A Study of the Efficacy of Different Particle Sizes of Press-Mud as Filler in Manure Mixture

In the fertiliser trade, most of the standard fertiliser mixtures contain only 80 to 95 % of fertilising materials, the remaining being made up of some make-weight materials known as fillers. The fillers play an important role in fertiliser mixtures by serving as a corrective of the residual acidity and also as conditioning agents. Press-mud, a solid material obtained in large quantities from sugar factories during the process of clarification of cane juice, may be useful as a filler on account of the nutrients contained in it. With this end in view, an observational trial was conducted using press-mud of different particle sizes as a filler in the sugar cane manure mixture 16:4:4.

Eight manure mixtures were prepared as stated below, and stored in polythene-lined jute bags for a period of ten months in the laboratory.

1. Urea + super + muriate of potash + 0.25 mm press-mud as filler
2. Urea + super + muriate of potash + 0.50 mm press-mud as filler
3. Urea + super + muriate of potash + 0.75 mm press-mud as filler
4. Urea + super + muriate of potash + gypsum as filler
5. Urea+super+muriate of potash+ammonium sulphate+0.25 mm press-mud as filler (65 % of N) (32 % of N)
6. Urea+super+muriate of potash+ammonium sulphate+0.50 mm press-mud as filler
7. Urea+super+muriate of potash+ammonium sulphate+0.75 mm press-mud as filler
8. Urea+super+muriate of potash+ammonium sulphate+gypsum as filler.

Press-mud analysing 1.4 % total N, 2.24 % total P_2O_5 and 1.88 % total K_2O received from the Amaravathy sugar factory was air-dried and sieved with 0 25 mm, 0 50 mm and 0.75 mm sieves respectively to obtain three different grades of filler. In the first four treatments, the proportion of filler in the mixture was 32 %, and in the rest it was 17% only, since ammonium sulphate was an additional ingredient in the mixture. The initial sample was drawn on the third day after allowing sufficient time for the ingredients of the mixture to get mixed well. Thereafter the samples were drawn at monthly intervals and analysed for their moisture, total N, P_2O_5 and K_2O, water soluble, P_2O_5 citrate soluble and insoluble P_2O_5 as per A.O.A.C. methods. The data were statistically analysed for finding out whether the reversion of phosphoric acid already reported (Mustafa *et al.* 1965) for manure

TABLE 1 (a) *Results of analysis of the manure mixture 16:4:4 at monthly intervals*

Treatments	Moisture		N		P_2O_5		K_2O		WSP		CSP		CISP	
	I	F	I	F	I	F	I	F	I	F	I	F	I	F
1.	9.6	10.5	16.5	16.4	5.8	5.8	4.7	4.7	4.9	2.8	5.6	5.4	0.24	0.45
2.	9.1	10.3	16.5	16.5	5.8	5.8	4.7	4.7	4.9	2.8	5.6	5.4	0.24	0.42
3.	8.2	9.3	16.5	16.5	5.8	5.8	4.7	4.7	4.9	3.4	5.6	5.4	0.24	0.41
4.	6.8	9.6	16.5	16.4	5.8	5.8	4.7	4.7	5.0	1.8	5.6	5.2	0.24	0.65
5.	6.0	7.9	16.5	16.4	5.8	5.8	4.7	4.7	4.9	2.8	5.5	5.4	0.24	0.42
6.	6.3	6.2	16.5	16.5	5.8	5.8	4.7	4.7	4.9	2.9	5.6	5.4	0.24	0.41
7.	6.0	7.0	16.5	16.5	5.8	5.8	4.7	4.7	4.9	3.4	5.6	5.4	0.24	0.40
8.	6.0	8.5	16.5	16.4	5.8	5.8	4.7	4.7	4.9	2.3	5.6	5.2	0.24	0.62

I = Initial F = Final

TABLE 1 (b) *Results of statistical analysis*

Particulars	Months	Between mixtures	Between different grades of fillers
Moisture	11, 5, 9, 10, 6, 8, 7, 4, 3, 2, 1 **	I, II **	1, 2, 4, 3 **
Citrate soluble phosphoric acid	1, 2, 3, 4, 5, 7, 6, 8, 9, 10, 11 **	II, I **	3, 2, 1, 4 **
Citrate soluble phosphoric acid	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 **	N.S.	3, 2, 1, 4 **
Citrate insoluble phosphoric acid	11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1 **	N.S.	4, 1, 2, 3 **

** Significant at 1 % level
Mixture I = Urea alone used as nitrogenous fertiliser
Mixture II = Urea + ammonium sulphate used as nitrogenous fertiliser
Grade 1 = 0.25 mm press-mud
Grade 2 = 0.5 mm press-mud
Grade 3 = 0.75 mm press-mud
Grade 4 = Gypsum

In all the eight treatments, the moisture content increased during the period of storage, and the increase was significant at 1% level. The increase in moisture content during 2nd and 3rd months was on a par and likewise from 4th to 11th month. The mixtures which contained urea alone (treatments 1 to 4) absorbed more moisture than those containing urea and ammonium sulphate (treatments 5 to 8). As regards the influence of the size of the press-mud particles on the absorption of moisture, it was found that the 0.25 mm press-mud absorbed more moisture followed by gypsum, 0.50 mm and 0.75 mm

Total N, P_2O_5 and K_2O: There was no variation in the total N, P_2O_5 and K_2O contents of the mixtures studied throughout the period of investigation.

Water soluble P_2O_5: In respect of water soluble P_2O_5, a significant sudden fall was noticed in the second month, and thereafter it remained steady. There was no significant variation in water soluble P_2O_5 content from second month onwards. The reversion of water soluble P_2O_5 was less in the mixtures having urea and ammoninm sulphate than those containing urea alone. Among the different sizes of particles of press-mud used, the mixtures containing 0.75 mm press-mud as filler recorded more water soluble P_2O_5 content followed by those containing 0.50 mm, 0.25 mm press-mud and gypsum as filler, which indicated that 0.75 mm press-mud could be used without bringing about much reversion of P_2O_5 in the manure mixture on storage.

Citrate soluble and insoluble P_2O_5: The citrate soluble P_2O_5 dreceased gradually in all the eight mixtures. In respect of citrate soluble P_2O_5 content there was gradual decrease from month to month and for different sizes of particles of press-mud which was significant at 1 % level. But the citrate insoluble P_2O_5 content increased gradually in all the eight mixtures, as the period of storage advanced, this being significant at 1 % level. However citrate soluble P_2O_5 content was more and the citrate insoluble P_2O_5 content was less in mixtures containing 0.75 mm press-mud as filler indicating that 0.75 mm particle sized press-mud was the best as filler. There was no significant variation in the citrate soluble P_2O_5 content and citrate insoluble P_2O_5 contents in urea-ammonium sulphate mixtures and plain urea mixtures.

Summary and Conclusions: The study revealed that the water soluble P_2O_5 was maximum in the mixture, containing 0.75 mm grade press-mud as filler. The reversion of water soluble P_2O_5 took place in the second month and thereafter it remained steady. A slight decrease in the citrate soluble P_2O_5 content and a slight increase in the citrate insoluble P_2O_5 content were recorded at the end of the trial, in all the eight types of the manure mixture. The reversion of P_2O_5 was less in the urea-ammonium sulphate mixture than urea alone mixture. Taking into account the available P_2O_5 content of the mixture it is concluded from the above data that 0.75 mm grade press-mud can be safely used as a filler, without much of reversion of P_2O_5.

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