Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(2): 753-755
Received: 11-01-2018
Accepted: 12-02-2018

B Pavan Naik Chaurasia
M.Sc, Department of Genetics and Plant Breeding, SHUATS, Allahabad, Uttar Pradesh, India

Bineeta M Bara
M.Sc, Department of Genetics and Plant Breeding, SHUATS, Allahabad, Uttar Pradesh, India

Correspondence
B Pavan Naik Chaurasia
M.Sc, Department of Genetics and Plant Breeding, SHUATS, Allahabad, Uttar Pradesh, India

Influence of priming on seed yield parameters of chickpea (*Cicer arietinum* L.)

B Pavan Naik Chaurasia and Bineeta M Bara

Abstract
Efficiency of biopriming agents i.e. biocontrol agents (*Trichoderma harzianum* @ 0.6%, *Pseudomonas fluorescens* @ 0.6%), and fungicides (Carbendazium @ 0.2%, Mancozeb 50% + Carbendazim 25% WS @ 0.2%) in enhancing field emergence, seedling growth and yield were investigated in chickpea of GNG-1581variety. Five treatments gave the significant results. T1 (*Trichoderma harzianum*) showed significant performance for field emergence (85.83), plant height (77.8), number of plants per plot (24.5), number of primary branches (3.25), number of pods per plant (45), seed weight per plant (17.61) and seed yield per plot (135.89) in organic priming followed by T4 (Carbendazim) in inorganic priming compared to untreated control. The present investigation was taken up to study the effects of chickpea with following objectives to evaluate the effect of different organic and inorganic priming treatment on seed germination behaviour and seed yield in chickpea and to identify suitable organic and inorganic priming treatment for chickpea.

Keywords: priming, biopriming, fungicides, *Trichoderma harzianum*, biocontrol agents

Introduction
Chickpea (*Cicer arietinum* (L.)) 2n=16, belongs to family leguminaceae. It is also known as Bengal gram. Gram is the most important rabi pulse crop grown in India. Rank first in area as well as in production of gram (FAO, 2012). It is a cool season legume crop and is grown in several countries worldwide as a food source. Seed is the main edible part of the plant and is a rich source of protein (23.3-28.9%), carbohydrates (61.5%), fats (4.5%) and minerals (phosphorus, calcium, magnesium, iron, zinc).
Seed priming with biocontrol agents or fungicides protect the seed from infection by seed borne and soil borne pathogens, enables the seed to germinate and establish as a healthy seedling (Chang and Kommedahl, 1968; Henis and Chet, 1975; Windels, 1981). Seed priming is a routine practice to increase emergence and establish better crop stand (Nene and Thapliyal, 1979; Ramos and Ribeiro, 1993). Biopriming of seeds with bacterial antagonists increase the population load of antagonist to a tune of 10 fold on the seeds thus protected rhizosphere from the ingress of plant pathogens (Callan *et al.*, 1990) [5].
Seed priming has been found a usable technology to increase rapid and uniform emergence, high vigour, and higher yields in all the vegetable and flower species (Dearman *et al.* 1987, Parera and Cantliffe 1994, Bruggink *et al.* 1999) and some field crops (Hartz and Caprile 1995, Chiu *et al.* 2002, Giri and Schillinger 2003, Murungu *et al.* 2004, Basra *et al.* 2005, 2006, Kaur *et al.* 2005, Farooq *et al.* 2006, 2007).

Materials and Methods
The experiment was conducted in *Rabi* season 2016 at the Field Experimentation Center of the Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology & Sciences (Formerly Allahabad Agricultural Institute), Allahabad.

Treatments
T0: control
T1: *Trichoderma harzianum* @ 0.6%
T2: *Pseudomonas fluorescens* @ 0.6%
T3: Carbendazim 25% WS @ 0.2% + Mancozeb 50%
T4: Carbendazim @0.2%
GNG-1581 with four treatments of chickpea were primed for 8 hours in water. Then all seeds were treated with rhizobium culture @10g/kg seeds using any natural agent that are sticky in nature. After that seeds were primed with bioagents or fungicides and shade dried overnight by spreading on ground at room temperature.

Methodology

1. Field emergence

Emerged seedling counting and evaluation are carried out when the seedlings showed well characterized apparent plumule over the soil surface.

2. Days to 50 per cent flowering

Number of days will be recorded from the date of sowing to the date of 50% flowering of the plants in a plot.

3. Plant height(cm)

Plant height will be measured in cm from the base of the plant to the tip of the time of physiological maturity and their mean is worked out.

4. Number of plants per plot

Number of emerged seedling in each treatment are counted and evaluated manually.

5. Number of primary branches per plant

The total number of branches originating from the main stem of five plants will be counted.

6. Number of pods/plant

The number of pods harvested from randomly selected five plants in each plot and tagged plants in each treatment was counted and average was worked out and expressed as number of pods per plant.

7. Seed weight per plant (g)

The five plants were uprooted at harvest physiological maturity and processed for seed yield, from which the average yield was calculated and expressed as seed weight per plant.

8. Seed yield/plot (kgha-1)

The matured pods harvested from each plot in each treatment were sun dried and the seeds were separated. The weight of the seeds from each plot was recorded and the seed yield obtained from five randomly selected and tagged plants were added to the seed yield of the each plot for calculation of seed yield per plot. Then, the seed yield (kg ha-1) was calculated.

Statical analysis

Data were statistically analysed using the software MSTAT-C. Analysis of variance was used to test the significance of variance sources, while RBD test (5% level of significance).

S. No	Treatments	Field emergence	Plant height (cm)	Number of plants	Days to 50% flowering	Primary branches	Number of pods per plants	Seed weight per plot	Seed yield
1	T1	85.83	77.80	24.50	90.75	3.25	45	17.61	135.89
2	T2	66.67	53.60	18.75	100.75	2.5	28.75	10.36	70.97
3	T3	74.16	68.15	21	98.50	2.75	33.25	11.95	91.4
4	T4	80	75.80	22.25	95.75	3	38.25	13.97	103.67
5	T5	60	40.60	11.75	101.25	1.75	21.5	6.79	43.23
Mean		73.33*	63.19*	19.65*	97.4*	2.65*	33.35*	12.17*	89.03*
Range	Max.	85.83	77.80	24.50	101.25	3.25	45	17.61	135.89
	Min.	60	40.60	11.75	90.75	1.75	21.5	6.79	43.23
CD 5%		12.27	10.88	3.84	1.95	1.37	5.7	3.83	27

Results and Discussion

1. Field emergence

The field emergence was ranged from 85.83 to 60 with grand mean value 73.33. The maximum field emergence was depicted by *Trichoderma harzianum* 85.83 followed by Carbendazim 80, whereas minimum field emergence was depicted by control 60.

Begum *et al*., (1998) observed *Trichoderma harzianum* has strong antagonistic effect which reduces not only the disease but also increases plant stand, the percentage of seedling emergence, plant height and fresh weight.

2. Number of plants per plot

The number of plants per plot was ranged from 24.50 to 11.75 with grand mean value 19.65. The maximum number of plants per plot was depicted by *Trichoderma harzianum* 24.50 followed by Carbendazim 22.25, whereas minimum number of plants per plot was depicted by control 11.75.

Pan *et al.*, (2011) explained that, biopriming with four strains of *Trichoderma viridae* and *Trichoderma harzianum* resulted in highest seedling vigour and seedling biomass.

3. Plant height (cm)

The plant height was ranged from 77.80 to 40.60 with grand mean value 63.19. The maximum plant height was depicted by *Trichoderma harzianum* 77.80 followed by Carbendazim 75.80, whereas minimum plant height was depicted by control 40.60.

Begum *et al*., (1998) observed *Trichoderma harzianum* has strong antagonistic effect which reduces not only the disease but also increases plant stand, the percentage of seedling emergence, plant height and fresh weight.

4. Days to 50% flowering

The days to 50% flowering was ranged from 101.25 to 90.75 with grand mean value 97.4. The maximum days to 50% flowering was depicted by control 101.25 followed by *Pseudomonas fluorescens* 100.75, whereas minimum Days to 50% flowering was depicted by *Trichoderma harzianum* 90.75.

5. Number of primary branches

The number of primary branches was ranged from 3.25 to 1.75 with grand mean value 2.65. The maximum number of primary branches was depicted by *Trichoderma harzianum* 3.25 followed by Carbendazim 3, whereas minimum number of primary branches was depicted by control 1.75.

According to Singh (2003) a improved method for seed biopriming with *Trichoderma harzianum*, which involves a pre-sowing hydration treatment to improve non-stress conditions. Also stated that root and shoot growth was improved hydro-priming.

6. Number of pods per plant

The number of pods per plant was ranged from 45 to 21.5 with grand mean value 33.35. The maximum number of pods per plant was depicted by *Trichoderma harzianum* 45 followed by Carbendazim 38.25, whereas minimum number of pods per plant was depicted by control 21.5.

Gupta, V. and Singh, M., (2012) [12] observed effect of seed priming and fungicide treatment on chickpea (*Cicer arietinum* L). The seed treatment consisted of seed priming (seed soaking in water for 8h). The observations are recorded about yield parameters. The results revealed that the growth parameters of chickpea were significantly affected by seed priming. Plant height of chickpea showed significantly highly correlation with nodule dry weight accumulation which, in turn, enhanced the seed and biological yield with the accuracy of 87%.

7. Seed weight per plant (gm)

The seed weight per plant was ranged from 17.61 to 6.79 with grand mean value 12.17. The maximum seed weight per plant was depicted by *Trichoderma harzianum* 17.61 followed by Carbendazim 13.97, whereas minimum seed weight per plant was depicted by control 6.79.

Nayaka *et al.,* (2010) explained that, biopriming with *Trichoderma harzianum* could also increase the seed germination, field emergence, vigour index, yield and thousand seed weight in comparison with the control.

8. Seed yield/plot

The seed yield per plot was ranged from 135.89 to 43.23 with grand mean value 89.03. The maximum seed yield per plot was depicted by *Trichoderma harzianum* 135.89 followed by Carbendazim 103.67, whereas minimum seed yield per plot was depicted by control 43.23.

Mohamedy *et al.* (2006) [9] observed that, biopriming with *Trichoderma harzianum* caused pods yield was increased highly when compared with fungicide treatment.

Summary and Conclusion

Seeds of chickpea were treated with various priming treatments recorded higher seed quality parameters compared to control for all the characters. The 4 treatments gave the significant results. It is concluded from the results of the experiment that among all the treatments, *Trichoderma harzianum* showed significant performance for field emergence, plant height, number of plants per plot, number of primary branches, number of pods per plant, seed weight per plant and seed yield per plot in organic priming followed by carbendazim in inorganic priming. Therefore, use of *Trichoderma harzianum* @ 0.6% and carbendazim @ 0.2% are recommended for treating chickpea for better quality, and quantity parameters. These findings are based on one year testing and further research is needed to substantiate the results.

Acknowledgement

I pay my sincere thanks to honarable Vice Chancellor S.B. Lal, Dean Dr. Gautam ghosh, Prof (Dr). Pramod W. Ramteke (Professor & Head), and advisor Dr. A.K. Chaurasia, all the teaching and non teaching staff of the Department and for their valuable help during my entire P. G. studies.

References

1. Moeinzadeh A, Sharif-Zadeh F, Ahmadzadeh M, Heidari Tajabadi F. Biopriming of sunflower (*Helianthus annuus* L.) seed with *Pseudomonas fluorescens* for improvement of seed invigoration and seedling growth. AJCS. 2010; 4(7):564-570.
2. Anitha UV. Mummigatti, Shamarao Jahagirdar. Seeds of JS 335 variety were primed with different fungicides and bio-agents and were subjected for seed germination and field performance in order to know the influence of fungicides and biocontrol agents on germination, seedling growth, disease incidence and yield parameters. J Agric. Sci. 2015; 28(1):20-23.
3. Basu RN, Dasgupta M. Control of seed deterioration in wheat (*Triticum aestivum* L.). Indian Agriculture. 1974; 18(3):285-288.
4. Basu RN, Pal P. Physico-chemical control of seed deterioration in rice. Indian Journal Agricultural Sciences. 1979; 49(1):1-6.
5. Callan NW, Mathre DE, Miller IB. Biopriming seed treatment for biological control of Pythium ultimum pre emergence-damping off in sh-2 sweet com. Plant Diseases. 1990; 74:366-376.
6. Callan NW, Mathre DE, Miller JB. Field performance of sweet com seed bioprimed and coated with *Pseudomonas fluorescence* ab254. Horticultural Science. 1991; 26:1163-1165.
7. Conrath U, Thulke O, Ketz V, Schwindling S, Kohler A. Priming as mechanism in induced systemic resistance of plants. European Journal of plant pathology. 2001; 107:113-119.
8. El-Mohamedy Abd MA. Soil Amendment and Seed Biopriming treatment as alternate fungicide for control damping of okra plants. International Journal of Agricultural Technology. 2004; 11(5):1240-1255.
9. El-Mohamedy Abd MA. Soil Amendment and Seed bio-priming treatments as alternative funicides for controlling Root Rot diseases on Cowpea Plants. International Journal of Agricultural Technology. 2006; 11(5):1219-1234.
10. Fisher PJ, Broad SA, Clegg CD, Lappin Scott HM. Retention and spread of a genetically engineered pseudomonad in seeds and plants of (*Zea mays* L.) A preliminary study, New Phytology. 1993; 124:101-106.
11. Gawade DB, Suryawanshi AP, Pawar AK, Apet KT, Devgire SS. Field evaluation of fungicides, botanicals and bioagents against anthracnose of soybean. Agric. Sci. Digest. 2009; 29(3):174-177.
12. Gupta Vikas, Singh Mahender, Kumar Anil, Kumar Jai, Singh BN, Jamwal BS. Screening of post-emergence herbicides in Chickpea (*Cicer arietinum*) under rainfed conditions of Jammu. Legume Research. 2012; 35(4):320-326.
13. Harris DA, Joshi PA, Khan P, Gothkar, Sodhi PS. On-farm seed priming in semi-arid agriculture development and evaluation in maize, rice and chickpea in India, using participatory methods. Experimental Agriculture. 1999; 35:15-29.
14. ISTA. International rules for seed testing. Seed Science and Technology. 1999; 27:27-31.