Indian Journal of Ecology (2016) 43 (Special Issue-1): 148-150

Manuscript Number: 2157
NAAS Rating: 4.47

Effect of Seed Rate, Seed Treatment and Foliar Nutrition on Yield Attributes and Yield of Rice Fallow Black Gram (*Phaseolus mungo* (L.) Hepper)

Stephen Rajasingh R., B. J. Pandian[1] and P. Venkatesan[2]

Department of Agriculture, Thoothukudi-628 203, India
[1]Water Technology Centre, Tamil Nadu Agricultural University, Coimbatore -641 003. India
[2]Extension Systems Management, Indian Council of Agricultural Research
National Academy of Agricultural Research Management, Hyderabad-500 030, India
E-mail: stevesingh10@gmail.com

Abstract: Field experiments were conducted with three level of seed rate *viz.*, 20, 30 and 40 kg ha^{-1} and four different seed treatments (Water soaking, $MnSo_4$ soaking, seed pelleting with single superphosphate and PRE-conditioning treatment sequence involving fresh *Prosopis* extract (1%) soaking cum DAP powder (40 g kg^{-1}) *Tricoderma viride* (4 g kg^{-1}) + Rhizobium pelleting and two foliar spray *viz.*, 1% KCL +100 ppm Cycocel (CCC) spray on 30 and 45 days after sowing (DAS), 0.05% Ammonium molybdate spray on 30 and 45 DAS. Number of pods plant^{-1} and grain yield were higher under 30 kg ha^{-1} seed rate with pre-conditioning seed treatments. Foliar spray of 0.05% Ammonium molybdate significantly increase the grain yield in both the seasons. Adoption of @ 30 kg ha^{-1} seed rate with pre-conditioning seed treatment and 0.05% Ammonium molybdate foliar spray twice is recommended for blackgram under rice fallow condition for getting higher yield.

Key Words: Cycocel, Foliar spray, Seed rate, Seed treatments

Black gram (*Phaseolus mungo (L.) Hepper*) is favorable short duration pulse crop as it thrives better in all seasons either as sole or as intercrop or fallow crop. India produces about 1.5–1.9 million tons of black gram annually from about 3.5 million hectares of area, with an average productivity of 600 kg ha^{-1}. Black gram output accounts for about 10 per cent of India's total pulse production. Productivity of black gram is low in general due to poor management and low soil fertility. In India, it is cultivated in both kharif and rabi seasons. In Tamil Nadu, area under blackgram cultivation is 3.41 lakh hectares with production of 1.21 lakh tonnes and productivity 354.84 kg ha^{-1}. Cultivation of pulses in rice-fallows is a common practice in southern district of Tamil Nadu. With this objective, optimum seed rate, seed treatment with foliar nutrition spray was evaluated in rice-fallow blackgram.

MATERIAL AND METHODS

Field experiments were conducted at Agricultural College and Research Institute Killikulam to study the effect of seed rate, seed treatment and foliar nutrition on yield attributes and yield of rice fallow black gram. The soil of the experimental field was sandy clay loam in texture, belonging to Typic ustropept. The nutrient status of soil at the start of experiment was low in available nitrogen (172 kg ha^{-1}), medium available phosphorus (9.1 kg ha^{-1}) and high available potassium (240 kg ha^{-1}) with the (P^H) of 7.4. The organic material were analysed prior to use in the experiments The experiment was laid out in factorial randomized block design with three replications. Seed rate 20, 30 and 40 kg ha^{-1} with four seed treatments water soaking for two hours, 8% $MnSo_4$ soaking of seeds for two hours, seed pelleting with single superphosphate, pre-conditioning of seed sequence involving fresh *Prosopis* extract (1%) soaking cum DAP powder (40 g kg^{-1}) *Tricoderma viride* (4 g kg^{-1}) + Rhizobium pelleting and two foliar spray treatments, *viz.*, 1% KCl +100 ppm Cycocel (CCC) spray on 30 and 45 DAS and 0.05% Ammonium molybdate spray on 30 and 45 DAS. The seeds of blackgram ADT - 3 were broadcasting on 7 days prior to harvest of rice crop. The black gram was sown during Feb.-April (crop I) and July-September (crop II) during the two years of study. The yield attributes like number of pod plant^{-1}, pod length, number of grain pod^{-1} and grain yield (kg ha^{-1}) was recorded at harvest of the crop. Blackgram yield measurement is optimized by maximizing blocks or replications, with only one quadrat per plot, provided an area of 1 m^2.

RESULTS AND DISCUSSION

Seed rate @ 30 kg ha^{-1} produced maximum number of 32 and 37 pods plant^{-1} in both the season which was on par with (40 kg ha^{-1}). Marked impact on the pods per plant was

ved due to various seed treatment practices. The ium number of pods were observed in pre-conditioning ents (37 and 42 during both the season) and it was ed by seed soaking $MnSO_4$ 8% in first season and soaking in second season. Maximum number of pods ant (33 and 37 pods per plant) was recorded with two sprays of 0.05% Ammonium molybdate and was arable with 1% KCl +100 ppm Cycocel (CCC) ent.

Management practices, significantly influenced the r of seeds pod^{-1}. Seed soaking with $MnSO_4$ 8% n produced maximum number of 5.58 and 5.49 seeds n season I and II, respectively. It was followed by pre-oning treatments in both the seasons (Table 2). Test veight of rice fallow blackgram was not influenced by ates and foliar nutrition methods (Table 3). Seed ent with pre-conditioning methods register the higher ain weight of 3.55 and 3.49 in both the seasons and it par with seed soaking with $MnSO_4$ 8% in first season s significantly superior in second season. The grain rice fallow blackgram was significantly influenced by t level of seed rates, seed treatments and foliar ents (Table 4). Among the seed rates, adoption of 30 kg ha^{-1} significantly produced higher grain yields as red to other (treatments). The grain yield was antly low by 20 kg ha^{-1}. Pre-conditioning of seeds d significantly maximum yield of 641 and 595 kg ha^{-1} both the seasons respectively and seed soaking $MnSO_4$ and water soaking practices ranked second in order for both the crops respectively. Foliar spray of 0.05% Ammonium molybdate foliar spray twice recorded maximum yield of 565 and 519 kg ha^{-1} in both the seasons respectively as compared to foliar application of KCl + cycocel (526 and 483 kg ha^{-1}, respectively).

The interaction effect between seed rate and seed treatment was significant. Seed rate @ 30 kg ha^{-1} with pre-conditioning seed treatment (S_2T_4) registered maximum grain yield of 686 and 636 kg ha^{-1} in first and second crop respectively. It was on par with 40 kg ha^{-1} with pre-conditioning (S_3T_4) in first season (671), whereas, identical performance with S_3T_4 (621 kg ha^{-1}) and S_2T_1 (601 kg ha^{-1}) were observed in second season.

Among the seed rates, adoption of 30 kg ha^{-1} significantly produced maximum number of pods plant^{-1}, increase grains pod^{-1} and higher grain yields in both the seasons. Similar trend was observed in 40 kg ha^{-1}. Plant densities would have enabled better translocation of photosynthates for production of sink resulting significantly influenced the yield attributes of black gram *viz.*, grain weight, number of seed per pod and pod length (Ratnam *et al.*, 1999). Pre-conditioning of seeds recorded maximum number of pods plant^{-1}, increase grains pod^{-1} and maximum yield of during both the seasons and seed soaking with $MnSO_4$ and water soaking practices ranked second in order for both the crops. The reason attributed for such elite physiological

. Effect of seed rate, seed treatment and foliar nutrition on pods per plant (No. plant^{-1}) and grain yield (kg ha^{-1}) of rice fallow blackgram

tment	Pods per plant (No. plant^{-1})		Grain yield (kg ha^{-1})	
	I crop (Feb.- April)	II crop (July-Sep.)	I crop (Feb.- April)	II crop (July - Sep.)
rate (S)				
-20 kg ha^{-1}	29.47	33.01	511	465
-30 kg ha^{-1}	32.44	37.3	563	526
-40 kg ha^{-1}	32.27	36.33	561	512
CD (p=0.05)	2.00	2.65	35	37
treatment (T)				
Water soaking	28.9	36.87	501	519
8% $MnSO_4$	31.92	32.10	553	452
Seed pellet SSP	27.97	31.03	486	437
Pre-conditioning	36.78	42.24	641	595
CD (p=0.05)	2.31	3.06	41	43
nutrition (F)				
KCl + CCC	30.26	34.28	526	486
Ammonium molybdate	32.52	36.84	565	519
CD (p=0.05)	1.63	2.16	29	30

Table 2. Effect of seed rate, seed treatment and foliar nutrition on seeds pod^{-1} and test weight (g) (100 grain) of rice blackgram

Treatment	Seeds pod^{-1}		Test weight (g) (100 grain)	
	I crop (Feb. - April)	II crop (July - Sep.)	I crop (Feb. - April)	II crop (July - S
Seed rate (S)				
S_1 - 20 kg ha^{-1}	5.47	5.35	3.38	3.32
S_2 - 30 kg ha^{-1}	5.46	5.31	3.39	3.35
S_3 - 40 kg ha^{-1}	5..48	5.30	3.40	3.29
CD (p=0.05)	NS	NS	NS	NS
Seed treatment (T)				
T_1 - Water soaking	5.39	5.21	3.22	3.19
T_2 - 8% $MnSO_4$	5.58	5.49	3.51	3.39
T_3 - Seed pellet SSP	5.41	5.16	3.28	3.22
T_4 - Pre-conditioning	5.53	5.43	3.55	3.49
CD (p=0.05)	0.080	0.056	0.088	0.050
Foliar nutrition (F)				
F_1 - KCl + CCC	5.45	5.31	3.37	3.32
F_2 - Ammonium molybdate	5.49	5.34	3.41	3.32
CD (p=0.05)	NS	NS	NS	NS

manifestation of hardened cum pelleted seed are, hardening resulting in number of physiochemical changes such as greater hydration of colloids, higher viscosity and elasticity of protoplasm, increase in water content and more efficient rot system (Gomathi *et al.*, 2014). Foliar spraying with ammonium molybdate was significantly superior over the foliar application of KCl + Cycocel. A foliar application of ammonium molybdate increases nutrient uptake, yield attributes and yield in horsegram (Duraisamy and Mani, 2001). The positive role of Mo in enhancing the pods plant^{-1} of pulses could be assigned to the fact that applied Mo increased dry matter production and pod set (Singh *et al.*, 1999). The interaction effect of seed rate and seed treatment was significant. Seed rate @ 30 kg ha^{-1} with pre-conditioning seed treatment (S_2T_4) registered maximum grain yield. It was at par with 40 kg ha^{-1} with pre-conditioning (S_3T_4) in first season, whereas, identical performance with S_3T_4 and S_2T_1 were observed in second season. The influence of seed hardening cum foliar treatments in black gram imparts drought tolerance, increases seed germination followed by better and quicker seedling emergence and recorded the higher seed yield when compared to other treatment: may be due to the beneficial effect of *Prosopis* leaf e seed hardening, which activates the growth pro substances and translocations of secondary metabol the growing seedling.

The @ 30 kg ha^{-1} seed rate with pre-condit treatment and 0.05% Ammonium molybdate foliar twice is recommended for blackgram in rice fall southern district of Tamil Nadu for getting higher yield.

Received 15 November, 2015; Accepted 18 December, 2015

REFERENCES

Duraisamy P and Mani AK 2001. Effect of iron and molybed yield and nutrition of horse gram in red loamy sa *Mysore Journal of Agricultural Science* **35**: 26-31

Gomathi G, Malarkodi K and Ananthi M 2014. Pre-sowi management techniques on initial seed parameters in blackgram Cv.ADT 3. *Internationa of Scientific Research* **3**(1): 13-14.

Ratnam M, Subbaiah G, Pulla Roa Ch and Hanumantha 1999. *The Andhra Agricultural Science* **46** (3& 288.

Singh M, Rakesh Kumar, Tomer DPS and Singh RC 1999. R of chickpea in micronutrients. *Haryana Jo Agronomy* **15**(2): 179-182.