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EFFECT OF SEED PELLETING WITH BIODIGESTED SLURRY AND MACRO NUTRIENTS ON RICE FALLOW GREEN GRAM cv. CO-2

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ABSTRACT

A field investigation was carried out at Annamalai University Experimental Farm, Annamalai Nagar during January to March 1989 to study the effect of seed pelleting with biodigested slurry and inorganic nutrients on rice fallow green gram cv. Co-2. Biogas fresh slurry at 10, 25 and 50 per cent (w/w of seed) was used as seed pelleting medium with or without DAP 5 per cent and muriate of potash (MOP) 5 per cent. Slurry at all three concentrations influenced favourably the grain yields. Slurry at 50 per cent with 5 per cent DAP gave increased grain yield of 589 kg ha -1 over unpelleted seeds. The yield increase was marginal with respect to potash treatments.

KEY WORDS : Seed pelleting, Biodigested slurry, Macro nutrients

Seed pelleting is a technique of seed encapsulation with organic, inorganic nutrients, water absorbents and pesticides. Importance of seed pelleting was well recognised as early as 1955 (Loneragen et al., 1955). Seed coating provides an opportunity to package effective quantities of material such that they can influence the seed or soil at the seed soil interface. By not having to treat the remaining bulk of the soil, farmers may be able to save on the inputs required and the associated cost of applying them (Scott, 1989). Seed coating materials were reported to improve the germination ability and to increase seedling emergence at changing soil moisture, especially in the suboptimal range (Mucke, 1987). Seed pelleting technique will be relevant in direct sown paddy, wheat, pulses and oilseeds crops which require initial vigour for sustained crop growth and development. This paper concerns itself with the findings of the effect of seed pelleting with biodigested slurry and macro nutrients on rice fallow green gram.

MATERIALS AND METHODS

A field experiment was conducted at Annamalai University Experimental Farm during January to March '89 to

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study the effect of seed pelleting with biodigested slurry, diammonium phosphate (DAP) and muriate of potash (MOP) on rice fallow green gram cv. Co-2. The experimental soil was clayey with low in available nitrogen (235.4 kg ha^{-1}), medium in available phosphorus (14.2 kg ha^{-1}) and high in available potassium (312.3 kg ha^{-1}). Biodigested fresh slurry (90 per cent moisture) was used at three concentrations viz., 10, 25 and 50 per cent (w/w of seed) with or without DAP 5 per cent and MOP 5 per cent. There were in all 10 treatments replicated four times adopting randomized block design (Table-1)

Method of Seed Pelleting

Fresh biodigested slurry, powdered DAP and MOP and green gram seeds were thoroughly mixed manually ensuring uniform seed coating. Gum arabic (0.5 per cent) was used as the binding material. Coated seeds were then shade dried to the pre-treatment moisture of the seed.

The biometric observations viz., germination percentage, plant height at vegetative and flowering stage, number of nodules per plant, number of pods per plant and yields were recorded and the data were statistically analysed.

RESULTS AND DISCUSSION

Effect of pelleting on germination

Seed pelleting with 50 per cent slurry significantly increased the germination of the seed by 23.3 per cent over unpelleted seed (control). Performance of seed pelleting with 25 per cent slurry (T_4) was comparable to that of 50 per cent slurry (T_7). No significant variation was found between the seed pelleting with 25 per cent slurry (T_4) and seed pelleting with 10 per cent slurry (T_1). Germination was favourably influenced by the inclusion of DAP (T_2, T_5 and T_8), although effect was inferior to slurry alone (T_7, T_4, and T_1). Seed pelleting with MOP + slurry (T_3, T_6 and T_9) resulted in reduction in germination percentage.

Coating materials regulate the transport of water to seed and embryo and act as a water reservoir that is able to release or bind additionally the water to certain limits (Mucke, 1987). In this way slurry coating might have improved germinating ability of seeds.

Plant height

Seed pelleting with 50 per cent slurry (T_7) exerted marked influence on plant height at both vegetative and flowering stages. Biogas slurry at lower concentration too increased the plant height over unpelleted seeds. Increased plant height in seed pelleting with slurry could be attributed to the presence of ammoniacal nitrogen and other nutrients in slurry (Zodhy and Din, 1983). Encapsulation of seed with slurry might have mitigated the initial water stress. Certain seed pelleting materials improving seedling vigour at changing soil moisture especially in the sub-optimal range was reported by Mucke (1987). Similar increase in plant height in black gram due to seed pelleting with slurry was observed by Sridhar (1989). Com-

TABLE-1 : Effect of seed pelleting in green gram

Treatment No	Treatment details	Germination percentage	Plant height (cm)		Number of effective nodules plant -1	Number of pods plant $^{-1}$	Grain yield t ha $^{-1}$
			Vegetative stage	Flowering stage			
T_1	Seed pelleting with 10% slurry	95.50 (77.75)	27.17	38.40	25.11	10.60	1.38
T_2	Seed pelleting with 10% slurry + 5% DAP	86.77 (68.67)	27.00	38.37	25.89	11.07	1.40
T_3	Seed pelleting with 10% slurry + 5% MOP	79.50 (63.08)	25.47	35.57	21.15	9.90	1.16
T_4	Seed pelleting with 25% slurry	97.50 (80.90)	26.93	39.33	28.14	11.47	1.51
T_5	Seed pelleting with 25% slurry + 5% DAP	94.77 (76.78)	26.90	39.30	29.27	11.17	1.62
T_6	Seed pelleting with 25% slurry + 5% MOP	78.33 (62.26)	25.97	36.83	21.73	10.27	1.33
T_7	Seed pelleting with 50% slurry	98.43 (82.80)	30.83	40.27	36.20	15.27	1.72
T_8	Seed pelleting with 50% slurry + 5% DAP.	91.03 (72.57)	30.60	39.80	39.26	17.00	1.77
T_9	Seed pelleting with 50% slurry + 5% MOP	76.83 (61.23)	25.17	37.07	24.66	10.90	1.38
T_{10}	Control (unpelleted seeds)	84.90 (67.13)	25.17	36.13	21.16	10.03	1.18
	S.E D	1.57	0.44	0.43	0.64	0.22	0.03
	C.D. (p=0.05)	3.23	0.92	0.91	1.32	0.45	0.05

Figures in parenthesis indicate transformed values.

bination of DAP with slurry (T_2, T_5, and T_8) did not increase the plant height over slurry treatments (T_1, T_4, and T_7). Seed pelleting with MOP along with slurry T_3, T_6, and T_9 had no impact on plant height.

Number of effective nodules plant

Seed pelleting with 50 per cent biodigested slurry + 5 per cent DAP (T_8) registered the maximum number of nodules per plant (39.26), followed by

seed pelleting with 50 per cent slurry alone (T_7). Higher nodule number with slurry treated seeds may be attributed to the favourable effect of slurry on growth and multiplication of rhizobium. According to Trung and Yoshida (1983), the nodulation of mung bean increased with the increase of FYM applications. The results of the present study are in line with the findings Jauhri (1989) who reported that pelleting soybean seeds with cowdung slurry improved nodulation. Slurry 25 per cent + DAP 5 per cent (T_5) did not vary from that of slurry 25 per cent alone (T_4) indicating insignificant influence of DAP on nodule number. MOP along with slurry either at 10 or 25 per cent (T_3 and T_6) failed to exert influence on effective nodule number. However, MOP with 50 per cent slurry resulted in a significant increase in effective nodules over control. Interestingly, the effect was similar to that of slurry 10 per cent (T_1) and slurry 10 per cent + DAP 5 per cent (T_2).

Number of pods plant

The Maximum pod production was observed in seed pelleting with 50 per cent slurry + DAP 5 per cent (T_8), closely followed by 50 per cent slurry alone (T_7). Seed pelleting with slurry increasing the pod number in black gram was reported by Sridhar (1989). Pod production from 25 per cent slurry (T_4) was better than that of T_5 (25 per cent slurry + DAP 5 per cent) and T_6 (25 per cent slurry + MOP 5 per cent). The results are indicative that the combination of DAP 5 per cent with 50 per cent slurry (T_8) resulted in an increase of 1.73 and 6.97 pods per plant over 50 per cent slurry and control respectively. Inclusion of MOP to slurry at 10 or 25 per cent had no beneficial effect.

Grain Yield

Seed pelleting with 50 per cent slurry + 5 per cent DAP (T_8) registered the maximum grain yield (1.77 t ha^{-1}), closely followed by 50 per cent slurry alone (T_7), both being on par. Increase in grain yield in T_8 and T_7 was 50 per cent and 45.8 per cent compared to control (T_{10}). Seed pelleting with 25 per cent slurry + 5 per cent DAP (T_5) had a clear edge over 25 per cent slurry alone. However, the combination of DAP with 10 per cent slurry (T_2) was in no way better than 10 per cent slurry alone (T_1). Irrespective of concentration of slurry, inclusion of MOP (T_3, T_6 and T_9) in pelleting media had shown negative effect compared to slurry alone treatments (T_1, T_4 and T_7). Slurry 10 per cent with MOP 5 per cent (T_3) registered the least grain yield (1.16 t ha^{-1}) and found to be on par with unpelleted seeds (T_{10}).

From the results, it is obvious that biodigested slurry at all the concentrations viz., 10, 25 and 50 per cent influenced favourably the gram yield. The crop response was linear with the increase in slurry concentrations. Seed pelleting with slurry increasing germination percentage and improving seedling vigour was earlier reported (Lakshmanan, 1989). Increase in grain yields due to seed pelleting with

biodigested slurry was reported by Sridhar (1989) and Ramanathan (1989) in black gram and rice, respectively. Presence of ammoniacal nitrogen and other macro-and micronutrients in biogas slurry (Zodhy et al., 1984) and favourable effect of slurry on backterial number (Varalakshmi Devi, 1988) might have contributed to the increased grain yields in green gram.

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