International Journal of Agriculture Sciences
ISSN: 0975-3710&E-ISSN: 0975-9107, Volume 9, Issue 9, 2017, pp.-3942-3944.
Available online at http://www.bioinfopublication.org/jouarchive.php?opt=&jouid=BPJ0000217

Research Article

GROWTH AND YIELD OF URDBEAN (*Vigna mungo* L. Hepper) AS INFLUENCED BY SUNFLOWER (*Helianthus annuus* L.) RESIDUE MANAGEMENT

SHWETHA N. AND MATH GANAJAXI*

Department of Agronomy, College of Agriculture, University of Agricultural Sciences, Dharwad, 580005, Karnataka
*Corresponding Author: Email-gkmathshreya@gmail.com

Received: January 19, 2017; Revised: February 04, 2017; Accepted: February 06, 2017; Published: February 24, 2017

Abstract- A field experiment was conducted during *kharif,* 2014 at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad to study the management of summer sunflower (*Helianthus annuus* L.) residue in *kharif* urdbean (*Vigna mungo* L. hepper) under rainfed condition. The treatments comprised of FYM at 5 t ha^{-1} applied 15 days before sowing, sunflower residue used as mulch at the time of sowing, sunflower residue with compost culture applied 15 days before sowing, incorporation of chopped sunflower residue before 15 days of sowing, sunflower residue decomposed for 75 days with compost culture and applied at the time of sowing, sunflower residue + FYM at 5 t ha^{-1} applied 15 days before sowing. The results revealed that among the sunflower residue treatments significantly higher grain yield was recorded with sunflower residue at 4 t ha^{-1} decomposed for 75 days with compost culture (1317 kg ha^{-1}) over other treatments and was on par with FYM at 5 t ha^{-1} applied 15 days before sowing (1264 kg ha^{-1}). Growth and yield parameters were also followed the similar trend.

Keywords- Compost culture, Residue, Sunflower, Urdbean

Citation: Shwetha N and Math Ganajaxi (2017) Growth and Yield of Urdbean (*Vigna mungo* L. Hepper) as Influenced by Sunflower (*Helianthus annuus* L.) Residue Management. International Journal of Agriculture Sciences, ISSN: 0975-3710 & E-ISSN: 0975-9107, Volume 9, Issue 9, pp.-3942-3944.

Academic Editor / Reviewer: Choudhary Mukesh, Simerjeet Kaur, Rajanna G.A.

Introduction

Sunflower (*Helianthus annuus* L.) is a photo-insensitive, short duration and high yielding crop, hence suitable for different multiple cropping systems. However, it is deleterious to the performance of succeeding crops. Sunflower residue is usually considered a problem but when managed correctly it can improve soil organic matter dynamics and nutrient cycling, thereby creating a favourable environment for plant growth on long-term basis [1]. As mentioned earlier sunflower residue contains large quantities of nutrients and incorporation of stover into the soil can save the considerable quantity of fertilizers [1]. Now a days compost culture (mixture of ligno-cellulytic microbes *viz., Trichoderma viridae, Phanerochaete chryzo-soporium, Pleurotus, Aspergillus sydowii*) *i.e.*, known for its efficiency in converting crop residues into good compost within 75 days [1]. So, on the basis of the above information the present study was planned to know the effect of sunflower with and without compost culture and also with application of FYM at 5 t ha^{-1} on urdbean.

Material and Methods

The field experiment was conducted at Main Agricultural Research Station, University of Agricultural Sciences Dharwad, which is situated at 15º26' N latitude and 75 º 01' E longitude and at an altitude of 678 m above mean sea level. The research station comes under Northern Transition Zone (Zone 8) of Karnataka which lies between the Western Hilly Zone (Zone 9) and Northern Dry Zone (Zone 3).

The experiment was conducted in medium black soil having 0.50 per cent organic carbon, 219.0 kg ha^{-1} available nitrogen, 24.5 kg ha^{-1} available phosphorous, 387.0 kg ha^{-1} available potassium with pH of 7.20. During the crop period (June to September) 240.20 mm of rainfall was received. The experiment was laid out in Randomized complete block design with four replications. The treatment details were T_1: FYM at 5 t ha^{-1} applied 15 days before sowing, T_2: Sunflower residue used as mulch at the time of sowing, T_3: Sunflower residue with compost culture applied 15 days before sowing, T_4: Incorporation of chopped sunflower residue before 15 days of sowing, T_5: Sunflower residue decomposed for 75 days with compost culture and applied at time of sowingT_6: Sunflower residue + FYM at 5 t ha^{-1} applied 15 days before sowing. The recommended dose of fertilizer (25:50:0 of N, P_2O_5 and K_2O kg/ha) was common to all the treatments and sunflower residue was applied @ 4t ha^{-1}. Nutrient composition of FYM, compost and sunflower residue is 0.48:0.19:0.50, 0.60:0.22:1.30 and 0.45:0.18:1.20 of N:P_2O_5:K_2O, respectively. Urdbean genotype DU-1 was sown during third week of June.

Results and Discussion

Sunflower residue at 4 t ha^{-1} decomposed for 75 days with compost culture recorded significantly higher seed yield (1317 kg ha^{-1}) over other treatments and it was on par with FYM at 5 t ha^{-1} applied 15 days before sowing (1264 kg ha^{-1}). Similar results were reported by earlier authors [2]. This is mainly due to significant increase in the yield attributing characters. Significantly higher number of pods per plant (29.35), test weight (59.71 g) and seed yield per plant (7.87 g) were noticed in sunflower residue at 4 t ha^{-1} decomposed for 75 days with compost culture as compared to rest of the treatments except FYM at 5 t ha^{-1} applied 15 days before sowing. Whereas, sunflower residue at 4 t ha^{-1} used as mulch at the time of sowing recorded lower number of pods per plant (18.63), test weight (40.83 g) and seed yield per plant (4.37 g) and were the reasons for significantly lower yield [Table-1]. This might be due to inhibitory effects of allelo-chemicals present in the sunflower residue. These results are in conformity with the results obtained by some authors [2-4]. During the decomposition period of compost, all the allelo-chemical's concentration will be reduced to negligible concentration and to microbial activity and other chemical activities.

Yield and yield attributes depend indirectly on growth attributes like plant height, number of branches, number of nodules, total dry matter production, leaf area, leaf area index, leaf area duration, crop growth rate and protein content. These results are in conformity with the findings of several authors [4-6]. The leaf area index often used as a vital indicator of plant growth for evaluating assimilation and transpiration rates. It is a major factor in determining solar radiation interception, canopy photosynthesis and yield. In the present investigation higher leaf area index was observed with sunflower crop residue at 4 t ha^{-1} decomposed for 75 days with compost culture at all the growth stages (30, 45 and 60, respectively). The higher leaf area index associated with this treatment might be due to increased uptake of nitrogen because of higher availability of nitrogen due to completely decomposed sunflower residue which acted as a source of organic manure.

Table-1 *Effect of sunflower crop residue on urdbean yield parameters.*

Treatments	Number of pods per plant	Test weight (1000 seed weight in g)	Seed yield (g plant^{-1})	Seed yield (kg ha^{-1})	Haulm yield (kg ha^{-1})
T_1: FYM at 5 t ha-1 applied 15 days before sowing	27.50	56.68	7.22	1264	2136
T_2: Sunflower residue used as mulch at the time of sowing	18.63	40.83	4.37	981	1809
T_3: Sunflower residue with compost culture applied 15 days before sowing	22.43	48.39	5.69	1107	1911
T_4: Incorporation of chopped sunflower residue before 15 days of sowing	21.93	46.50	5.45	1075	1857
T_5: Sunflower residue decomposed for 75 days with compost culture	29.35	59.71	7.87	1317	2201
T_6: Sunflower residue + FYM at 5 t ha^{-1} applied 15 days before sowing	23.85	49.56	6.22	1118	1919
S.Em+	0.77	1.10	0.31	44	27
C.D. (P=0.05)	2.34	3.33	0.94	132	82

*Recommended dose of fertilizer (25:50:0 of N, P2O5 and K2O kg/ha) was common to all the treatments and sunflower residue was applied @ 4 t ha^{-1}

The pre-requisite for getting higher yield in any crop depends upon total dry matter production and its accumulation in various plant parts which in turn influence the yield components. The dry matter production per plant of urdbean differed significantly with the different sunflower residue treatments and it was significantly higher with sunflower residue at 4 t ha^{-1} decomposed for 75 days with compost culture (12.83 g plant^{-1}) and was on par with FYM at 5 t ha^{-1} applied 15 days before sowing (12.26 g plant^{-1}) over other treatments [Table-2]. The superiority of above treatments with regard to dry matter production might be due to better growth of plant as evidenced by increased plant height (35.16 cm) and higher number of branches per plant (6.44) [Table-2]. The better plant growth and greater assimilation of photosynthates due to more assimilatory surface area ultimately resulted in increased dry matter production in these treatments. The dry matter production per plant of urdbean was significantly least (7.92 g plant^{-1}) with sunflower residue at 4 t ha^{-1} used as mulch at the time of sowing. These results showed that the phytotoxicity of sunflower crop residue on urdbean expressed in terms of decreased seedling growth, plant height and number of branches resulted in lower dry matter production. These results are in conformity with the work of these authors [4].

Table-2 *Effect of sunflower crop residue on urdbean growth parameters.*

Treatments	Plant height (cm)	Total number of branches	Number of effective nodules plant^{-1}	Leaf area index	TDMP (g plant^{-1})
T_1: FYM at 5 t ha-1 applied 15 days before sowing	34.4	6.21	25.7	1.98	12.26
T_2: Sunflower residue used as mulch at the time of sowing	28.3	4.56	20.9	1.71	7.92
T_3: Sunflower residue with compost culture applied 15 days before sowing	32.4	5.23	21.9	1.82	9.71
T_4: Incorporation of chopped sunflower residue before 15 days of sowing	31.8	5.15	21.5	1.75	9.32
T_5: Sunflower residue decomposed for 75 days with compost culture	35.2	6.44	26.9	2.07	12.83
T_6: Sunflower residue + FYM at 5 t ha^{-1} applied 15 days before sowing	32.8	5.48	23.1	1.87	10.65
S.Em+	0.50	0.23	0.60	0.03	0.36
C.D. (P=0.05)	1.51	0.69	1.81	0.10	1.08

*Recommended dose of fertilizer (25:50:0 of N, P2O5 and K2O kg/ha) was common to all the treatments and sunflower residue was applied @ 4 t ha^{-1}.

The superiority of sunflower residue at 4 t ha^{-1} decomposed for 75 days with compost culture on urdbean yield was also attributed to better nodule development and their efficiency of fixing atmospheric nitrogen. Sunflower residue at 4 t ha^{-1} decomposed for 75 days with compost culture recorded significantly higher nodule count (26.94) over other treatments except FYM at 5 t ha^{-1} applied 15 days before sowing (25.73) [Table-2]. These treatments favoured the biological nitrogen fixation system, as they acted as organic manures. Whereas, sunflower residue at 4 t ha^{-1} used as mulch at the time of sowing recorded significantly least number of nodules (20.89). The difference in nodule number could be attributed to harm-full effect of allelo-chemicals affecting the growth and development of nodules and the activity of micro-organisms. Favourable effect of nodule development is attributed to greater dry matter accumulation and availability of photosynthates with sunflower residue at 4 t ha^{-1} decomposed for 75 days with compost culture.

Conclusion

From this study, it can be concluded that sunflower residue at 4 t ha^{-1} decomposed for 75 days with compost culture and applied at the time of sowing can be used as alternative to FYM at 5 t ha^{-1} applied 15 days before sowing. In future, there is a need to study the different crop residue composts prepared by pigeonpea, cotton, sesame, linseed, mustard *etc* which are not having the fodder value.

Acknowledgement
Authors are thankful to University of Agricultural Sciences, Dharwad for funding for the research under Staff Research Project.

Conflict of Interest: None declared

References

[1] Davari M., Sharma S.N. and Mirzakhani M. (2012) *International Journal Recycling of Organic Waste in Agriculture,* 1, 14.
[2] Badnur V.P., Bellakki M.A. and Tolnur S.I. (2000) *Karnataka Journal of Agricultural Sciences,* 13(3), 733-734.
[3] Mangare P.N., Shendurse S.M, Matale S.G. and Nandapure S.P. (2008) *Green Farming,* 2(1), 47-49.
[4] Narwal S.S., Palaniraj R., Sati S.C. and Rawat L.S. (2003) *Journal of Ecobiology,* 15(5), 371-376.
[5] Pal M.S. and Sand N.K. (2006) *Allelopathy Journal,* 17(2), 297-302.
[6] Uzma B., Arshad J. and Rukhsana B. (2012) *Chilean Journal Agricultural* Research, 72(3), 326-331.