International Journal of Food Science and Nutrition
ISSN: 2455-4898
Impact Factor: RJIF 5.14
www.foodsciencejournal.com
Volume 3; Issue 6; November 2018; Page No. 235-237

Climate resilient intervention in pigeonpea under drought condition for food security

Raju G Teggelli[1], Shankrayya[2], DV Srinivas Reddy[3], Zahir Ahmed[4]
[1] Senior Scientist & Head, Krishi Vigyan Kendra, Kalaburagi, Karnataka, India
[2] Senior Research Fellow, NICRA Project, Krishi Vigyan Kendra, Kalaburagi, Karnataka, India
[3] Principal Scientist (Agronomy), ICAR-ATARI, Banglore, Karnataka, India
[4] Scientist (Plant Pathology), Krishi Vigyan Kendra, Kalaburagi, Karnataka, India

Abstract
Field experiments were conducted in NICRA village (Melakunda B) of Krishi Vigyan Kendra (KVK), Kalaburagi to study the influence of seed priming with CaCl2 (2%) in pigeonpea growth, yield and quality parameters during 2018-19 under rainfed condition. The result reveals that, seed priming with CaCl2 (2%) recorded higher Plant height (185.7 cm), Number of branches (17.3), Total number of pods (293 pods/plant), Number of seed/pod (4.2), 100 seed weight (10.7), Seed yield (13.6 q/ha) and higher seed quality parameters like seed germination (92 %), root length (11.3 cm), and field emergence (87 %) compared to control under drought condition.

Keywords: pigeonpea, drought tolerance, CaCl2, seed yield, seed priming

Introduction
India is the major pulse growing country, accounting for about one third of the total world area under pulses and one-fourth of the world production of pulses. Certain unique features of pulses *viz.,* their ability to fix atmospheric nitrogen in symbiotic association with rhizobium, deep penetrating root system enabling them to draw moisture from deeper moist soil layers and high seed protein content ranging from 20 to 30 % makes them indispensable. Pulses offer most convenient and practical means of eradicating protein hunger especially among children and nursing mothers.

Pigeon pea is a versatile deep rooted legume crop, well known for its drought tolerance under Kharif rainfed upland ecosystem (Emefiene *et al.,* 2013) [1] and very often affected with vagaries of monsoon. Crop experiences prolonged dry spells during the critical growth stages especially during flowering to pod development stage (terminal drought), heavily reduce the yield of the crop. Therefore there is a need to identify suitable ameliorative measures to overcome the moisture stress effect. The pre-sowing seed treatment with CaCl2is one of the simple technique being employed to modify the marpho-physio-biochemical nature of seed, so as to induce the characters that are favorable for drought resistance. Keeping these views the investigation was under taken to study the influence of drought tolerance by seed priming with CaCl2 (2%) on growth, yield and quality parameters in pigeonpea.

Materials and Methods
An field demonstration were conducted to study the influence of climate resilient intervention in pigeonpea by seed priming with CaCl2 (2%) during 2018-19 under rainfed condition in NICRA village (Melakunda B) of Krishi Vigyan Kendra (KVK), Kalaburagi. The NICRA village receive annual rainfall of 750 mm.

The experiments consist of two treatments i.e contol and seed priming with CaCl2. A day before sowing, the pigeonpea seeds were soaked in solution of CaCl2 (2%) for one hours and later seeds were dried under shade to its original moisture. The seeds were sown in field by following all the normal pigeonpea packages of practices includes agronomic practices and plant protection measures for the crop.

To know the effect of seed soaking on germination and early seedling vigour, 100 seeds were sown in each plot. The germination count was taken from these plots. From this the percentage germination was worked out. The seedlings were thinned out at 8 days. The observations on percent germination, root length, 100 seed weight and field emergence were recorded at the beginning of crop growth. The observations on plant height (cm), number of branches, total number of pods per plant, Number of seed per pod, 100 Seed weight (g), and seed yield recorded after harvest of crop.

Results and Discussion
Rainfall: Twenty eight days dry spell observed prior to sowing and after sowing i.e between 09/06/2018 to 06/07/2018**.** The data shows that after sowing up to Twenty eight days there was no rainfall received and hence's there was moisture stress at germination and seedling growth in the pigeonpea field.

In the present study, seed priming with CaCl2 (2%) under drought condition recorded significantly higher Plant height (185.7 cm), Number of branches (17.3), Total number of pods (293 pods/plant), Number of seed/pod (4.2), 100 seed weight (10.7), Seed yield (13.6 q/ha) and higher seed quality

parameters like seed germination (92 %), root length (11.3 cm), and field emergence (87 %) compared to control under drought condition.

The improvement in germination by seed priming with CaCl2 (2%) under drought condition lead to physicochemical changes within the cytoplasm leading to improvement in seed germination, seed viability, vigour, root length, shoot length and also yield parameters in chickpea crops has been recorded (Solaimalai and Subbaramu, 2004) [6] and reviewed by many workers (Rathinavel & Dharnalingraju, 2000; Kulkarni and Chittapur, 2003) [5, 3]. Many studies on the improvement of growth and yield due to pre sowing seed treatment with CaCl2 are documented (Solaimalai and Subbarmanu, 2004; Meek and Oosterhugs, 2005) [6, 4]. Soaking the seeds for 24 hours in CCC under saline condition resulted an increase in seed cotton yield (Gabr and Ashkar, 1977) [2].

The improvement in yield and yield parameters in pulse crops has been attributed to the beneficial effects of seed priming with CaCl2 due to increased bound water content, triggering of biosynthesis of nucleic acids and rapid germination and growth of seedlings resulting in increased uptake of nutrients and the ability of the treated seeds to with stand high temperature for prolonged periods under dry condition (Swaminathan and Sujatha, 2001) [7].

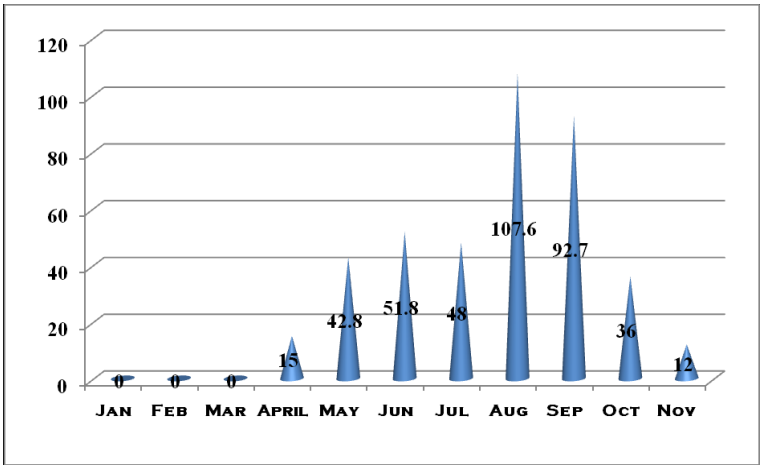

Table 1: Influence of rainfall on seed primming with CaCl2 in pigeonpea growth, yield and quality parameters in NICRA village KVK, Kalaburagi.

Table 2: Period of dry spell after seed primming with CaCl2 in pigeonpea growth, yield and quality parameters in NICRA village KVK, Kalaburagi.

Rainfall 2017-18		March	April	May	June	July	August	September	October
No. of dry spells during 2017-18	>10 days	-	-	-	-	-	-	-	
	>15 days	2	-	1	-	-	-	-	-
	>20 days	-	-	-	1	-	-	-	1(dry spell) i. e (28 days) after pigeonpea sowing
No. of Rainy Days			3	4	2	7	9	4	6
No. Intensive Rain-Spells (2017	>60 mm per day	-	-	-	-	-	1	-	-

Table 3: Effect of seed priming with CaCl2 and yield trait in Pigeonpea under drought condition

Dry spell period	Particulars	Seed treatment with $CaCl_2$ demonstration plot	Control
Dry spell from 09/06/2018 to 06/07/2018 (28 days)	Seed germination (%)	92	80
	Root length (cm)	11.3	9.7
	Plant height (cm)	185.7	173.4
	Number of branches	17.3	13.8
	Total number of pods/plant	293	221
	Number of seed/pod	4.2	3.4
	100 Seed weight (g)	10.7	9.3
	Field emergence (%)	87	79
	Seed yield (q/ha)	13.6	11.7

Conclusion

Based on the present experiment conducted, it could be concluded that the seed priming with CaCl2 -2% improved yield and seed quality parameters in pigeonpea over control. This simple technique may be employed by the growers to realize the potential yield and seed quality parameters.

Acknowledgements

We acknowledge the financial support obtained from ICAR-CRIDA, Hyderabad to run NICRA project at KVK, Kalaburagi. We also would like to acknowledge Director, ICAR-ATARI Banglore, for his guidance and support for implementation of the project.

References

1. Emefiene ME, Slaudeen AB, Yaroson AY. The use of pigeon pea (Cajanus cajon) for drought mitigation in Nigeria. International Letters of Natural Scieces. 2013; 1:6-16.
2. Gabr AI, Ashkar SA. The effect of different combinations of soil salinity and CCC on dry matter accumulation and yield of cotton plants *Biologia Plantarum.* 1977; 19:391-393.
3. Kulkarni SS, Chittapur BM. Seed treatment technology in crop production-A review. Agric. Rev. 2003; 24(4):308-312.
4. Meek CR, Oosterhugs DM. Proceedings of the 2000 Cotton Research Meeting, AAES Special report, 2000.
5. Rathinavel K, Dharmalingam C. Upgradation of seed quality by hardening cum halogenations treatment in uppam Cotton, Seed Research. 2000; 28(1):5-9.
6. Solaimalai A, Subburamu K. Seed hardening field crops-A Review., Agric Rev. 2004; 25(2):129-140.
7. Swaminathan C, Sujatha K. Presowing seed hardening in two forage grasses. Seed Research. 2001; 29(2):229-230.