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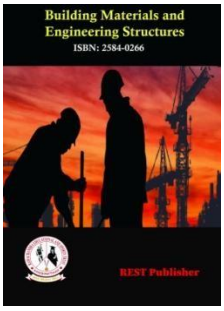

Performance Analysis of Agricultural Waste Using Gray Relational Analysis (GRA) Method

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Abstract: *Agricultural waste, which is produced in large Sizes in India, for biogas production is A promising ingredient. A circular economy based on agro-waste biogas requires the Integration of agricultural waste management, biogas production and utilization and policy support. This article is from agricultural waste and Discusses in detail the feasibility of biogas production, its development and governance initiatives and policy regulations. For predicting the biogas content of agricultural wastes a simple theoretical study of anaerobic digestion is proposed. There are many different models, but most of them are instead of biochemical equations Relies on algebraic equations, and many more input parameters and Computational time is required. This work provides a simplified model that predicts the amount of biogas produced and can be used for agricultural energy feasibility studies, for example, bioreactors. That digests animal waste slurry. The objective of this thesis finding the best cleaning location for Agricultural waste or the Gray Relational Analysis (GRA) method showing. Based on grey correlation analysis for improving with many performance characteristics. This paper presents a useful approach. Based on the Taguchi method of orthogonal arrays sixteen test runs was performed. Such as laser power and cutting speed the laser cutting parameters are optimized considering multi-functional characteristics, that is Work piece surface roughness, Top kerf width and heat affected zone (HAZ) width. By analyzing the corresponding grayscale, Laser power is in the answers rather than slowing down and can be seen to have a greater effect. Ultimate analysis C, Ultimate analysis H, Ultimate analysis O, Ultimate analysis N, Ultimate analysis S there are alternatives parameter and Poultry Litter (Dry), Pig Solids (Dry), Fodder Manure (Dry), and Beef feedlot manure (dried) there are evaluation parameters. Ultimate analysis S is got the first rank whereas the Ultimate analysis O is having the lowest rank in this paper Agricultural waste Ultimate analysis S is got the first rank whereas the Ultimate analysis O is having the lowest rank.*

Keywords: *Agricultural Waste, MCDM.*

1. INTRODUCTION

The agricultural and ligneous feedstock to produce bibfuls and various useful biochemical supply chains in the last decade, Hydro-power linkage and cost-effectiveness issues are the focus of research. Substitution of agricultural raw materials Could of zero-carbon energy proves to be a valuable resource, It is a bio-based product fuel and Can be produced whenever converted to an internal trade-off: For energy production By using these products, Humans cannot eat them. However, since waste products are unwanted by-products of other processes, does not have many practical applications. Hence, research on organic waste-to-energy conversion is very useful, because it is from previously undesired waste products to produce the desired biomaterials Provides method. In existing biomass production and processing networks adding these agricultural waste-to-energy pathways would be even more beneficial. Biogas anaerobic digestion and for those who want an alternative energy path Considered. Digesters digest organic waste into energy (biogas). Plus, it's digestible A good soil additive and can be used by farmers to increase crop production. The benefits of anaerobic digestion are energy production. Also, biogas production to overcome energy problems Improve the agriculture sector, can increase efficiency and Consider environmental compatibility Act as a service. By the Taguchi method, grey correlation analysis is given first. Then, in the cutting parameters selection and turning

operations Evaluation of machining performance is discussed. Based on the Taguchi method by grey correlation analysis the optimization of turn functions is described in detail.

2. AGRICULTURAL WASTE

As for their abundance, between 1998 and 2001 in Western Europe About 0.7 million tones of agricultural and forest wastes were generated. France, the 1995e2006 census, in 2006, the total annual waste generation showed an increase to about 849 million tones, of this, agricultural and forest wastes account for about 43%, i.s. 374 million tones. It is the second largest agricultural country in Europe in Germany, in 2000; Agricultural waste represents more than 175 million tons per year, which includes 25 million tons of agricultural biomass per year. German municipal waste per year is 16 million tones and industrial waste is only 9 million tones. containing the words "forest restoration" and "agricultural waste" or "agricultural by-product" or "crop residue" Compost, bios lids and On the use of sewage sludge There are additional grey literature reports. But for direct use Best documented examples the authors could not find it. Web of Science or other easily accessible Due to lack of data from peer-reviewed studies based on grey literature, For forest restoration Experiments on direct utilization of agricultural wastes or It does not mean that tests are not conducted. Considering the uncertain parameters, With Agricultural Waste-to-Energy Network Design we formally state the problem of biomass. With an agro-waste-to-energy network, we consider extensive biomass. This network consists of various alternatives; it includes different types of bio-feeds, Organic and agricultural waste feeds, Befouls and by-products available. The raw materials or raw materials Sustainable energy, such as bibfuls and biogas is also converted into useful by-products. Accordingly, not only for producing clean energy and managing agricultural wastes Networking has great value. A total of 216 processing and There are 172 ingredients/combinations with enhancing technologies. Feedstocks include soybeans, corn, sugarcane, hardwood and softwood etc. Different types of feeds on the network are converted into energy and biomass in the following way.

3. MATERIALS AND METHOD

Gray Relational Analysis (GRA) is a multivariate statistical analysis method; it is in their similarities or developmental trends the degree of correlation between factors Evaluates by difference. Between geometric patterns of time series as unity increases, the interaction between these factors is becoming increasingly important. Based on this principle, for the development of the organization Major and minor factors can be determined. According to grey structure theory, complex factor relationships and ambiguity with ecosystems' internal policies are grey control systems. Accounting due to the interference of unknown and undetermined factors has increased our understanding of ES. Grey correlation analysis that does not satisfy standard distribution laws. The number of GRA calculations is relatively high although small; the results are consistent with qualitative analysis results. Hence, drought and supply of ESs to analyze vegetation restoration implications used the GRA method. Estimates using this method are usually based on grey color correlation coefficient, degree, and order. The first step in grey correlation analysis is grey correlation during this step, Tool life, cutting force and surface finish are normalized to a range between zero and one. Next, desired and actual tool life, cutting force and surface roughness to express the relationship between the grey correlations. Then, corresponding to each performance characteristic Gray Correlation Coefficient Averaged grey correlation coefficient is calculated. The overall evaluation of several performance characteristics is based on gray relative quality. Consequently, the optimization complexity of multiple performance characteristics in single grey is converted into an optimization of the corresponding quality. Also, any process parameters statistically To find out what is important.

4. RESULTS AND DISCUSSION

TABLE 1. Agricultural Waste

	Chicken litter (dried)	**Swine solids (dried)**	**Feedlot manure (dried)**	**Beef feedlot manure (dried)**
Ultimate analysis C	45.32	47.30	45.39	46.43
Ultimate analysis H	42.65	41.54	33.69	27.30
Ultimate analysis O	24.08	27.87	34.78	49.00
Ultimate analysis N	23.17	34.76	35.86	28.65
Ultimate analysis S	33.33	54.76	27.96	39.09

Table 1 shows the Agricultural Waste for Grey relational analysis. Ultimate analysis C, Ultimate analysis H, Ultimate analysis O, Ultimate analysis N, Ultimate analysis S, Chicken litter (dried), Swine solids (dried), manure (dried), Beef feedlot manure (dried) in this Alternatives or Evaluation value.

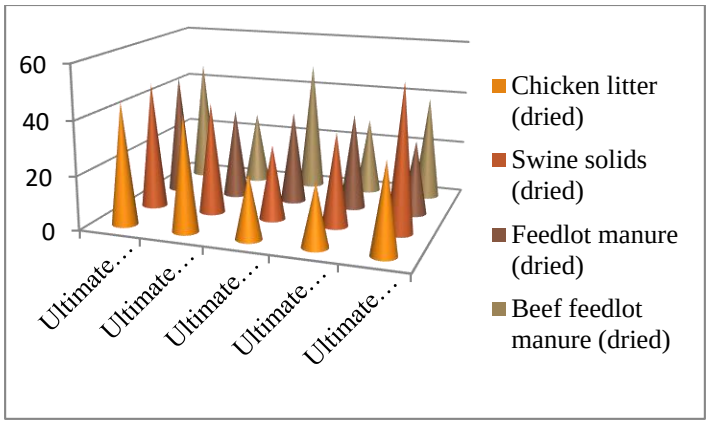

FIGURE 1. Agricultural Waste

Figure 1 shows the Agricultural Waste for Grey relational analysis. Ultimate analysis C, Ultimate analysis H, Ultimate analysis O, Ultimate analysis N, Ultimate analysis S, Chicken litter (dried), Swine solids (dried), manure (dried), Beef feedlot manure (dried) in this Alternatives or Evaluation value.

TABLE 2. Normalized Data

	Normalized Data			
Ultimate analysis C	1.0000	0.7226	0.0000	0.1184
Ultimate analysis H	0.8795	0.5084	0.6713	1.0000
Ultimate analysis O	0.0411	0.0000	0.6087	0.0000
Ultimate analysis N	0.0000	0.2562	0.5468	0.9378
Ultimate analysis S	0.4587	1.0000	1.0000	0.4567

Table 2 shows the Normalized data for Agricultural Waste. Ultimate analysis C, Ultimate analysis H, Ultimate analysis O, Ultimate analysis N, Ultimate analysis S, Chicken litter (dried), Swine solids (dried), manure (dried), Beef feedlot manure (dried) it is also the Normalized value.

TABLE 3. Deviation sequence

	Deviation sequence			
Ultimate analysis C	0.0000	0.2774	1.0000	0.8816
Ultimate analysis H	0.1205	0.4916	0.3287	0.0000
Ultimate analysis O	0.9589	1.0000	0.3913	1.0000
Ultimate analysis N	1.0000	0.7438	0.4532	0.0622
Ultimate analysis S	0.5413	0.0000	0.0000	0.5433

Table 3 shows the Deviation sequence for Agricultural Waste. Ultimate analysis C, Ultimate analysis H, Ultimate analysis O, Ultimate analysis N, Ultimate analysis S, Chicken litter (dried), Swine solids (dried), manure (dried), Beef feedlot manure (dried) it is also the Maximum or Deviation sequence value.

TABLE 4. Grey relation coefficient

	Grey relation coefficient			
Ultimate analysis C	1.0000	0.6431	0.3333	0.3619
Ultimate analysis H	0.8057	0.5042	0.6033	1.0000
Ultimate analysis O	0.3427	0.3333	0.5610	0.3333
Ultimate analysis N	0.3333	0.4020	0.5245	0.8893
Ultimate analysis S	0.4802	1.0000	1.0000	0.4792

Table 4 shows the Grey relation coefficient for Agricultural Waste. Ultimate analysis C, Ultimate analysis H, Ultimate analysis O, Ultimate analysis N, Ultimate analysis S, Chicken litter (dried), Swine solids (dried), manure (dried), Beef feedlot manure (dried) it is also Calculated the Maximum and minimum Value.

TABLE 5. GRG and Rank

	GRG	Rank
Ultimate analysis C	0.5846	3
Ultimate analysis H	0.7283	2
Ultimate analysis O	0.3926	5
Ultimate analysis N	0.5373	4
Ultimate analysis S	0.7399	1

Table 5 shows the Result of final GRG Rank of GRA for Agricultural Waste. GRG Rank Ultimate analysis S is showing the highest value for GRG Rank and Ultimate Analysis O is showing the lowest value.

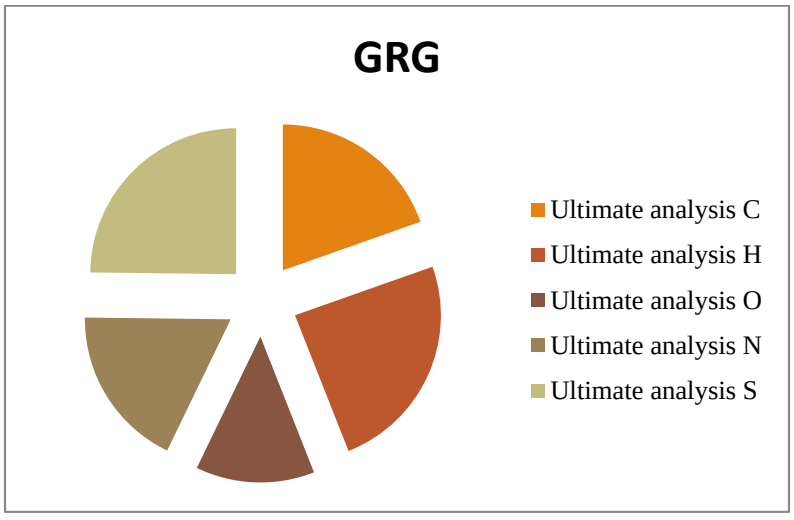

FIGURE 2. GRG

Figure 2 shows the GRG of GRA for Agricultural Waste. GRG Ultimate analysis S 0.7399 is showing the highest value for GRG Rank and Ultimate analysis O 0.3926 is showing the lowest value.

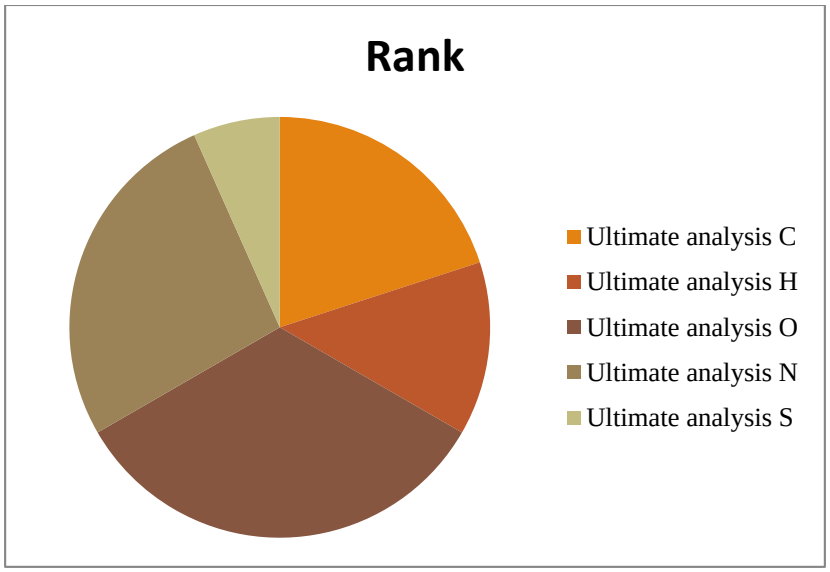

FIGURE 3. Rank

5. CONCLUSION

In fact, by using a simple model this is one of the areas where the most benefits can get. But the sample will help farmers make decisions and Provide basic predictions. A sustainable waste treatment option and potential alternative to other energy production processes increased use of anaerobic technology a theoretical study can support this. Agricultural waste products have Utilization of agricultural wastes Very important. From aqueous solutions at various operating conditions for removing various dyes many agricultural waste products are studied. This study, through the grey correlation analysis method of Pellet combustion in an improved domestic pellet boiler, Conducted correlation analyzes on multivariable relationships. Grey correlation analysis is as part of the grey theory, and it is used for the combustion process. In addition to classical statistical techniques, by the standard of grey rationality, this method of Combustion allows all aspects to be qualified by a single variable. Complex multi-response optimization Standardized single grey of corresponding quality will be optimized. A confirmatory test, Factor Dependence Analysis of Gray Relative Quality Shows that "optimal combustion" is allowed to be achieved. The result of the final GRG Rank of GRA for Agricultural Waste. GRG Rank Ultimate analysis S is showing the highest value for GRG Rank and Ultimate analysis O is showing the lowest value.

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