Seed Res. 47(2): 193-195, December, 2019

Short Communication

Priming for Enhanced Foxtail Millet (*Setaria italica*) Seed Production Income

ASHOK S SAJJAN AND LOKESH*

Department of Seed Science and Technology, College of Agriculture, Vijayapur
University of Agricultural Sciences, Dharwad, Karnataka-580005, India
*lokeshbijanalli143@gmail.com

(Received: September 2019; Revised: November 2019, Accepted: December 2019)

Foxtail millet (*Setaria italica* (L.) P. Beauv.) is one of the oldest crops cultivated for hay, pasture and food grain. Known for its drought tolerance, it was once an indispensable crop of vast rainfed areas in semiarid regions in India. At present the crop is cultivated on a limited area in sporadic patches in the states of Andhra Pradesh, Karnataka, Tamil Nadu, Maharashtra, Rajasthan, Madhya Pradesh, Uttar Pradesh and North Eastern states. Native home of foxtail millet is considered to be China. In Karnataka, foxtail millet is widely grown in Bellary, Koppal, Chitradurga and Belgaum districts. Lower yield in India is attributed mainly due to biotic stresses. Among them shoot fly (*Atherigona soccata* Rondani) is one of the most important and destructive pest causing damage at seedling stage. In India, about five per cent of the loss has been attributed to shoot fly. Currently used methods to manage this pest are early sowing, increased seed rate, thinning and destroying of seedlings with dead hearts and seed dressing with thiamethaxam, chlothidian and imidacloprid have been recommended before sowing of the crop [1]. Seed priming with $CaCl_2$, can improve vigour, growth, and development of cereals in stressful environments. Water stress is a growing problem around the globe and seed priming with $CaCl_2$ may help to mitigate the adverse effects of drought stress it leads to increase the yield [2]. Seed priming increases the seed germination at sub-optimum temperature and also helps soften the hard coat of seed. Degradation of seed can be regulated by priming in mid storage, as priming catalyses instances of antioxidant enzymes such as catalase, peroxidase, superoxide and reduces seed oxidation [3]. "On-farm seed priming involving soaking of seeds in water that can be enhance the crop establishment throughout life cycle [1]. The farmers can better utilize their marginal lands by cultivating foxtail millet and harvest higher seed yield with less cost of cultivation. Hence, an attempt has been made for economics of seed production in foxtail millet.

The field experiment was conducted during kharif 2018-19 at seed farm, College of Agriculture, Vijayapura to study the effect of seed priming and seed treatment on economics of seed production in foxtail millet. The experimental site comes under the Northern Dry Zone of Karnataka (Zone 3). The field experiment consisted of two factors. Seed priming (P_1), Control (P_2): Hydro priming for 8 hr (P_3), Seed priming with VIGRO-S (sea weed extract) (P_4), Seed priming with 2 per cent $CaCl_2$ (P_5), Seed priming with 20 per cent Pseudomonas. The seed treatment with Thiamethoxam 25 WG @ 2 g/kg (S_1),

Table 1. Prices of inputs and outputs used in calculating the economics of millet

Input Particulars	Price (Rs.)
Foxtail Millet seed	33/ kg
Chemicals and Microbes	
a. Thiamethaxam	434/ 50g
b. Imidacloprid	277/ 30g
c. Chlothidian	116/ 6g
d. Acetamiprid	130/ 50g
e. $CaCl_2$	8/ 20g
f. Vigro-s	7000/ t
g. *Psuedomonas florescence* 20 %	80/ l
Manures and fertilizers	
h. Urea	6.0 kg^{-1}
i. DAP	33.0 kg^{-1}
j. MOP	19.0 kg^{-1}
k. FYM	1000 t^{-1}
l. Vermicompost	7000 t^{-1}
Labour wages	
Men	264 day^{-1}
Women	205 day^{-1}
Output (Grain)	
Foxtail millet	18 kg^{-1}
Foxtail millet Straw	1500 t^{-1}

Table 2. Effect of seed priming and seed treatment with insecticides on seed yield in foxtail millet

Priming	Seed yield (q/ha)				
	Seed treatment				
	S_1	S_2	S_3	S_4	Mean
P_1	16.47	16.07	15.77	15.33	15.91
P_2	19.10	18.73	18.47	18.00	18.58
P_3	17.33	16.93	16.47	16.13	16.72
P_4	20.10	19.67	19.27	18.83	19.47
P_5	18.13	17.60	17.27	16.73	17.43
Mean	18.23	17.80	17.45	17.01	
For comparing the means of	SEm (±)		CD (p=0.05)	CV (%)	
P	0.34		0.96	11.50	
S	0.30		0.86		
P × S	0.67		NS		

Imidacloprid 70 WG @ 5 g/kg (S_2), Chlothidin 50 WG @ 2 g/kg (S_3), Acetamiprid 20 SP @ 2 g/kg (S_4) and laid out in Factorial Randomized Block Design with three replications. The seeds of cultivar DHFT-333 were drill sown with spacing of 60 x 30cm. The cost of cultivation worked out by using local market rates (Table 1). The data was subjected to statistical analysis as described for Factorial Randomized Block Design.

The seed yield was significantly influenced by seed priming and treatment (Table 2). Among the priming 2 per cent $CaCl_2$ produced higher seed yield 19.47 q/ha which works out 22.37 per cent over control. Significantly higher gross returns, net returns and B: C ratio was seen in the seed priming with 2 per cent $CaCl_2$ (Rs. 41,391, 28,819 and 3.29, respectively) followed by hydro priming for 8 hrs, as compared to control (Rs. 33,197, 20,633 and 2.64, respectively). Seed treatment of thiamethaxam 25 WG @ 2 g/kg of seeds significantly improved higher seed yield, gross return, net return and B:C ratio (18.23 q/ha, Rs. 38,899, Rs. 28,819 and 3.10 respectively) followed by imidacloprid. While the lower seed yield, gross return, net return and B:C ratio was seen in acetamiprid 20 SP (Rs 35,542, Rs 23,043 and 2.84).

Interaction effect did not varied significantly due to seed priming and seed treatment (Table 2 and 3). However, seed priming with 2 per cent $CaCl_2$ along with seed treatment of thiamethaxam 25 WG @ 2 g/kg of seeds recorded higher seed yield , gross return, net return and B:C ratio (20.10 q/ha, Rs 43,237, Rs 43,237 and 3.44, respectively) followed by P_4S_2. Whereas, lower gross return, net return and B:C ratio (15.33 q/ha, Rs. 31,550, Rs. 19,059 and 2.53, respectively) was recorded in no

Table 3. Effect of seed priming and seed treatment with insecticides on economics in foxtail millet

Priming	Gross return (Rs./ha)					Net return (Rs./ha)					B:C				
	Seed treatment					Seed treatment					Seed treatment				
	S_1	S_2	S_3	S_4	Mean	S_1	S_2	S_3	S_4	Mean	S_1	S_2	S_3	S_4	Mean
P_1	34790	33670	32780	31550	33197	22238	21113	20122	19059	20633	2.77	2.68	2.59	2.53	2.64
P_2	40880	39670	38880	37700	39282	28328	27113	26222	25209	26718	3.26	3.16	3.07	3.02	3.13
P_3	36900	35680	34678	33740	35249	24333	23108	22005	21234	22670	2.94	2.84	2.74	2.70	2.80
P_4	43237	42100	40580	39650	41391	30677	29535	27914	27151	28819	3.44	3.35	3.20	3.17	3.29
P_5	38690	37230	36470	35070	36865	26122	24657	23796	22563	24284	3.08	2.96	2.88	2.80	2.93
Mean	38899	37670	36677	35542		26339	25105	24011	23043		3.10	3.00	2.90	2.84	
For comparing the means of	SEm (±)	CD (p=0.05)	CV (%)			SEm (±)	CD (p=0.05)	CV (%)			SEm (±)	CD (p=0.05)	CV (%)		
P	641.62	1836.92	11.97			641.62	1836.92	12.02			0.05	0.15	10.9		
S	573.88	1642.99	573.88			1642.99	0.05	0.13							
P X S	1283.25	NS	1283.25			NS	0.10	NS							

Note:
NS – non significant

Priming
P_1 - Control
P_2 - Hydro priming for 8hr
P_3 - Seed priming with VIGRO-S (sea weed extract)
P_4 - Priming with 2 per cent $CaCl_2$
P_5 - Seed priming with 20 per cent *Pseudomonas*

Seed treatment
S_1 - Seed treatment with thiamethoxam 25 WG @ 2g/kg
S_2 - Seed treatment with Imidacloprid 70 WG @ 5g/kg
S_3 - Seed treatment with chlothidin 50 WG @ 2g/kg
S_4 - Seed treatment with Acetamiprid 20 SP @ 2g/kg

priming but seed treated with acetamiprid 20SP @ 2 g/kg of seeds. The increased seed yield mainly due to higher partitioning of the plant assimilates towards the sink [4, 5]. The seed treatment with insecticides were not toxic to the plants and increased all the yield attributing characters and high partitioning of the plant assimilates towards the sink [6, 7].

The Economic analysis in foxtail millet did not varied significantly due to seed priming and seed treatments. However, the higher seed yield, gross returns, net returns and B:C ratio were seen in the seed priming with 2 per cent $CaCl_2$ along with seed treatment of thiamethaxam 25 WG @ 2 g/kg of seed (Rs. 43,237, Rs. 30,677 and 3.44, respectively) followed by seed priming 2 per cent $CaCl_2$ along with seed treatment of imidacloprid 70 @ 5 g/kg of seed as compared to control (Rs. 31,550, Rs. 19,059 and 2.53, respectively).

Seed priming with 2 per cent $CaCl_2$, seed treatment of thiamethaxam 25 WG @ 2 g/kg of seeds recorded higher gross returns, net returns and B:C ratio, seed priming with 2 per cent $CaCl_2$ along with seed treatment of thiamethaxam 25 WG @ 2 g/kg of seeds recorded higher gross returns, net returns and B:C ratio.

REFERENCES

1. HARRIS D (2010). Increasing yields of rain fed crops in Africa using on-farm seed priming. *African Crop Science conference proceedings*, **6**: 26-30.
2. HARRIS DA, PA JOSHI, P KHAN, P GOTHKAR AND S SODHI (1999). On-farm seed priming in semi-arid agriculture: development and evaluation in maize, rice and chickpea in India using participatory methods. *Experimental Agriculture,* **35**: 15–29.
3. RAVINDER KUMAR AND US TIWANA (2018). Control efficacy of different seed dressing insecticides against sorghum shoot fly, *Atherigona soccata* (Rondani) in forage sorghum, *Sorghum bicolor* (L.). *Journal* of *Entomology and Zoology Studies*, **6**(2): 795-799.
4. RAHMAN IU, N ALI, A RAB AND Z SHAH (2013). Role of pre storage seed priming in controlling seed deterioration during storage. *Sarhad Journal* of *Agriculture,* **29**: 379-386.
5. KUNAL V JADHAV, NV KAYANDE AND MR WANDHARE (2012). Effect of seed priming on yield and yield components of soybean. *International Journal of Plant Sciences,* **6**(4): 587-595.
6. KUMAR LV AND A PRABHURAJ (2007). Bio-efficacy of chemicals for seed treatment against sorghum shoot fly, *Atherigona soccata* and shoot bug, *Peregrinus maidis*. *Annals of Plant Protection Sciences,* **15**(2): 312-315.
7. JOTWANI MG (1983). Losses due to shoot fly in high yielding sorghum cultivars. In: Crop Losses Due to Insect Pests, Eds. Krishnamurthi Rao B.H. and Murthi, K.S., Entomological Society of India, Rajendra nagar, Hyderabad, pp. 213-220.
8. PRAJAPATI KR, DB PATEL, K PATIL AND RS BHADANE (2017). Effect of seed hardening on morpho-physiological and yield parameters in black gram (*Vigna mungo* L.). *International Journal of Chemical Studies*, **5**(4): 439-441.