the duration of different phenophases with respect to varieties exhibits considerable variance. Similar trend was observed in days needed to 50% pod formation and maturity.

Mean Seed Index response to sowing windows and varieties

Table 2. provides information on mean seed index (i.e., 100 seed weight) recorded during harvest. The D$_1$ (25th SMW) sowing window showed considerably higher mean seed index (11.59 g) over other date of sowings and was found at par with D$_2$ (26th SMW) date of sowing with seed index 10.96 g. The influence of different sowing window on seed index (g) was determined to be significant However, the D$_4$ (28th SMW) sowing had the lowest mean seed index (9.86 g). This might be brought on by moisture stress and change in moisture across various treatments. Ram *et al.* (2011) [6] found similar findings. The variety BSMR-736 was found to have a mean seed index that was higher (10.78 g), than other kinds and found at par with BDN-711 with seed index 10.70 g. whereas BDN- 716 had the lowest mean seed index (9.73 g). Dates of sowing and cultivars were shown to have no significant interaction effect with respect to seed index.

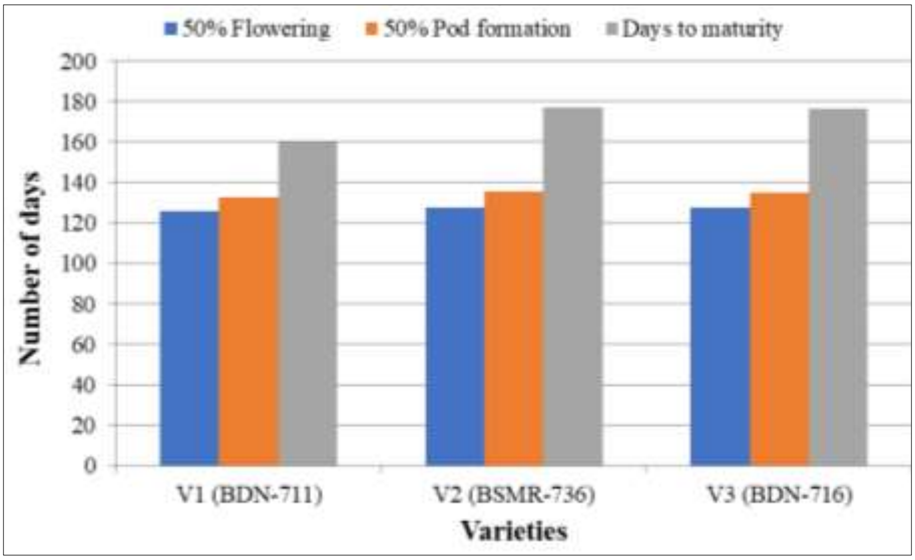

Fig. 1: Mean Number of days required for 50% flowering, 50% pod formation and days to maturity of Pigeon pea

Table 2: Mean Seed Index (g) and Seed yield (Kg ha^{-1}) of pigeon pea varieties as influenced by sowing windows

Treatments	Seed Index (g)	Seed yield kg ha^{-1}
Date of Sowing		
D1-25th SMW	11.59	950.89
D2-26th SMW	10.96	870.11
D3-27th SMW	9.57	733.89
D4-28th SMW	9.50	732.89
S.E. m±	0.18	24.13
C.D. at 5%	0.65	85.12
Variety		
V1 (BDN-711)	10.70	849.58
V2 (BSMR-736)	10.78	882.25
V3 (BDN-716)	9.73	734.00
S.E. m±	0.15	39.55
C.D. at 5%	0.44	119.6
Interaction (D x V)		
S.E. m±	0.30	68.95
C.D. at 5%	NS	212.74
G. mean	10.41	821.94

Seed yield response to sowing windows and varieties

Table 2. Provide information on the mean seed yield of pigeon pea as affected by various sowing dates and varieties. Higher seed yield was produced by D_1 (25th SMW) sowing window and found significantly superior over D_3 and D_4 date of sowings but at par with D_2. Similar results obtained by Nagamani *et al*. (2015) [3]. Variety BSMR-736 had significantly highest (882.25 kg ha^{-1}) seed yield and found at par with BDN-711 (849.58 kg ha^{-1}) and variety BDN-716 had the lowest (734 kg ha^{-1}).

The interaction between D_1 and V_2 exhibited maximum seed yield (1146.33 Kg ha^{-1}) and found at par with treatment combination of D_2 with varieties combination V_1 while it was significantly superior over rest of the treatment combination.

Conclusion

The best sowing window of pigeon pea was observed during 25th SMW (18th to 24th June). Among the three varieties, BSMR-736 performed better throughout the crop growth phases and recorded higher yield.

The meteorological variables rainfall, rainy days, minimum temperature, RH-I, RH-II and wind speed only exhibited significant positive link with seed yield during branching to 50% flowering (P_4) stage of variety BDN-711 and BSMR-736.

The meteorological variables maximum temperature, minimum temperature and RH-I exhibited significant correlation with seed yield during branching to 50% flowering (P_4) stage of variety BDN-716.

References

1. Gwata ET, Siambi M. Genetic enhancement of pigeonpea for high latitude areas in Southern Africa. African Journal of Biotechnology, 2009, 8(18).
2. Hodges T. Temperature and water stress effects on phenology. In: Hodges T, editor. Predicting crop phenology. Boca Raton (FL): CRC Press; c1991. p. 7-14. http://farmer.gov.in/imagedefault/pestanddiseasescrops/pulses.pdf http://nsdl.niscair.res.in/jspui/bitstream/123456789/528/1/Pulses%20%20Formatted.pdf
3. Nagamani C, Sumathi V, Reddy GP. Performance of *rabi* Pigeonpea Under Varied Times of Sowing, Nutrient Dose and Foliar Sprays. Progressive Agriculture. 2015;15(2):253-258.
4. Omanga PA, Summerfield RJ, Qi A. Flowering in Pigeon pea (*Cajanus cajan* in Kenya: Responses of medium- and late-maturing genotypes to location and date of sowing. Exp Agric. 1996;32:111-128.
5. Patel NR, Shekh AM, Bapujirao B, Chaudhari GB, Khushu MK. An assessment of phenology, thermal time and phasic development model of pigeon pea (*Cajanus cajan* (L.) Millisp.). Journal of Agrometeorology. 1999;1(2):149-154.
6. Ram H, Singh G, Sekhon HS, Khanna V. Effect of sowing time on the performance of pigeonpea genotypes. Journal of Food Legumes. 2011;24(3):207-210.
7. Ritchie JT, NeSmith DS. Temperature and crop development. In: Hanks J, Ritchie JT, editors. Modeling plant and soil systems. Agronomy Monograph no. 31. Madison, WI: ASACSSASSSA; c1991. p. 5-29.
8. Silim SN, Coe R, Omanga PA, Gwata ET. The response of pigeonpea genotypes of different duration types to variation in temperature and photoperiod under field conditions in Kenya. Journal of Food, Agriculture and

Environment. 2006;4(1):209-214.
9. Singh G, Kaur H, Aggarwal N, Ram H, Gill KK, Khanna V. Symbiotic characters, thermal requirement, growth, yield and economics of pigeon pea (*Cajanus cajan* L.) genotypes sown at different dates under Punjab conditions. Journal of Applied and Natural Science. 2016;8(1):381-385.
10. Turnbull JV, Whiteman DC, Byth DE. The influence of temperature and photoperiod on floral development of early pigeon pea. Proceedings of the International Workshop on pigeonpea. 1981;2:15-19. December 1980. Patencheru, India, ICRISAT; p. 217-222.