

International Journal of Applied Life Sciences and Engineering (IJALSE)

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Vol. 1 (1) 79-80, 2014

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Lignite in PROM: A Preliminary Study

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Abstract

Lignite is used in making PROM as a replacement to cattle dung. The biomass (stem) production of *Cicer arietinum* in 20 days indicate that lignite is as effective as dung in making PROM. Detailed studies are proposed.

Keywords : PROM, Lignite

Introduction

Organic manure enriched with high grade (+34% P₂O₅) rock phosphate mineral in very fine (74 microns) size (PROM) is reported as effective^{1,2,3} as any other chemical phosphatic fertilizer and also shows equal residual effect indicating that PROM overcomes the problem of phosphate fixation^{4,5} by soils. Cattle dung is used in the initial studies of PROM. Later press mud, a waste from sugar industry is also found to be equally effective. The requirement of phosphatic fertilizers is in several million tons. Hence there is a need to test and find equally effective organic matter to replace cattle dung partially or fully. Lignite a fuel mineral has been tested as an ingredient in PROM in the present study.

Materials and Methods

Lignite analyzing 36.69% fixed carbon, 38.07% volatile matter with 25.24% ash on dry basis was used in making PROM-1. Agricultural grade gypsum (+70% CaSO₄ 2H₂O in 100% minus 2 mm size) and phosphate concentrate analyzing +34% P₂O₅ were used. All these minerals were sourced from M/s RSMM Ltd. Salt Petre of +97% purity was obtained from M/s Liladhar Biyani Salt Petre India Ltd. Jaggery, PSB (with VAM) were of commercial grades

available in the market. Azatobacter was procured from Rajasthan College of Agriculture, Udaipur. DAP used is of ANALAR grade of M/s Glaxo Laboratory (India) Ltd.

Experiments

Pot scale experiments were conducted using *Cicer arietinum* to note biomass production in 20 days using DAP, PROM produced using lignite (PROM-1) and cattle dung (PROM-2) and absolute control (normal sandy soil without any addition of either DAP or PROM). *Cicer arietinum* is grown in October/November and is harvested⁶ during February. PROM 1 and 2 were produced with constituents as shown in Table 1. The results of biomass production in 20 days are shown in Table 2.

Results and Discussion

As can be seen from the Table 2 that PROM-2 shows comparable results with DAP whereas PROM-1 made using lignite shows slightly better results. These results are of preliminary nature and nevertheless prompt detailed confirmatory field trials. It is a matter of interest to investigate the role of volatile matter present in lignite. What effect will it have if lignite is used in PROM after recovering volatile matter by biotic activity or by thermal stripping?

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Closing Remarks

1. The results presented in this article unequivocally show that lignite can be used in PROM making either as full (almost +90%) or part replacement of the organic materials so far tested in PROM making.
2. More detailed field investigations are recommended. The possibility of recovering volatile matter from lignite for use as fuel needs further studies.

Table 1

S. No.	Material	Dry Weight in Grams	
		PROM- 1	PROM- 2
1.	Rock Phosphate (+34% P ₂ O ₅) powder	90	90
2.	Gypsum powder (70% pure)	10	10
3.	Lignite powder (having 38% fixed carbon on dry basis)	80	-
4.	Cow dung	5	85
5.	PSB	0.5	0.5
6.	<i>Azotobacter</i>	0.5	0.5
7.	Jaggery	0.5	0.5
8.	Water	26	26
9.	Salt Petre	14.00	14.00

Table 2

Treatment No.	Treatment	Biomass (Stem) per plant	Percent increase or decrease
1.	Absolute Control (normal sandy soil)	1.49 gms	--
2.	DAP, 25.12 gms (plus sandy soil)	1.62 gms	8.72
3.	PROM- 1, 100 gms (plus sandy soil)	2.33 gms	56.38
4.	PROM- 2, 100 gms (plus sandy soil)	1.65 gms	10.74

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