REVIEW OF RESEARCH
IMPACT FACTOR : 5.7631(UIF) UGC APPROVED JOURNAL NO. 48514 ISSN: 2249-894X
VOLUME - 8 | ISSUE - 3 | DECEMBER - 2018

EFFECT OF PARTHENIUM HYSTEROPHORUS AS COMPOST AND REDUCE ITS HAZARDS

D. S. Suryawanshi
Head Department Botany Jawahar Arts Science & Commerce collegeAndur, Tq. Tuljapur Dist. Osmanabad. Maharastra.

ABSTRACT

The present investigation was aimed to assess parthenium compost can be utilized to increase yield of crops. Parthenium compost and urea along with Azotobactorchroococum on growth and yield of Sorghum bicolor L. Chemical characteristicsbacteria, fungiAzotobactor are considered. Results revealed that100% N through parthenium compost isdetrimental to sorghum. Use of 50% N through each of parthenium compost and urea along with Azotobactorchrooccum was found to be beneficial for better growth and higher yield of sorghum. Increasing temperature of compost pit could not destroy 100% viability of parthenium seed. Application of bloomed parthenium compost generated new plants of parthenium in sorghum field .This suggests that composting of uprooted parthenium before flowering may reduce its spreading as well as menace of human health hazards.

KEYWORDS: *Parthenium compost, integrated nutrient management, organic matter, plant growth response.*

INTRODUCTION

Congress grass (Parthenium hysterophorus L) is spreading very fast in grass lands and pastures and now has become an obnoxious weed to human all around the world. It is common in vertisols than an alfisols. It is also observed on road sides and wastelands. Accidentally introduces in India, 1955 in Pune through the imported food grains (Dhawan and Dhawan 1996.) Present, it has occupied almost all parts of India and is attracting the attention of all (Dhawan and Dhawan,1996.) While, application of composted biomass to soil may increase soil physical quality and nutrition (Weber et al, 2007.). Compost amendments enhance SOM quality and quantity by an increased accumulation of various classes of organic compounds. Research on SOM following compost amendments has been mainly focused on change of bulk OC (Pedra et al. 2007, Sebastia et al. 2007) microbial biomass, macro and micronutrients availability (Kowaljow and Mazzarino, 2007) and organic matter pools such as Dissolved Organic Matter (DOM) and humic substances (Adani et al, 2007) Parthenium extracts nutrients even from nutrient deficient soil and in cropped land can reduce up to 40% in yield (Swaminathan et al.,1990). Beneficial effect of organic sources such as FYM crop residues and compost on soil properties and profitable crop yield has been well documents. Huge amount of locally available Parthenium can be utilized as a source of organic matter to prepare its compost resulting we can control its exotic weed and sustain the soil health Kumar et.al,(2007) also recorded higher yield of rice-wheat with the use of organic manures. They also reported that bio-fertilizers have added advantage in wheat production. Integration of FYM and Azotobacter with N. Productivity and monetary returns of wheat can be increased by maintaining or improving soil fertility (sharma et.al. 2007). Composting cannot be considered a new technology, but amongst the waste management strategies it is

gaining interest as a suitable option for manures with economic and environmental profits, since, this process eliminates or reduces the risk of spreading of pathogens, parasites and weed seeds associated with direct land application of manure and lead of a final stabilized product which can be used to improve and maintain soil quality and fertility (Larney and Hao, 2007 Pullicinoa et al. 2009).

The present investigation was aimed to assess the combined effect of N through Parthenium compost and urea along with Azotabactercrococum on growth and yield of Jawar .Parthenium compost provided N after mineralization, it is a slow process and takes more time. So N requirement of Jawarplants is fulfill by addition of nitrogen through urea for better growth and development of plants.

MATERIALS AND METHODS

Prepared Parthenium Compost:

Flowered and unflowered plants of Parthenium hystrophorus were uprooted, chopped together and composted under tree shade at the department of Botany Dr. Babasaheb Ambedkar Marathwada university Aurangabad. In a pit of size 4'X3'X2' during rainy season (August 2015) and finally plastered with mud layer. Temperature of compost was recorded from different places of pit after a week of plastering using 1 m long probe thermometer. In a month's time, the mud plaster was removed and content of pit was turned andmixed with water, then again plastered Parthenium compost was ready in 14 weeks (10 November 2015)

Pot Trial and Treatments:-

In a pot culture experiment, integration impact of Parthenium Composted Nitrogen (PCN) ,urea N (U) and Azotobacter chroococum was studied on growth attributes and yields of Jawar (Soghum bicolor.) A glass house experiment was conducted in department of Botany Dr. Babasaheb Ambedkar Marathwada university Aurangabad. with Jawar during Rabi 2015-16 comprising eight treatments in complete randomized design with eight replications. Bulk soil collected from Godawari Rivar Paithan. Based on soil test, recommended dose of fertilizer N for Jawar was 120Kg hactar. Required quantity of Parthenium compost for substituting a specific amount of N, basal dose of 60kg P and 33kg K ha through urea, single superphosphate and muriate of potash, respectively were mixed to soil as per the treatment before 10 days of sowing of Jawar . Each post was lined with polythene and filled with 5 Kg of above soil Jawar seed were treated with 10 days old Azotobacter chroococum suspension (10 cells ml.) with sticker (5% sugar and 2% gum acacia in water)and sown as per the treatments. Moisture of each pot was maintained as and when required. Five healthy and uniform plants in each pot were maintained after seedlings establishment. Remaining 60kg N ha was applied in two equal splits at tillering and flag leaf initiation. The recommended agronomic practices were adopted for raising the crop. At 60DAS, four pots under each treatment were used to study tillers, plant height and root volume. Grain and straw yields of remaining four posts were recorded at crop harvest. Researchers have seen emergence of Parthenium in posts to which its compost was applied. Hence, effort was also made to search the reason for it to minimize the spread of Parthenium.

Plant Sampling and their Analysis:-

Wheat grains and straw were harvested at maturity and air dried for further processing. The dried grains were stored at room temperature for 3 months prior to analysis. The samples were analyzed in the laboratory for chemical parameters after tri-acid digestion. Protein contents was determined from the formula Nx 5.83(AOAC,1990) Phosphorus content was estimated photometrically via the development of phospho-molybdate complex, as described by Taussky and Shorr (1953) .Potassium content was determined by flame photometry. Micronutrients (Fe,Mn, Zn and Cu) were determined by atomic absorption spectrophotometer.

Statistical Analysis;-

All of the plant date was analyzed by complete randomized design, using Microsoft Excel and SPSS packages. Least Significance Difference (LSD) at p= 0.05 were tested to determine the significant difference (Gomez and Gomez, 1984) .Statistical analysis of Parthenium seed Viability were computed for F-test.

Results

Manurial Value of Parthenium Compost:-

Table 1 shows the manorial value of Parthenium compost. The electrical conductivity and pH of Parthenium compost was found to be higher 1 dSm and 7.8 respectively .Total N, P, K, S, Mn, Fe, Zn and Cu content in Parthenium compost was 1.58,0.33,1.64,0.29,306,7829,116 and 66, respectively. Viable number of total bacteria, fungi, Azotobacter, Actionomycetes and Phosphate solubilizing bacteria were observed 3.66*10(6), 6.67*10(4) 2.3*10(6) ,7.67*10(5) and 2,67*10(6) , respectively in g compost.

Table 1: Chemical and biological characteristics of Parthenium compost

Characteristics	Value
Macronutrient(%)	
Total N	1.58
Total P	0.33
Total K	1.64
Total S	0.29
Micronutrients (ppm)	
Fe	7829
Mn	304
Zn	116
Cu	66
Electrochemical	
PH	7.8
EC (dSm(1))	1
Biological(g compost (1))	
Total bacterial	$13.66'X10^{6}$
Fungi	$9.67X10^{4}$
Azotobacter	$2.33X10^{6}$
Actiomycetes	$7.67X10^{5}$
Phosphate Solubilizing Bacteria(PPB)	$2.67X10^{6}$

Table 2: Effect of integrated use of composed Parthenium hysterophorous on growth and yields of Jawar.

Treatments	Plant hight (cm)	Tillers (Pot)	Root Volume (cc Pot)	Grain	Straw
T1(100% urea N)	50.43	18.00	35.00	28.82	36.2
T2 (100%PCN)	43.00	14.50	25.00	21.44	26.80
T3(75%urea N+25% PCN)	55.00	18.50	37.50	30.91	38.05
T4(50% urea N(50%PCN)	55.50	20.50	40.00	32.00	40.00
T5(25%ures N(75%PCN)	45.50	17.00	30.00	23.52	29.40
T6(75% urea N+25% PCN+ AzotobacterChroococum)	53.50	20.50	51.50	32.89	40.74
T7(50% urea N+50% PCN+	67.00	23.50	58.40	34.87	43.59

AzotobacterChroococum)					
T8(25% urea N+75% PCN+ AzotobacterChroococum)	65.50	21.00	53.20	32.66	40.83
SEM+	0.57	0.72	1.43	0.19	0.99
CD(p=0.05)	1.40	1.77	4.54	1.97	2.45

*N : Nitrogen through Urea ** PCN :Nitrogen through parthenium compost, CD: Critical difference at 5%

Effect of Integrated Use Composted Parthenium hysterophorous on Growth and Yields of Sorghum the mean plant height (cm), total number of tiller, root volume (cc pot (1)) and root length(cm) pertaining to different treatments recorded at 120 days of Jawar plant has been shown in Table 3.Scanning of data revealed that the mean plant height ranged from 0.4meter to 4.0 meters . Treatment T7 gave significantly greater plant height than T4 where recommended dose of nitrogen was applied in the ration 1/2:1/2 through urea and Parthenium compost (PCN) with inoculation of Azotobacter chroococum. Treatment T6 T7 and T8 were superior to T3 T4 and T5 Application of 100% N through composted parthenium (PCN) resulted in significant reduction in plant height, tillers and root volume of plant and ultimately grain and straw yield of Jawar as compared to 100%N through urea This may due to the allelopathic potential of Parthenium (Oudhia et al.1997;Oodhia,.2000).Higher growth and yields of Jawar was recorded with 50% N through urea +50% N through composted Parthenium However, use 25% N through urea +75% through composted Parthenium caused significantly inferior growth attributes and yield of Jawar as compared to 50% N through each of composted Parthenium+urea. Thus, maximum 50% of N can be supplemented through composted Parthenium beyond which it exhibits harmful effect on crop(Singh et al.1999;Rakesh and Bajpai, 2001).

Table 4- Effect of integrated use of parthenium compost, urea and Azotobacter on macro and micro nutrients acquisition of Jawar

Treatments	N	P	K	S	Fe	Mn	Zn	Cu
T1(100% ureaN)	0.43	0.10	0.49	0.12	2.79	0.98	3.02	0.31
T2 (100%PCN)	0.29	0.07	0.34	0.07	1.95	0.60	1.80	0.12
T3(75%urea N+25% PCN)	0.48	0.13	0.53	0.14	3.33	2.07	2.25	0.46
T4(50%ures N(50%PCN)	0.54	0.14	0.56	0.17	4.28	2.57	2.86	0.50
T5(25%ures N(75%PCN)	0.34	0.19	0.39	0.08	4.73	2.20	1.96	0.60
T6(75% urea N+25% PCN+ AZotobacterChroococum)	0.58	0.14	0.58	0.18	3.38	1.80	2.88	0.54
T7(50% urea N+50% PCN+ AZotobacterChroococum)	0.67	0.16	0.68	0.22	3.76	3.31	3.15	0.0
T8(25% urea N+75% PCN+ AZotobacterChroococum)	0.60	0.15	0.61	0.19	5.20	1.43	2.37	0.60
SEM+	0.014	0.005	0.016	0.006	0.351	0.239	0.108	0.16
CD(p=0.05)	0.035	0.013	0.041	0.012	0.868	0.519	2.267	NS

*N : Nitrogen through Urea ** PCN :Nitrogen through parthenium compost, CD: Critical difference at 5% NS : Not significance.

Table 4 clearly show that integrated use of Parthenium compost and Azotobacter increased nitrogen phosphorus, postassium and sulphur acquisition in Jawar urea and Parthenium compost. The maximum uptake N (6.67 g port(1)), P (0.16 g pot(1)), K (0.68 g pot(1)) and S (0.22g pot(1)) were recorded with treatments T7, where 50% N through each of urea and composted Parthenium were applied with Azotobacter. This may be due to increasing availability of nitrogen, phosphorus, postassium and sulpohur in soil when integrated application composted Parthenium. A similar trend was recorded for

acquisition of Mn and Zn also. Copper uptake was affectednon significantly by the application of composted Parthenium.

DISCUSSION

Parthenium either pre or post flowering for composting in not a solution to reduce its hazards until they are uprooted.Singh and Singh (2005) also reported 29.9, 18.8,35.5and 15.2 % increase in yield owing to FYM application at 15 t ha (1) and vermicompost at 7.4,10 and 15 t ha(1) respectively over no organic manure.

Vadav (2005) also reported similar result. Inoculation of Azotobacterchroococcumsignificantly enhanced growth and yield of Triticum aestivation as compared to their respective uninolulated treatment combination. Inoculation of Azotobacterchroococcum produced 33-130 % more volume of toots as compared to its corresponding uninoculated treatment indicating synergistic effect of composted parthenium on activity of organophilic Azotobacterchroococcum treatment T7 gave significantly higher plant height (cm), number of tillers root volume (cc) and yield of grain and straw compare to all other treatment, where integrated use of 50 % recommended dose of N through each of urea and (PCN)Parthenium along ith Azotobacter Chrococcum was beneficial to target higher yield of wheat. It was due to Azotobacter chroococcum reduces contents of auxin and gibberellins inhibitors and which causes increase the multiplication of cell and thus help in elongation of plants (Qureshi, 1985) .As similar result was found in case of total number of tillers root volume and root length.The increase in tillers was probably because of greater supply of observed in case of acquisition N.P.K.S. Mn and zn (Gupt et al, 1986) Application of nitrogen through Parthnium compost exhibited lowest value of nutrients acquisition because application of full dose of nitrogen through composted parthenium adversely affected the plant growth and lower supply of nutrients. Composted Parthenium probably had allelopathic effect and affected metabolic processes of wheat plant.

CONSCLUSION

The nutrient composition of composted Parthenium (PNC) was higher than FYM. Application of recommended dose of nitrogen (120 Kg ha^{-1}) through PCN caused lower values of growth, yield and uptake of nutrients by Jawar. Inoculation of Azotobacter chroococcum along with 50% of nitrogen through each of the urea and PCN gave greater values of growth, yield and nutrient acquisition of Jawar. On the basis of these finding it was concluded that integrated nutrient supply approach inclusion of Azotobacter certainly will be useful in improving the growth and yield of Jawar. Hence, recycling of Parthenium plants by composing seems to be an efficient way for utilizing the tremendous agricultural weeds. Composting is a resource for low external input sustainable agriculture and is also a good method for solving control weeds and pollution problems.

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