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Chemical Characterization of Organic Amendments Prepared from Lignin-rich Waste and its impact on the Growth of *Cicer arietinum* and *Phaseolus vulgaris*

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Abstract

Composting is the regulated transformation of waste and biodegradable organic materials into stable products with the help of microbes**.** Rice husk and sawdust are substrates that contain high amount of organic matter but still are slow degraders due to presence of lignin and are generally considered an environmental burden. Therefore, in the present study, an attempt has been made to degrade such wastes by converting them into compost using a sustainable eco-friendly technique and controlling the influencing parameters. Two different types of compost were prepared using rice husk (R.C.) and sawdust (S.C.) as substrate. The efficacy of prepared compost has been evaluated in terms of growth parameters of plants. During the entire study period, a reduction of 16% to 49 % in organic matter content has been assessed using S.C. and 26% to 61% for R.C. The C:N ratio reduced from 127 to 20 in case of R.C whereas for S.C it reduced from 102 to 16. Total phosphorous was observed maximum 0.62% in S.C and 0.34% R.C. The germination value for *Cicer arietinum* has been found to be 100% in case of compost prepared from sawdust and rice husk. Similarly, in case of *Phaseolus vulgaris* the germination value of 90% has been obtained for substrate S.C. and 93% for substrate R.C. The highest value of 10.23mg/g of total chlorophyll and 2.73mg/g of ascorbic acid has been observed for *Cicer arietinum* in S.C. Also, for *Phaseolus vulgaris* the maximum total chlorophyll value of 5.93mg/g and 1.63 mg/g of ascorbic acid has been evaluated in S.C. The fertility index value of 3.4 for S.C and 3.22 for R.C respectively thus indicates the prepared compost in present study is of very good quality with medium fertilizing potential.

Keywords: Agriculture waste, Composting, Vigor index, Fertility index, Phytotoxicity.

Introduction

Environmental challenges such as environmental deterioration, water pollution, soil pollution and air pollution are primarily caused by unethical practises, inappropriate waste collecting methods and unethical behavior. Based on their physical, chemical and biological qualities, wastes can be classed as biodegradable, non-biodegradable, or toxic. Natural organic molecules that can be degraded by microorganisms, such as waste from cotton mills, paper mills and sugar mills are examples of biodegradable waste (Kumari et al. 2021). In recent years the circular economy concept has gained attention as it provides a positive backdrop for ecofriendly waste management systems (Ujj et al. 2021). The wastes should be properly treated before its final disposal otherwise, it can create major health issues in the society (Satiya et al. 2018). For proper management of solid waste segregation is the first foremost step that is important as in India around 40-50% of total solid waste is biodegradable. Also, about 23% of rice straw (RS) is burned on farms, contributing 0.05% to greenhouse gas emissions (Kumar et al. 2018).

Agriculture play a vital role in Indian economy as it accounts to 20.2% share in GDP of the country. Even after covid-19, the upsurge in the contribution of agriculture to economy has been on positive side. Agricultural wastes also known as agro-wastes, are the leftovers and residues of crop and animal farming's from cultivation, harvesting and processing of raw agricultural goods. Organic farming is a non-toxic farming practice that utilize organic additives made from waste resources like agricultural waste. According to a recent study, organic farming contributes to a holistic production management system that encourages and boosts agro-ecosystem health, such as biodiversity which includes micro and macro species in the soil, biogeochemical cycles, and soil biological activity. Soil health, which encompasses physical, chemical and biological components, is critical in humanity's quest for sustainable agriculture, particularly crop production (Sulok et al. 2021**)**.

Particularly for municipal authorities who have to deal with this issue within their purview, the treatment and disposal of waste is a very essential and critical challenge. Obviously, a variety of alternative tactics, such composting or anaerobic digestion, have been suggested to try to stop and decrease waste output. (Sokac et al. 2022). Stabilization by composting allows suitable waste management as a way of sustainable agriculture and environmental concerns, potentially mitigating health and environmental dangers associated with overproduction. Composting as a method of value addition is a viable choice due to its low cost (Tabrika et al. 2021).

To decompose organic waste and convert it into organic fertiliser, composting is a more economical and environmentally good option. It is a biological technique that uses fungi and bacteria to break down polymeric waste materials that contain organic waste. Temperature, pH, moisture content, C/N ratio, particle size, nutrient content, and oxygen availability are significant factors affecting any biological process's ability to convert organic waste into useful compost. (Sokac et al. 2022**)**.

Stability and Maturity of compost

In agronomy, maturity relates to the level of toxicity of the material applied to soil (Dios *et al.,* 2009). Since application of unstablized or partially unstablized compost on soil affects crop as well as environment due to the presence of phytotoxins which effect the growth and survival of plants (Khan *et al.,* 2009). Compost Maturity and Stability are pivotal measures to depict the quality of compost. Stability is related to state of organic matter of composted organic waste which is related to type of organic compounds remaining and to intensity of biological activity (Islam, 2012), stability is a parameter of compost evolution that reflects the biodegradability of its organic matter and is primarily assessed through respirometric measures. (Sciubba et al. 2015). Level of phytotoxins in compost and suitability for plant growth are the indicators of compost maturity (Islam et al. 2012). An indicator of compost's potential to support plant development is compost maturity (Sciubba et al., 2015), also it is considered as index of completeness of compost (Islam et al., 2012).

Due to the fact that immature composts keep decomposing even after being applied to soil, which causes soil bacteria to scavenge for the nutrients that ought to have been made available to plants. By competing with crops for oxygen or by causing phytotoxicity in plants due to insufficient organic matter biodegradation, unstable or immature compost may hinder plant growth and harm crops. Furthermore, immature compost usually subdues nitrogen rather than releasing it for plant growth (Ofusu-Budu et al. 2010). Even being essential measure there no method to determine the stability and maturity of compost. So the researchers have found their own set of parameters accordingly (Monedero et al. 2002).

Before composts is reintroduced to agricultural land, one of the most crucial factors to consider is phytotoxicity in order to assess the compost's viability for agricultural use and to eliminate environmental risks. Immature compost also contains phytotoxic substances such heavy metals, phenolic compounds, ethylene, and ammonia, as well as an overabundance of salts and organic acids that may inhibit seed germination and plant growth. Utilizing a liquid extract from the compost, the germination index gauges maturity based on seed germination and early plant growth. The germination index was employed to evaluate the toxicity of compost, which incorporates measurements of relative seed germination and relative root elongation. The most efficient methods for determining phytotoxicity are often germination or growth assays. The outcome of the Germination Index (GI) test are the most accurate and uncomplicated approach to determine if compost is harmful to plant growth. Salinity, soil pathogens, poisonous chemicals, as well as various other physical and chemical parameters of compost are frequently tested using germination bioassays. (Basil et al. 2020).

Considering the above-mentioned facts in view the present study has been carried out with the objective to examine the fertility potential of compost prepared from agricultural waste under controlled conditions. The germination index, relative root growth, and plant growth bioassay of *Cicer arietinum* and *Phaseolus vulgaris* were used to determine the compost's phytotoxicity. In addition, the efficacy of the fertility index were also determined by practical assessment of prepared compost.

Materials and Methods

Composting Procedure and Raw Material

Two different composts were prepared from agriculture residue (rice husk) and sawdust by aerobic pile method. Rice husk has a high content of lignin and silica which leads to slower degradation.

Pre-treatment of food waste was being carried out before carrying out the composting process. The food in form of sawdust and rice husk along with cow dung was added in the ratio of 5:3:1 in each composting pile. The piles were prepared by alternate layer of substrate cow dung and food waste giving pile an triangular shape, later covered with the soil. In order to maintain required moisture content each composting pile was covered with jute sacks. Maturation time and raw material used in the composting process and the details has been summarized in table 1

Table 1: Raw material, method and maturation time of each compost.

Raw material	Method	Maturation period
Sawdust +Cowdung+ Foodwaste with ratio 5:3:1	Aerobic composting	140 days
Rice husk +Cowdung+ Foodwaste with ratio 5:3:1	Aerobic composting	160 days

The temperature and pH was monitored regularly in the composting pile during the entire study period. In order to maintain the moisture content in the composting piles the water was added accordingly as per the requirement. The piles were manually turned continuously to provide aeration at an interval of 1 month. After the stabilization of temperature the piles were left for curing stage so as the no further degradation that harms the plants growth could occur after the application of compost.

Physico-chemical Parameters

The physico chemical parameters analyses of all the collected fresh samples except moisture content was carried out after drying the samples in oven as per the prescribed standard method in Jackson 1958. Composite sample were collected, crushed and sieved through a BSS standard sieve number 8 (Lopez et al. 2002). The obtained compost was analyzed for various physico-chemical temperature through thermometer, moisture content using gravimetric method, pH using glass electrode method, organic matter by Walkley and Black method 1934, Organic Nitrogen was analysed using Kjeldhal method. The available and total phosphorous was determined by using method prescribed by Jackson 1958. The Volatile Solids were determined by IS: 10158 (1982), further TOC was calculated according to the formula, %C = VS%/1.8 (Saha et al 2014).

Phytotoxicity of Compost

Before compost may be recycled back onto agricultural land, it must satisfy the phytotoxicology test in order to determine suitability for agricultural use and to minimise environmental concerns (Selim et al. 2012). In present study phytotoxicity of compost was analysed in terms of relative seed germination percentage, relative root growth percentage by (Jakubus, 2020) and plant growth bioassay in terms root length, shoot length, biomass and over all vigor index has been calculated using method prescribed by Abdul-Baki and Anderson, 1973.

The following formulas were employed to calculate the relative seed germination (RSG), relative root growth (RRG), and germination index (GI) percentages (Jakubus 2020). The Relative Seed Germination as RSG can be calculated by using Eq.1 as:

$$\mathrm{RSG}(\%) = \frac{\text{mean number of seeds germinated in compost extract}}{\text{mean number of seeds germinated in control}} * 100 \qquad (1)$$

While, Relative Root Growth as RRG can be calculated by using Eq2 as :

$$\text{RRG}(\%) = \frac{\text{mean root length in compost extract}}{\text{mean root length in control}} * 100 \quad (2)$$

and, Germination Index as GI can be calculated by using Eq.3 as :

$$\text{GI}(\%) = \frac{\text{RSG}*\text{RRG}}{100} \quad (3)$$

Fertility Index

Compost fertility index of both the prepared composts was calculated utilising Saha et 2010 methodology. The TOC, TN, TP, TK, and C:N values were used to calculate the index and each parameter received a score value and weighting factor. TOC is considered the most important parameter for characterization of prepared compost and is given the highest weight factor. Fertility index can be calculated by using equation (Eq. 4) as (Saha et al. 2010):

$$\text{Fi} = \frac{\Sigma \text{Si}*\text{Wi}}{\Sigma \text{Wi}} \quad (4)$$

where, S_i is the score value and W_i is the weight factor i^{th} is the fertility parameter.

Clean Index

The Clean index of both compost in the present study was determined by using the method suggested by Saha et al. 2010, Mandal et al. 2014. The index has been calculated from the amount of heavy metals present in the prepared compost. The heavy metals included Cadmium, Chromium, Copper, Zinc, Nickel and Lead. The maximum weight factor 5 was for cadmium due to its crucial phytotoxic characterstics and mammalian toxicity while the other heavy metal had weight score less than 5. The clean index was calculated as per equation (Eq 5) as Saha et al. 2010

$$\text{CI} = \frac{\Sigma \text{Sj}*\text{Wj}}{\Sigma \text{Wj}} \quad (5)$$

where, S_j is the score value and W_j is the weight factor j^{th} is the heavy metal analytical data.

The analysis of all samples in present study were carried out in triplicate. The results of the analysis are means of 6 replicates for each compost. The one-way ANOVA technique has also been used for the statistical analysis of results.

Results and Discussion

The findings from an investigation of the employed substrate's physico-chemical characteristics both before and after the composting process are summarized in Table 2 while the heavy metals in the prepared compost have been tabulated in Table 3. However, the results obtained from Bio-chemical analysis of prepared compost is tabulated in Table 4 showing effect of compost on the growth of plants species *Cicer arietinum* and *Phaseolus vulgaris*.

Rice husk and sawdust possess significant amount of lignin and cellulose and therefore retards the degradation process (Thiyageshwari et al. 2018). In order to enhance the degradation process effectively, the compost piles were kept moist by addition of water regularly and turning the piles at proper interval of time. The temperature of the compost was regularly monitored using a thermometer. The characteristics of both the substrates was determined in terms of moisture content, pH and electrical conductivity. The organic carbon content in saw dust and rice husk was found to be 28.56% and 35.55% respectively, while the organic matter content in sawdust and rice husk was found to be 49.28% and 61.28% respectively thus indicating a significant difference between the two substrates. Also, the total nitrogen in both the substrates was found to be 0.28% thus leading to a very high C:N ratio. The C:N ratio for saw dust and rice husk was found to be 102 and 127 respectively indicating a high ratio. However, the volatile solids content in cow dung as an inoculum was found to be 14.2% with organic matter content of 18.18%.

Table 2: Analysis of physico- chemical parameters of the substrate before and after composting process

S. No	Parameters	Before Composting		After Composting		
		Sawdust	Rice Husk	S.C	R.C	Control
1	**Moisture Content (%)**	3.50	2	53.4±0.12	57.65±0.22	40±0.078
2	**pH**	6.5	6.3	7.88±0.50	7.60±0.09	6.51±0.03
3	**Electrical Conductivity (S cm^{-1})**	0.544	0.515	0.30±0.10	0.20±0.01	0.11±0.001
4	**Organic Carbon (%)**	28.56	35.55	9.40±0.04	15.14±0.10	1.39±0.127
5	**Organic Matter (%)**	49.28	61.28	16.21±0.04	26.10±0.10	2.40±0.150
6	**Total Nitrogen (%)**	0.28	0.28	0.65±0.04	0.77±0.07	0.28±0.007
7	**C:N**	102	127	16	20	9
8	**Available Phosphorus (%)**	-	-	0.27±0.12	0.19±0.14	0.12±0.02
9	**Total Phosphorus (%)**	-	-	0.62±0.05	0.34±0.03	0.28±0.05
10	**Total Potassium (%)**	-	-	1.98±3.60	1.02±2.78	0.16±0.13
11	**Total Sodium (%)**	-	-	0.93±2.35	0.98±3.11	0.19±0.14
12	**Volatile Solids (%)**	-	-	46.34±0.63	55.37±0.13	-
13	**TOC (%)**	-	-	25.07±0.55	30.76±0.72	-

*All the values are mean of 6 triplicates and Significant at $p \leq 0.05$ level of variance.

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Table 3 Heavy metals analysed in the prepared compost.

S.No	Heavy Metals	Sawdust Compost	Rice husk compost
1.	**Zinc (mg/kg)**	0.81	0.94
2.	**Copper (mg/kg)**	0.22	0.0004
3.	**Cadmium (mg/kg)**	0.0003	0.003
4.	**Lead (mg/kg)**	0.02	0.0005
5.	**Nickel (mg/kg)**	0.06	0.007
6.	**Total Chromium (mg/kg)**	0.01	0.008

During the composting process, the maximum temperature of R.C. was found to be 58°C while it was observed to be 55°C for S.C. This temperature was ultimately reduced to the ambient temperature value after the compost attained maturity. The variation in temperature during the entire composting process is depicted through Fig 1. The maximum temperature rise of 58°C during composting process was observed after 7 days period in both the cases and it persisted for around 5 weeks. Thereafter, the temperature was found to be decreased and ultimately got stagnant to ambient temperature value. The present study can be well compared with the work carried out by Sarika et al. 2014 with maximum temperature value of 59.7 °C with decomposition of water hyacinth to form compost. Similarly, Tabrika et al. 2021 carried out similar study and reported that the maximum core temperature during biodegradation for the tomato plant waste ranged from 53°C to 57°C.

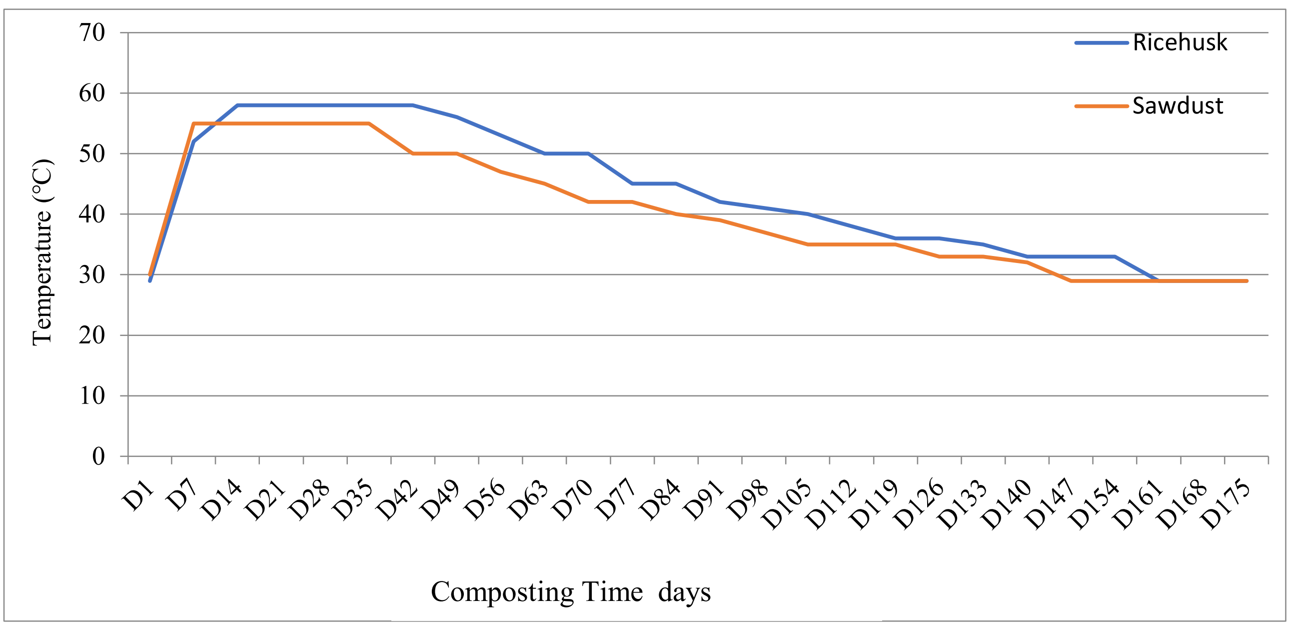

Fig 1: Temperature variation observed during Composting Process.

Carbon to nitrogen ratio as C:N ratio is another important indicator for assessing the suitability of biodegradability of organic matter during the composting process. In the present study a decrease in the C:N ratio has been observed thus indicating an appropriate or complete degradation of the complex organic matter. However, the decrease is observed due to the degradation of carbonaceous substances, while the nitrogen tends to increase during the process. The C:N ratio in prepared compost of 16 and 20 has been observed in S.C. and R.C. respectively. The present study can be well compared with the work carried out by Nolan et al. 2011 and observed that the C:N ratio for the prepared compost ranged from 9-17.2. Also, Du et al. 2021 in a study prepared 4 different compost from rice straw, rice straw biogas residue and microbial inoculant the C:N ratio for all the compost ranged 19.8-16.3. The C:N ratio less than 20 indicates stable and mature compost (Ravindra et al. 2019).

After nitrogen, phosphorus is the second-most significant macronutrient. It is crucial for biochemical and physiological processes like photosynthesis and plant transfer traits. (Harada et al. 2020). In the present study the total phosphorous in the obtained compost has been found to be 0.62±0.05, 0.34±0.03 and 0.28±0.05 % for S.C, R.C and for control samples respectively. Also, in present study the potassium maximum concentration of 1.98 ±3.60 % and minimum value of 0.16±0.13 % has been assessed for the control. Kumari et al. 2020 in a similar study observed potassium percentage of 1.02 % in terms of Dry weight the aerobic compost prepared using flower waste. The physico chemical parameters in the present study has been assessed and the observed data is depicted through Fig 2.

Table 5: Criteria used for estimation of the score value of compost (Saha et al. 2010)

Fertility Parameter	**Score value**					**Weight Factor**
	5	4	3	2	1	
TOC	20.1	15.1–20.0	12.1–15	9.1–12	9.1	5
TP	>1.25	1.01–1.25	0.81–1.00	0.51–0.80	0.51	3
TN	>0.60	0.41–0.60	0.21–0.40	0.11–0.20	<0.11	3
TK	>1.00	0.76–1.00	0.51–0.75	0.26–0.50	<0.26	1
C:N ratio	>10.10	10.1–15	15.1–20	20.1–25	<25	3

Fertility index is another important indexing method that has been evaluated in the present study as per the method prescribed by Saha et al. 2010 and Mandal et al. 2014. Fertility index is a rating system based on fertilising capability for compost, can be used to rate the compost's quality. The criteria used in assessment of fertility index is summarized in table 6. Also, the grading in present study can help to enhance the market value of good quality compost before being it is sold. Data of fertility index value calculated for the prepared compost in the present study scored 3.4 for sawdust and 3.22 for rice husk compost. The obtained grade values thus indicating that the prepared compost to be in the range of very good quality with medium fertilizing potential. Clean index was calculated as the method prescribed by Saha et al. 2010 and Mandal et al. 2014. The CI value can be used by the regulatory authority to restrict the entry of heavy metals into the environment Mandal et al 2014 classified the compost into 7 different classes based on the score of each compost for both clean index and fertility index. The classes were Class A for compost with >3.5 fertility index and >4 clean index the compost was graded as highest quality with high manuring value and low heavy metal content. Class B with fertility index ranging between 3.1-3.5, clean index score >4 compost rated as exceptionally good quality, with a medium fertility potential and low heavy metal concentration.\. Class C included > 3.5 fertility index score and clean index score ranging between 3.1- 4 the compost was classified as compost with very high manuring potential and medium heavy metal content. Class D with fertility index score 3.1-3.5 and clean index score ranging between 3.1- 4 Manure was classified as medium quality manure with medium fertility and medium heavy metal content. Class RU-1, 2, 3 have a restricted use with low fertility and can only be used as soil conditioner Mondal et al 2014. In the present study both the compost had low heavy metal potential, since the clean index score for both the compost was 5. The prepared compost could be classified in Class B good quality compost with very low heavy metal potential.

Table 6: Effect of prepared compost on Biochemical parameters of *C.areitnium* and *P. vulgaris*

S. No	**Parameters**	**Sawdust Compost**		**Rice Husk Compost**		**Control**	
		Cicer aeritinium	***Phaseolus vulgaris***	***Cicer aeritnium***	***Phaseolus vulgaris***	***Cicer aeritnium***	***Phaseolus vulgaris***
1.	**Germination %**	100%	90%	100%	93%	86.66%	86.66%
2.	**Relative Seed Germination**	136.36%	127.27%	131.81%	118.18%	-	-
3.	**Relative Root Growth**	174.80%	164.22%	128.65%	150.44%	-	-
4.	**Germination Index**	2.38	2.09	1.69	1.77		
5.	**Biomass (gm/m^2)**	131.69±0.03	229.65±0.18	105.50±0.01	220.32.±0.22	72.34±0.01	170.50±0.12
6.	**Vigor index (cm)**	481	420	430	422	328	309
7.	**Total Chlorophyll content(mg/g)**	10.23	5.93	7.90	5.67	7.34	4.7
8.	**Chlorophyll 'a'(mg/g)**	6.72±0.01	3.32±0.025	5.03±0.07	3.18±0.022	4.6±0.06	2.67±0.023
9.	**Chlorophyll 'b'(mg/g)**	3.51±0.04	2.61±0.11	2.87±0.07	2.49±0.050	2.74±0.03	2.03±0.054

10.	**Carotenoids(mg/g)**	0.67±0.006	0.54±0.016	0.62±0.001	0.47±0.006	0.64±0.006	0.35±0.011
11.	**Ascorbic acid**	2.73±0.18	1.63±0.23	1.90±0.22	1.62±0.12	2.39±0.13	1.55±0.14

*All the values are mean of 6 triplicates and Significant at p≤0.05 level of variance.

Plant Growth Bioassay of *Cicer arietinum*

In present study growth parameter is depicted through germination percentage, relative seed germination, relative root growth, biomass and vigor index of *Cicer arietnium*. However, germination value of 100% has been observed in both the prepared composts. Also, the germination value of 100% has been observed for the S.C. on day 6 while a value of 100% has been assessed for the R.C on day7. The highest biomass flux of 139.69±0.03 gm/m^2 and lowest biomass flux of 72.34±0.01 gm/m^2 has been observed in S.C and control respectively. The total chlorophyll content has also been determined in the present study and a value of 10.23 mg/g and 7.9mg/g was observed in S.C and R.C respectively. Therefore, the obtained chlorophyll thus indicates the use of compost that exiles the biochemical attributes of the plant as compared to 7.34mg/g value for control. Also, the caretenoid content of 0.67mg/g and 0.63mg/g was assessed in S.C and R.C respectively. Ascorbic acid is another important parameter that is considered as an antiphytoxicant as it influences the resistance against adverse environmental condition. Through its synergistic interaction with other antioxidants like glutathione and -tocopherol, ascorbic acid influences a number of stress-responsive enzyme activities and lessens oxidative cell damage. (Venkatesh and Park 2014). In present study the ascorbic acid content of 2.73 mg/gm and 1.90 mg/gm has been found in S.C and R.C respectively.

Similarly, the highest Vigor Index value of 481 cm has been observed in sawdust compost while a value of 430 cm has been assessed in rice husk compost with a value of 328 cm for control. The germination index value has been computed by multiplying the relative seed value with root growth and a maximum value of 2.38 has been obtained for sawdust compost with a value of 1.69 for rice husk compost.

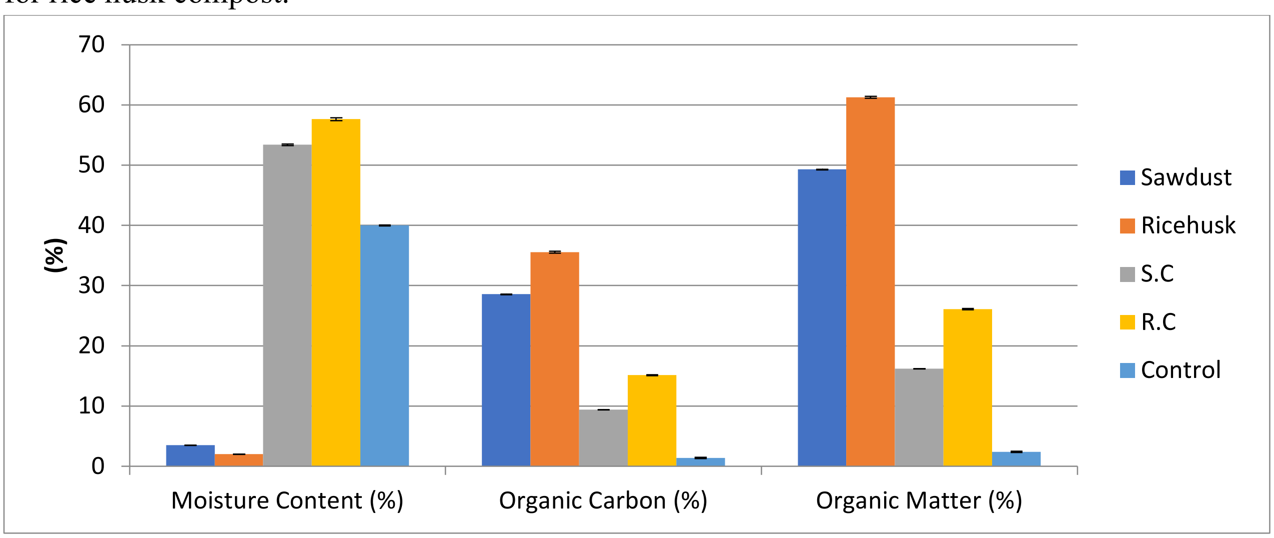

Fig 2 Physico-chemical Characteristics of raw material and prepared compost.

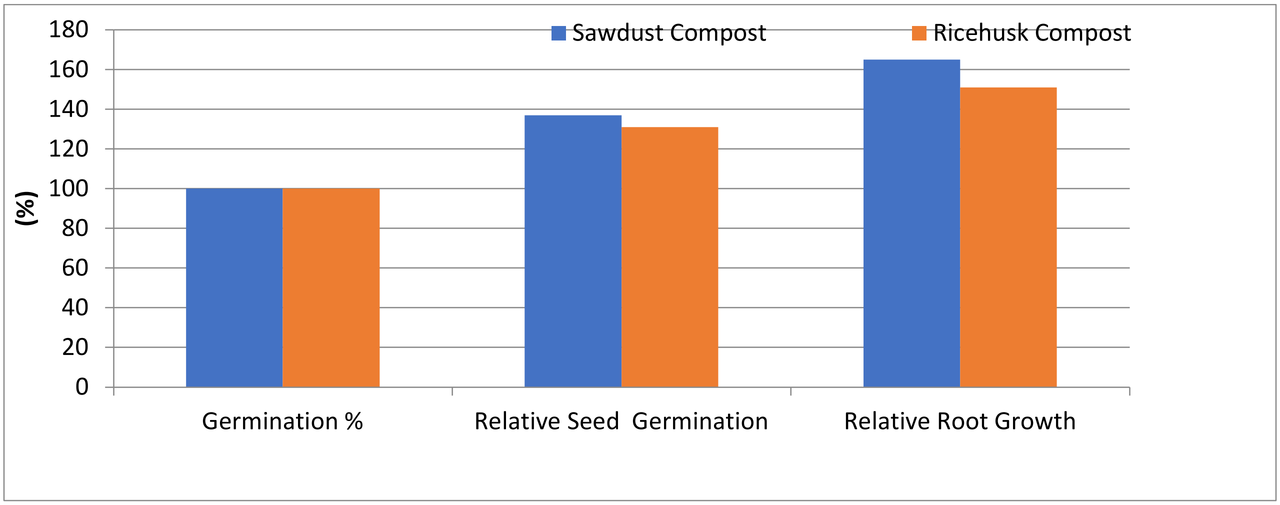

Fig 3. Germination % Relative seed germination and Relative root growth values for different organic amendments for plant species *Cicer arietnium*.

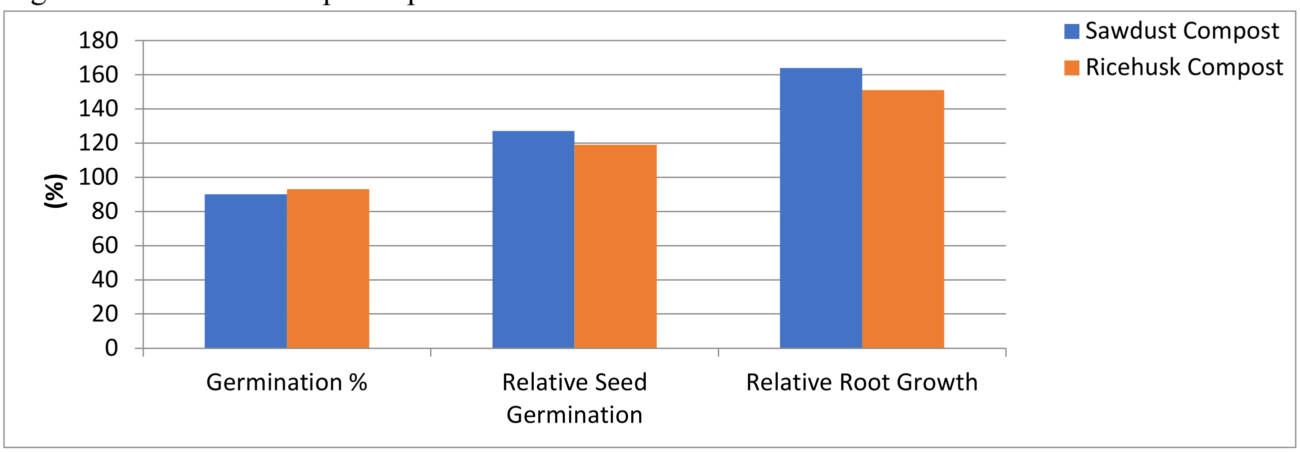

Fig 4: Germination % Relative seed germination and Relative root growth values for different organic amendments for plant species *Phaseolus vulgaris*

Plant Growth Bioassay of *Phaseolus vulgaris*

Growth bioassay included germination percentage, relative seed germination, relative root growth biomass vigor index. A germination value of 93 % was observed in R.C with 90% germination value in S.C. The highest biomass flux of 229.65±0.18 gm/m^2 has been observed in sawdust compost while a value of 220.32.±0.22 gm/m^2 is observed in rice husk compost with a minimum value of 170.50±0.12 gm/m^2 detected in control.

The total chlorophyll content of the prepared compost has also been determined in the present study and a value of 5.97 mg/g and 5.67 mg/g was observed in S.C and R.C respectively thus indicating that the use of compost also exiles the biochemical attributes of the plant. Also the carotenoid content of 0.54±0.016 mg/g and 0.47±0.006 mg/g was assessed in S.C and R.C respectively. Ascorbic acid is another important parameter that is considered as an antiphytoxicant as it influences the resistance against adverse environmental condition. In present study the ascorbic acid content of 1.63 mg/gm and 1.62 mg/gm has been found in S.C and R.C for the respectively. The maximum germination index value of 2.07 and 1.77 has been observed in S.C and R.C. respectively. Similarly, the highest Vigor Index value of 422 cm has been observed for R.C while a value of 420 cm is observed for S.C with a value of 309cm for control.

Conclusion

Present study aids to conclude that the compost prepared from saw dust and rice husk along with cow dung as an inoculum is the best alternative of utilization of different agricultural slow degradable waste. During the composting process, the maximum temperature was found to be 58°C for rice husk while it was observed to be 55°C for sawdust compost. A reduction of 16.21% and 26.10% in organic carbon has been observed at the end of the process for sawdust and rice husk compost respectively. In prepared compost the C:N ratio of 16 and 20 has been observed in substrate sawdust and rice husk respectively thus indicating the better biodegradability of the organic matter in prepared compost. As per the fertility index value the prepared compost in the present study scored 3.4 for sawdust and 3.22 for rice husk compost. The obtained grade values thus indicating that the prepared compost in present study is of very good quality with medium fertilizing potential. Compost is black gold as it is solution to the problem of solid waste management, alternate for synthetic fertilizers and improves soil health. The present study thus indicates that utilizing rice husk and saw dust in composting is an efficient technique that can be implemented and adapted by the farmers for the management of crop residue. Also, the prepared compost will be helpful to revive nutrient cycles in soil which get affected due to excessive use of synthetic fertilizers.

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