Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(4): 1834-1835
Received: 13-05-2019
Accepted: 15-06-2019

D Leninraja
Assistant Professor (SS&AC) - Agricultural College & Research Institute, Tamil Nadu Agricultural University, Killikulam, Tuticorin, Tamil Nadu, India

S Maragatham
Associate Professor (SS&AC) - Agricultural College & Research Institute, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

M Jeeva
PG Scholar (Agronomy) – Agricultural College & Research Institute, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

K Manobharathi
PG Scholar (Agrl. Extension and Communication) – Sher-e-Kashmir University of Agricultural Sciences and Technology, Faculty of Agriculture and Regional Research Station, Wadura Sopore, Jammu and Kashmir, India

Correspondence
D Leninraja
Assistant Professor (SS&AC) - Agricultural College & Research Institute, Tamil Nadu Agricultural University, Killikulam, Tuticorin, Tamil Nadu, India

Influence of organic and inorganic amendments on growth parameters of black gram

D Leninraja, S Maragatham, M Jeeva and K Manobharathi

Abstract
A study was undertaken to assess the influence of organic and inorganic amendments on growth parameters of black gram. The results from the experiment revealed that the various organic and inorganic amendments added to the soil had significantly influenced the germination percentage in black gram. Among the various amendments added to the soil, it was observed that application of Spent Wash @ 5.0 lakh litres ha^{-1} (T6) recorded the highest germination percentage and Leaf Area Index of 93 and 4.84% respectively which was followed by T7 (Pressmud @ 8 tonnes ha^{-1}) recording 82 and 4.33% respectively. Among the various amendments added to the soil, it was observed that application of Spent Wash @ 5.0 lakh litres ha^{-1} (T6) recorded the highest root length and shoot length of 7.7 and 11.54 cm respectively which was followed by T7 (Pressmud @ 8 tonnes ha^{-1}) recording 6.2 and 10.82 cm respectively. Based on the present study, it can be concluded that application of spent wash @ 5.0 lakh litres ha^{-1} significantly influenced the growth parameters of black gram.

Keywords: Spent wash, leaf area index, press mud

1. Introduction
India is a major producer and consumer of sugar in the world. The 579 sugar industries in the country produce 19.0 million tonnes of white sugar with daily cane crushing capacities varying from 800-10,000 tonnes. Apart from the sugar and alcohol, these factories generate many by-products and waste materials. For example, more than 5 million tonnes of solid waste (pressmud) are being produced from sugar industries.
Intelligent and selective use of organic amendments like vermicompost, vermiwash, mulch (chiefly including plant residues like paddy straw) and green manure, and bio-inoculation of soil organisms like earthworms in sodic soil in this study, have proved effective in soil conditioning values and varying degrees on influence on soil properties (Ansari, A.A., 2007) [1]. Soil amendments are materials, such as gypsum or calcium chloride, that directly supply soluble calcium for the replacement of exchangeable sodium, or other substances, such as sulphuric acid and sulphur, that indirectly through chemical or biological action, make the relatively insoluble calcium carbonate commonly found in sodic soils, available for replacement of sodium. Organic matter (i.e. straw, farm and green manures), decomposition and plant root action also help dissolve the calcium compounds found in most soils, thus promoting reclamation. With this background a study was conducted to assess the influence of organic and inorganic amendments on growth parameters of black gram.

2. Material and Methods
A pot culture experiment was conducted to assess the influence of organic and inorganic amendments on growth parameters of black gram under different treatments during January 2018. The experiment was conducted in a randomized block design with six treatments *viz*., control (T1; no amendments); application of Gypsum (T2); application of Vermicompost @ 5.0 tonnes ha^{-1} (T3); application of FYM @ 12.5 tonnes ha^{-1} (T4); application of GLM @ 6.25 lakh litres ha^{-1} (T5); application of Spent Wash @ 5.0 lakh litres ha^{-1} (T6) and application of Press mud @10 tonnes ha^{-1} (T7). At first, plastic pots were filled with the respective soils with three replications. After filling the pots, calculated doses of organic and inorganic amendments were added and it was thoroughly mixed with the soil. In case of T6 (application of Spent Wash @ 5.0 lakh litres ha^{-1}), the soil was repeatedly leached with water for two months.

3. Results and Discussion

3.1. Characteristics of Initial soil sample (Table 1)

The initial soil sample of the pot culture experiment was analyzed for various properties. The textural class was found to be clay loam having a bulk density of 1.33 Mg/m^3 and particle density of 2.42 Mg/m^3 respectively. The pH was found to be highly alkaline (10.5) and EC was found to be 0.45 dSm^{-1}. Regarding ESP, it was found to be 20.31%. In case of free $CaCO_3$ it was found to be 21.56% and the fertility status of organic carbon was found to be 0.42%. The available nitrogen was found to be low i.e. 189 kg ha^{-1}. The available phosphorus was found to be medium recording 15.33 kg ha^{-1} and the available potassium, had recorded higher fertility status of 364 kg ha^{-1}. In case of exchangeable Ca+Mg it was found to be 14.12 cmol kg^{-1} whereas exchangeable Na recorded 10.14 cmol kg^{-1} respectively.

Table 1: Characteristics of initial soil used for Pot culture experiment

1. Mechanical composition	Values
Clay (%)	38.12
Silt (%)	34.00
Fine Sand (%)	16.02
Coarse sand (%)	11.03
Textural class	Clay loam
Soil series	Vayalogam Soil Series
Soil Taxonomy	Paralithic Haplustalfs
2. Physical composition	
Bulk Density (Mg/m^3)	1.33
Particle Density (Mg/m^3)	2.42
Pore space (%)	38.60
3. Chemical composition	
pH	10.50
EC($dS\ m^{-1}$)	0.45
ESP (%)	20.31
Free $CaCO_3$ (%)	21.56
Organic carbon (%)	0.42
Available N (Kg ha^{-1})	189
Available P (Kg ha^{-1})	15.33
Available K (Kg ha^{-1})	364
Exc. Ca+Mg [c mol kg^{-1}]	14.12
Exc. Na[c mol kg^{-1}]	10.14

3.2. Effect of organic and inorganic amendments on growth parameters of black gram

The results of the experiment revealed that, among the various organic and inorganic amendments added to the soil, it was found that spent wash and pressmud had a significant effect on the plant growth. Among the various amendments added to the soil, it was observed that application of Spent Wash @ 5.0 lakh litres ha^{-1} (T6) recorded the highest germination percentage of 93 which was followed by T7 (Pressmud @ 8 tonnes ha^{-1}) recording 82%. The lowest was observed in the control (T1) recording 41%. Regarding leaf area index, it was observed that application of Spent Wash @ 5.0 lakh litres ha^{-1} (T6) recorded the highest leaf area index of 4.94% which was followed by T7 (Pressmud @ 8 tonnes ha^{-1}) recording 4.33% and T2 (Gypsum @ 8 tonnes ha^{-1}) recording 3.91% (Table 2). The lowest was observed in the control (T1) recording 1.73%. Similar findings were also reported by Gaur and Singh (1995) [2] and Kannan and Upreti (2008) [4].

The same trend was observed in case of root and shoot length, where application of Spent Wash @ 5.0 lakh litres ha^{-1} (T6) recorded the highest root and shoot length of 7.7 cm and 11.54 cm respectively which was followed by T7 (Pressmud @ 8 tonnes ha^{-1}) recording 6.2 cm and 10.82 cm respectively. The lowest root and shoot length was observed in the control (T1) recording 3.1 cm and 7.21 cm respectively (Table 3). Similar findings were also reported by Hussain *et al*. (2001) and Murugaragavan (2002) [5].

Table 2: Effect of organic and inorganic amendments on Germination percentage and Leaf Area Index in Black gram

Treatments	Germination Percentage	LAI (%)
T1 (Control)	41	1.73
T2 (Gypsum @ 8 tonnes ha^{-1})	72	3.91
T3 (Vermicompost @ 5 tonnes ha^{-1})	67	3.50
T4 (FYM @12.5 tonnes ha^{-1})	62	2.87
T5 (GLM @ 6.25 tonnes ha^{-1})	62	2.96
T6 (Spent Wash @ 5.0 lakh litres ha^{-1})	93	4.94
T7 (Pressmud @10 tonnes ha^{-1})	82	4.33
SED	1	0.07
CD(0.05)	3	0.14

Table 3: Effect of organic and inorganic amendments on Root and Shoot Length in Black gram

Treatments	Root Length (cm)	Shoot Length (cm)
T1 (Control)	3.1	7.21
T2 (Gypsum @ 8 tonnes ha^{-1})	5.7	9.79
T3 (Vermicompost @ 5 tonnes ha^{-1})	5.2	8.76
T4 (FYM @12.5 tonnes ha^{-1})	4.4	8.03
T5 (GLM @ 6.25 tonnes ha^{-1})	4.6	8.24
T6 (Spent Wash @ 5.0 lakh litres ha^{-1})	7.7	11.54
T7 (Pressmud @10 tonnes ha^{-1})	6.2	10.82
SED	0.1	0.18
CD (0.05)	0.2	0.37

4. Conclusion

Thus from the above investigation, it is very clear that application of spent wash and pressmud had a significant effect on the plant growth. Among the various amendments added to the soil, it was observed that application of Spent Wash @ 5.0 lakh litres ha^{-1} had significantly influenced the growth parameters of black gram.

5. References

1. Ansari AA. Reclamation of sodic soil through vermitechnology. Journal of Soil and Nature, Green World Foundation. 2007, 1(1).
2. Gaur AC, Singh G. Recycling of rural and urban wastes through conventional and vermicomposting. In**:** Recycling of crop, animal, human and industrial wastes in agriculture. (Ed.) H.L.S. Tandon. Fertilizer development and consultancy organisation, New Delhi, India, 1995, 150-155.
3. Hussian N, Hassan G, Arshadullah M, Mujeeb F. Evaluation of amendments for the improvement of physical properties of sodic soil**.** Intl. J Agric. Bio. 2001; 3:319-322.
4. Kannan A, RK Upreti. Influence of distillery effluent on germination and growth of mung bean (*Vigna radiata*) seeds. J Hazardous Material. 2008; 153:609-615.
5. Murugaragavan R. Distillery spent wash on crop production in dryland soils. M.Sc., Thesis, Tamil Nadu Agricultural University, Coimbatore, 2002.