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Research Article

EFFECT OF INTEGRATED CROP MANAGEMENT ON SEED YIELD IN MUNGBEAN [*Vigna radiata* L. WILCZEK]

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Abstract- The experiment was conducted at Chaudhary Charan Singh Haryana Agricultural University, Hisar during summer and *kharif* 2015 to study the effect of integrated crop management on seed yield of mungbean. The sixteen treatment combinations including control were laid out in randomized block design with three replications. Among the seasons, the *kharif* crop showed the highest seed yield and its components. Among different treatment applications RDF + RWM + RPM had higher plant height (53.33), number of branches (5.67), pods *per* plant (24.00), seeds *per* pod (10.00) and seed yield *per* plot (1.440 Kg) followed by RDF + Biomix in both the season. However, the number of days to 50% emergence (4.00) and days to 50% flowering (34.33) were recorded lesser in this treatment in both the seasons. Minimum days to maturity (60.33) were observed in control (T16) during summer season. These treatments (T11 and T2) could be used under integrated crop management to get high seed yield for mungbean.

Keywords- Mungbean, Integrated Crop Management, Seed Yield, Summer, *Kharif*.

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Introduction

Mungbean (*Vigna radiata* L.Wilzek), popularly known as green gram, is an ancient and well known legume crop in Asia, particularly in the Indian subcontinent. It is one of the important pulse crops of India, as it is an excellent source of easily-digestible protein of low flatulence, which complements the staple rice diet in the country. Since it is a short duration legume (maturing in 55 to 70 days) fits well into many cropping systems, including rice and sugarcane under both rainfed and irrigated conditions. Besides increasing small farmer's income, it also improves soil conditions. In India, it is cultivated on 3019 thousand hectare and production is 1503 thousand tones, with an average yield of 498 kg ha^{-1} during 2014-15 [1]. Seed not only makes base of agriculture, however, effective and efficient use of other inputs is contingent upon quality seed for its effectiveness and dividends. Thus quality and quantum of seed decide the amount of success in agriculture. Quality seed alone accounts for at least 10-15 per cent increase in production [2]. Realization of higher seed yield should always be accompanied by the production of superior quality seed. Therefore, the present study was conducted to determine the effect of integrated crop management on seed yield in mungbean.

Materials and Methods

The field experiment was conducted to study the influence of integrated crop management on seed yield in Mungbean during summer and *kharif* 2015 at Chaudhary Charan Singh Haryana Agricultural University, Hisar. Seeds of Mungbean variety "MH-421" were collected from Pulses Section, Department of Genetics and Plant Breeding of CCS Haryana Agricultural University, Hisar during summer 2015. Sixteen treatments were comprised *viz*. T1= RDF (recommended dose of fertilizer), T2= RDF+ Biomix (Rhizobium + PSB), T3= RDF + $ZnSO_4$, T4= 50% RDF + $ZnSO_4$, T5= Biomix, T6= Recommended weed management (RWM), T7= Recommended pest management (RPM), T8= RDF+RWM, T9= RDF + RPM, T10= RWM + RPM, T11= RDF + RWM + RPM, T12= FYM, T13= FYM + 50% RDF, T14= Vermicompost, T15= Vermicompost + 50% RDF, T0= Control. The variety "MH-421" of mungbean with all treatment combinations was grown in the field of research area of Genetic and Plant Breeding with the recommended cultural practices and above said treatments. The sowing was done in summer and *kharif*, 2015. The observations on days to 50% emergence, days to 50% flowering, days to maturity and seed yield were recorded on plot basis while data related to plant height, number of branches *per* plant, number of pods *per* plant and number of seeds *per* pod were recorded by randomly selecting 5 plants from each plot in each replication. The factorial experiment in Randomized Block Design (RBD) has been conducted for field parameters. The data obtained from experiment conducted in RBD were analyzed as *per* standard method suggested by Panse and Sukhatme [3].

Table-1 *Details of plot size and doses of different treatments*

Particulars	Details
Plot size	9.6 m^2 (4m × 2.4m)
FYM	15 t ha^{-1} (Recommended dose)
Vermicompost	5 t ha^{-1} (Recommended dose)
Rhizobium	150 ml ha^{-1} 15kg $seed^{-1}$ (seed treatment)
PSB	150 ml ha^{-1} 15kg $seed^{-1}$ (seed treatment)
RDF	N: P_2O_5: K_2O:: 20:40:00
RWM	Pendimethalin@ 4000gm 25 EC ha^{-1} + 1 hoeing at 20-25 days.
RPM	Metasystox@625ml 25 EC ha^{-1} at 14-21 days.
$ZnSO_4$	25 kg ha^{-1}

Results and Discussion

In the present investigation, which was carried out to assess the effect of integrated crop management on seed yield and yield attributes of mungbean, all the treatments differed significantly for yield and yield attributes of mungbean. Days to 50% emergence was significantly influenced by different treatment combinations. The lesser number of days taken for 50% emergence were recorded with the treatment RDF+ Biomix (T2: 4.00) and it was at par with the treatments Biomix (T5: 4.33), RDF+ RWM+ RPM (T11: 4.67), RDF+ $ZnSO_4$ (T3: 4.67) in summer season. While, more number of days for 50% emergence was recorded in case of control (T16: 7.00) in *kharif* season. Days to 50% flowering was also influenced by different treatment combinations. The lesser number of days (34.33) were taken for 50% flowering were recorded with the treatment RDF+ Biomix (T2) in summer season. While, more number of days (41.00) recorded in case of vermicompost (T14) in *kharif* season. Days to maturity was recorded lesser in summer season as compare to *kharif* season. The lesser number of days (60.33) taken for maturity was recorded with the treatment control (T16) and it was at par with RDF+ RWM+ RPM (60.67) and RDF+ Biomix (T2: 61.00) in summer season. While, more number of days (66.67) recorded in case of vermicompost+ 50% RDF (T15) in *kharif* season. Earliness might be due to the enhanced production of growth substances like gibberllic acid, indole acetic acid, dihdrozeatin from biofertilizer which had positive influence on physiological activity of plants which could assist the plants to induce early flowering and maturity [4] and [5].

Table-2 *Effect of integrated crop management on days to 50% emergence, days to 50% flowering, days to maturity and plant height in mungbean.*

Treatments	Days to 50% Emergence		Days to 50% flowering		Days to Maturity		Plant height(cm)	
	Summer	*Kharif*	Summer	*Kharif*	Summer	*Kharif*	Summer	*Kharif*
T1 (RDF)	5.00	5.33	37.33	38.67	63.00	64.33	42.67	47.00
T2(RDF+BIOMIX)	4.00	4.67	34.33	36.00	61.00	62.33	45.33	52.33
T3 (RDF+$ZNSO_4$)	4.67	5.67	36.00	37.33	62.67	64.00	43.00	47.33
T4 (50%RDF+$ZNSO_4$)	5.33	6.33	38.00	38.67	63.67	65.67	42.00	46.00
T5 (BIOMIX)	4.33	5.00	36.33	37.33	62.33	65.00	42.33	44.67
T6 (RWM)	5.33	6.67	38.33	40.00	64.33	65.67	39.67	45.00
T7 (RPM)	6.33	7.00	38.67	40.33	64.67	66.67	38.67	43.67
T8 (RDF+RWM)	5.00	5.33	35.67	38.00	62.33	64.00	44.33	49.67
T9 (RDF+RPM)	5.67	6.00	35.00	39.00	63.00	65.67	43.67	49.33
T10 (RWM+RPM)	6.00	6.67	38.00	39.67	63.33	66.00	40.67	45.33
T11 (RDF+RWM+RPM)	4.67	5.33	35.00	36.33	60.67	62.67	46.00	53.33
T12 (FYM)	6.33	6.67	39.00	40.67	64.00	65.67	37.33	42.33
T13 (FYM+50%RDF)	6.00	6.33	38.00	39.33	63.67	65.33	38.33	43.33
T14 (VERMICOMPOST)	5.67	6.33	38.33	41.00	64.33	66.33	37.67	42.67
T15 (VERMICOMPOST) +50%RDF	5.33	6.00	37.67	39.67	63.33	66.67	38.67	44.00
T16 (CONTROL)	6.67	7.00	34.67	36.33	60.33	61.33	36.67	41.67
Mean	5.40	6.02	36.90	38.65	62.92	64.83	41.06	46.10
Range	4.00-6.67	4.67-7.00	34.33-39.00	36.00-41.00	60.33-64.67	61.33-66.67	36.67-46.00	41.67-53.33
CD@5%	0.82	1.04	1.35	1.50	2.00	1.42	1.40	1.78

Table-3 *Effect of integrated crop management on number of branches plant^{-1}, number of pods plant^{-1}, seeds per pod and seed yield plot^{-1} in mungbean.*

Treatments	No. of branches plant^{-1}		No. of pods plant^{-1}		Seeds *per* pod		Seed yield plot^{-1} (Kg)	
	Summer	*Kharif*	Summer	*Kharif*	Summer	*Kharif*	Summer	*Kharif*
T1 (RDF)	3.67	4.67	14.67	22.00	6.33	8.00	0.852	1.202
T2(RDF+BIOMIX)	4.67	5.33	18.00	23.33	8.67	9.33	1.059	1.354
T3 (RDF+ZNSO4)	3.67	5.00	15.67	22.33	7.67	8.67	0.901	1.247
T4 (50%RDF+ZNSO4)	3.33	3.33	13.00	18.00	6.00	7.33	0.831	1.016
T5 (BIOMIX)	3.00	4.00	14.00	19.00	7.00	7.00	0.860	0.986
T6 (RWM)	3.00	3.67	12.33	16.67	5.00	5.67	0.763	0.919
T7 (RPM)	2.67	3.33	12.67	15.33	4.67	6.33	0.762	0.907
T8 (RDF+RWM)	4.33	4.67	16.33	23.00	8.33	9.00	1.036	1.172
T9 (RDF+RPM)	4.00	4.33	16.00	20.00	8.00	8.00	0.891	1.059
T10 (RWM+RPM)	3.00	3.67	12.33	18.33	5.67	6.67	0.810	0.949
T11 (RDF+RWM+RPM)	5.00	5.67	19.33	24.00	9.67	10.00	1.137	1.440
T12 (FYM)	2.33	3.33	11.67	15.67	4.67	5.33	0.778	0.910
T13 (FYM+50%RDF)	3.00	3.67	13.00	16.33	5.33	5.67	0.805	0.942
T14 (VERMICOMPOST)	2.67	3.67	12.67	16.67	5.00	5.33	0.808	0.920
T15 (VERMICOMPOST) +50%RDF	3.33	4.00	13.33	17.00	6.00	6.00	0.826	0.989
T16 (CONTROL)	2.00	3.00	9.00	14.67	4.00	4.33	0.741	0.834
Mean	3.35	4.08	14.00	18.90	6.38	7.04	0.866	1.053
Range	2.00-5.00	3.00-5.67	9.00-19.33	14.67-24.00	4.00-9.67	4.33-10.00	0.741-1.137	0.83-1.44
CD@5%	0.93	0.76	2.69	1.40	1.20	1.45	0.103	0.080

The plant height differed significantly due to different treatments. Significantly higher plant height (53.33 cm) was recorded in T11 (RDF+ RWM+ RPM) and it was on par with the application of RDF + Biomix (T2: 53.33 cm) in *kharif* season compared to control (T16: 36.67 cm). Among the seasons, the maximum plant height was recorded in *kharif* season. The data clearly indicated that there was significant difference in number of branches *per* plant among treatments and seasons. It was observed maximum (5.67) with the treatment (T11) RDF+ RWM+ RPM in *kharif* season which was at par with treatment RDF+ Biomix (T2: 5.33),

RDF+ ZnSo4 (T3: 5.00) and minimum (2.00) with the treatment (T16) control. The maximum number of branches was recorded in *kharif* season compared to summer season. Significantly higher number of pods *per* plant was recorded with the treatment (T11: 24.00) RDF+ RWM+ RPM, which was at par with (T2: 23.33) RDF+ Biomix) in *kharif* season. Significantly lower number of pods were recorded with the treatment control (T16: 9.00) in summer season. The plants with treatment RDF + RWM+ RPM (T11) showed maximum number of seeds *per* pod (10.00) which was at par with RDF + Biomix (T2: 9.33) in *kharif* season, whereas lower number of seeds *per* pod was observed in control (T16: 4.00) in summer season. The maximum seeds *per* pod were observed in *kharif* season as compared to summer season.

Among all the treatments, (T11) RDF + RWM+ RPM (1.440) recorded significantly higher seed yield *per* plot in both the seasons as compared to (T16: 0.741) control. This improvement in seed yield and its components may be due to improved vegetative growth. In T11 and T2 application of inorganic sources of nitrogen in combination with bio-fertilizers (Rhizobium and PSB) led the plant growth favorably with the fixation of required amount of atmospheric nitrogen by rhizobium which enhanced the vegetative growth resulting in higher plant height of mungbean. Besides PSB converted the soil phosphorus into available form required for the plants. In this situation flow of assimilates to sink was high and might be the reason of higher pod length and number of seeds *per* pod. A synergistic interaction among the inputs in the promising treatments might contribute to the results of yield attributes as explained from the findings of [6] in chickpea, [7] and [8] in bitter gourd. The overall improvement in growth and yield components may be due to synergistic effect of combined use of practices adopted might have enhanced the nutrient uptake *vis-a-vis* yield as reported by [9] in blackgram and [10] in pea.

Conclusion

Overall it can concluded that higher seed yield and yield traits were observed in *kharif* season crop as compare to summer crop and among different treatment applications T11 (RDF + RWM + RPM) showed highest seed yield in both the season followed by T2 (RDF + Biomix). Thus, it is suggested that these treatment combinations (T11 and T2) could be used under integrated crop management to get high seed yield for mungbean.

Abbreviations

T: treatment, RDF: recommended dose of fertilizer, RWM: recommended weed management, RPM: recommended pest management, Kg: kilogram, ha: hectare, CD: critical difference, PSB: phosphate solubilizing bacteria.

Author Contributions

Conceived and designed the experiments: J, RCP and AB. Analyzed and interpret the data: J and RCP. Wrote the paper: J and RCP. Critical Revised: RY and OSD.

Ethical Approval

This article does not contain any studies with human participants or animals performed by any of the authors.

Conflict of Interest: None declared

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References

[1] Anonymous (2015) www.indiastat.com.
[2] Ousmane B. and Ajeigbe H.A. (2008) Proceedings of the Training Workshop on Production of Legume and Cereal Seeds: 24 January–10 February, 2008.
[3] Panse V.G. and Sukhatme P.V. (1967) Statistical Method for Agricultural workers. ICAR, New Delhi.
[4] Aminifard M. H., Aroiee H., Nemati H., Azizi M. and Khayyat M. (2012) *Journal of Plant Nutrition*, 35, 235–242.
[5] Fathollahi Z. A., Gharavi K. B. P. and Gasemi A. (2014) *Indian Journal of Fundamental and Applied Life Sciences,* 4(3), 423-427.
[6] Tagore G. S., Namdeo S. L., Sharma S. K. and Kumar N. (2013) *International Journal of Agronomy*, Article ID 581627.
[7] Patil S.N., Patil R.B. and Suryawanshi Y.B. (2005) *Seed Research,* 33(2, 142-145.
[8] Mulani T.G., Musmade A.M., Kadu P. P. and Mangave K. K. (2007) *Journal of Soil & Crops*, 17(2), 258-261.
[9] Ahamed S.A. (1999) *Legume Research*, 22, 109-112.
[10] Singh P., Kanwar J.S. and Singh K. (2007) *Seed Research*, 35(2), 164-167.