Indian Journal of Agricultural Sciences **91** (2): 315–7, February 2021/Short Communication
https://doi.org/ 10.56093/ijas.v91i2.111646

Short Communications

Yield and economics of pigeonpea as influenced by foliar application of pulse magic

J R PATIL[1], RAJU G TEGGELLI[2] and VIJAYSINGH THAKUR[3]*

College of Agriculture, Dharwad, Karrataka 580 005, India

Received: 22 June 2020; Accepted: 20 October 2020

Keywords: Front Line Demonstrations, Flower drop, Pigeonpea, Pulse Magic, Seed yield

Pulses are sometimes regarded as "poor man's meat" due to their low cost and the presence of high amount of proteins and they also contain enzyme inhibitors, lectins, phytosterols, phytic and tannic acid and oligosaccharides which possess health-benefiting activities in humans (Singh *et al.* 2017). Among various pulses, pigeonpea is one of the most important crop grown in wide range of soils, from sandy to heavy soils and it is able to tolerate drought conditions during dry seasons but cannot tolerate even light frost during any stage of its growth. It appears to be better adapted to marginal climatic conditions than any other pulse crops (Choudhury *et al.* 2008) and it also improves soil health through addition of leaf fall and its deep strong root system breaks the plough pans and improves the soil structure. Hence, pigeonpea is often called as a "biological plough".

In India, pigeonpea occupies an area of about 3.96 mha producing 2.56 mt with an average productivity of 646 kg/ha (Anon. 2016). India has a virtual monopoly in pigeonpea production by contributing 90% of world's total production. In India, it is mainly grown in Maharashtra, Uttar Pradesh, Madhya Pradesh, Karnataka, Gujarat, Telangana and Tamil Nadu and these all states constitute 90% of the area and production of pigeonpea. Further, pigeonpea is one of the most important pulse crops of Karnataka and the major pigeonpea growing districts are Kalaburagi, Vijayapura, Bagalakot, Belagavi, Bidar, Raichur, Dharwad and the district Kalaburagi specifically called as Tur bowl of Karnataka as it contributes 40% of Karnataka's Tur production (Anon. 2017).

Yield of pigeonpea is declining and it is due to several reasons and one of the important and major reason is premature dropping of flowers (http://farmer.gov.in). Pigeonpea produces large number of flowers, of which as much as 90% are shed (Wasike *et al.* 2005 and Choudhury *et al.* 2008). So, it is very necessary to compensate the high degree of flower dropping in pigeonpea and increase the yield. The flower drop is mainly due to excessive vegetative growth, indeterminate growth habit which leads to poor source-sink relationship and this in turn will lead to poor pod set resulting from high flower and pod drops. Among several strategies to boost the productivity of pigeonpea, application of nutrients and plant growth regulators (PGR) may serve as one of the important strategy. Among the methods of nutrient application, foliar application is credited with the advantage of quick and efficient utilization of nutrients by eliminating the losses through leaching and fixation and regulating the uptake of nutrients by plants (Manonmani and Srimathi 2009, Rahman *et al.* 2014). Application of nutrients through foliar spray at appropriate stages of growth becomes important for their utilization and better performance of the crop (Anandhakrishnaveni *et al.* 2004). Keeping this in view, front line demonstrations of pigeonpea under National Food Security Mission (NFSM) to reduce flower and fruit drop with the use of pulse magic spray was conducted to demonstrate the productivity potential and economic benefit under farmer's conditions.

Participatory Rural Appraisal (PRA) method and group discussions with identified progressive farmers were held by the team of scientists to identify the various problems faced by farmers in getting potential yield of pigeonpea. The problem noticed are about use of local varieties, nutrient supply, flower drop and pod setting at the field level apart from pest and diseases. Front line demonstration on usage of pulse magic were conducted at 100 farmer's fields of Alanda taluka in Kalaburagi district (Karnataka) during *kharif* 2017–18 under National Food Security Mission (NFSM) and majority of farmers were growing TS3-R variety. There were two treatments, viz. recommended practices with pulse magic spray and another with check also called as farmers practice (No use of pulse magic, i.e. only recommended practices). The pulse magic contains 10% of nitrogen, 40% of phosphorus, 3% of micro nutrients and 20 ppm PGR. 10 g of nutrient mixture and 0.5 ml of plant growth regulator (PGR) mixed in one liter water sprayed two times, first spray was carried out during 50% flowering

Present address: [1]Zonal Agricultural Research Station, Kalaburagi, Karnataka; [2]Krishi Vigyan Kendra, Kalaburagi, Karnataka; [3]College of Agriculture, Dharwad, Karnataka.
*Corresponding author e-mail: vijay7607@gmail.com.

Table 1 Effect of foliar application of Pulse Magic on yield attributes and yield of pigeonpea

Year	No of demonstrations	Area (ha.)	No of pods/ plant		No of seeds/ pod		1000 seed weight (g)		Seed yield (q/ha)		% increase yield over check
			T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2	
2017–18	100	0.4	274	198	4.5	3.8	11.2	10.4	15.5	12.9	20

Table 2 Effect of foliar application of Pulse Magic on economics of pigeonpea

Year	No of demonstrations	Area (ha.)	Cost of cultivation (₹/ha)		Gross return (₹/ha)		Net return (₹/ha)		B:C Ratio	
			T_1	T_2	T_1	T_2	T_1	T_2	T_1	T_2
2017–18	100	0.4	24600	21500	85250	70950	60650	49450	3.46	3.3

T1, All practices as per package of practice with pulse magic application; T2, Only package of practice and no pulse magic spray (Also called as farmers practice and check)

stage and second spray at 15 days after first spray. Pulse magic was developed in the year 2014 from University of Agricultural Sciences, Raichur, Karnataka, to reduce flower and pod drop in pulses. Each demonstration was conducted in an area of 0.4 ha adjacent to the plots of check. Data on yield, yield attributes and economics were collected and average data were tabulated.

Higher number of pods/plant (274) and seeds/pod (4.5) were obtained in pulse magic sprayed plot compared to unsprayed plots (198 and 3.8, respectively) (Table 1) and it is due to foliar application of nutrients and PGR at reproductive stage and pod filling stage helped in better translocation of photosynthates to developing pods. Due to better translocation of photosynthates to developing pods, there was better filling of seeds and due to better filling there was increment in test weight (11.2 g) in pulse magic sprayed plots compared to control (10.4 g). Further, due to increment in yield attributing characters, ultimately there was increment in seed yield to the extent of 20% compared to unsprayed plots (Table 1). Similarly, foliage applied macro and micronutrients at critical stages of the crop were effectively absorbed and translocated to the developing pods, producing more number of pods and better filling in soybean was reported by Jayabel *et al.* (1999) in soybean. The results of present demonstration were similar with the findings of Thakur *et al.* (2017) in blackgram due to foliar application of pulse magic. Further, results were in agreement with the findings of Marimuthu and Surendran (2015) in blackgram due to application of 100 % recommended dose of nitrogen, phosphorous and potassium + foliar application of diammonium phosphate @ 2% + TNAU pulse wonder at 5.0 kg kg/ha at 45 days after sowing resulted in higher number of pods per plant and grain yield.

One of the main reason for increasing seed yield to the extent of 20% compared to unsprayed plots was reduction of flower and pod drop, as it is well known that in pigeonpea around 90% flowers are shed (Wasike *et al.* 2005 and Choudhury *et al.* 2008) leading to poor yield and controlling that can help in achieving potential yield. Similar results of reduction in flower drop and enhancement of seed yield due to foliar application of pulse magic has been reported by Teggelli *et al.* (2016) in pigeonpea. Due to higher seed yield in pulse magic sprayed plot, ultimately there was higher gross returns (₹ 85250/ha) and net returns (₹ 60650/ha) compared to control (₹ 70950/ha and ₹ 49450/ ha, respectively) (Table 2).

SUMMARY

The low yield of pigeonpea is due to flower drop and this is a major cause which contributes for much reduced potential yield of pigeonpea. If this major problem is reduced, then there will be attainment of maximum potential yield of the crop. This major problem can be minimized by foliar application of Pulse Magic (nutrients and plant growth regulators) during 50% flowering stage and 15 days after first spray. In addition to reduction in flower drop the increment in seed yield to the extent of 20% can be obtained due to foliar application of pulse magic as compared to control. Due to greater seed yield higher income could be generated-which is pre-requisite for sustainability.

REFERENCES

Anandhakrishnaveni S, Palchamy A and Mahendran S. 2004**.** Effect of foliar spray of nutrient on growth and yield of greengram (*Phaseolus radiatus*). *Legume Research* **27**(2): 149–50.

Anonymous. 2016. *Annu. Coordinator's Rep*. All India Coordinated Res. Project on Pigeonpea, p 23.

Anonymous. 2017. District Profile-Kalaburagi: investkarnataka. co.in

Choudhury P R, Singh I P, George B, Verma A K and Singh N P. 2008. Assesment of genetic diversity of pigeonpea cultivars using RAPD analysis. *Biologia Plantarum* **52**: 648–53.

http://farmer.gov.in/imagedefault/pestanddiseasescrops/pulses.pdf

Jayabel A, Revathy M and Saxena M G. 1999. Effect of foliar nutrition on nutrient uptake pattern in soybean. *Andhra Agricultural Journal* **46**: 243–44.

Manonmani V and Srimathi P. 2009**.** Influence of mother crop nutrition on seed and quality of blackgram. *Madras AgriulturalJournal* **96**(16): 125–28.

Marimuthu S and Surendran U. 2015**.** Effect of nutrients and plant growth regulator on growth and yield of black gram in sandy

loam soils of Cauvery new delta zone, India. *Cogent Food and Agriculture* **1**: 1010415.

Rahman I U R, Afzal A, Iqbal Z and Manan S. 2014. Foliar Application of plant mineral nutrients on wheat: A Review. *Research and Reviews: Journal of Agriculture and Allied Sciences* **3**: 19–22.

Singh B, Singh J P, Shevkani K, Singh N, Kaur A J. 2017. Bioactive constituents in pulses and their health benefits: Review. *Food Science and Technology* **54**(4): 858–70.

Teggelli R G, Salagunda S and Ahamed B Z. 2016**.** Influence of pulse magic application on yield and economics of transplanted pigeonpea. *International Journal of Science and Nature* **7**(3): 598–600.

Thakur V, Patil R P, Patil J R, Suma T C and Umesh M R. 2017. Physiological approaches for yield improvement of blackgram under rainfed condition. *International Journal Current Microbiology and Applied Sciences* **6**(11): 4114–22.

Wasike S, Okori P and Rubaihayo P R. 2005. Genetic variability and relatedness of the Asian and African pigeonpea as revealed by AFLP. *African Journal of Biotechnology* **4**: 1228–33.