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

J R Patil1, Raju G Teggelli2 and Vijaysingh Thakur3*

College of Agriculture, Dharwad, Karnataka 580 005, India

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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
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, foliaged 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 pigeonpea due to 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 yield attributing characters, 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.

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