the specified yield targets based on the fertility status of the soil.

Verification of fertilizer Prescription equation

The mean sorghum grain yield and the initial fertility status of the soil are reported in Table 2. The results indicated that the highest grain yield of 46.63 Q ha^{-1} for 50 Q ha^{-1} yield target treatment and control (no manure) plot recorded the lowest yield of 18.67 Q ha^{-1}. The blanket recommendation treatment recorded a grain yield of 43.23 Q ha^{-1}. The value cost ratio (VCR) was worked out for the treatments and the 40 Q ha^{-1} yield target treatment recorded a highest VCR of 7.0 followed by 6.3 in 45 Q ha^{-1} yield level treatment. In sorghum reasonable agreement between targetted and achieved yield was recorded. The per cent deviation also worked out for three yield targetting treatments and it ranges from -7.0 to +6.8.

*Two more verification trials were also conducted in farmer's holdings in Salem district in red non-calcareous soils of Irugur series. The results of the experiment are presented in Table 3. The mean initial fertility status of the fields were 265 kg $KMnO_4$- N(low), 24.5 kg Olsen-P(high) and 549 kg NH_4OAC-K(high). The highest grain yield of 52.5 q ha^{-1} was recorded in 55 Q ha^{-1} yield level + composted coir pith treatment followed by 55 qha^{-1} with FYM treatment. The beneficial effect of composed coirpith which supplies more nutrients than FYM would have contributed for the highest yield.

*Two more verification trials were conducted in farmer's holdings in Thennamanallur, Coimbatore district in a red soil - Irugur series with sorghum Co.26 as a test crop. The initial fertility staus of the soil indicated that the soil is low in $KMnO_4$-N/ medium in both Olsen-P and NH_4OACK. The results of the experiment are presented in Table 4. The grain yield ranged from 20.63 Q ha^{-1} to 51.55 Q ha^{-1}. The yield obtained in the three yield targetting treatments were higher than the blanket recommendation as well as soil test recommendation (Mitscherlich - Bray approach). The yield response was 23.02 in the blanket recommendation to 30.92 Q ha^{-1} in the 55 Q ha^{-1} yield target treatments. The value Cost Ratio (VCR) of 8.1 was recorded in the 45 Q ha^{-1} yield target treatment which was higher than the blanket recommendation (4.7).

From the results, the fertilizer recommendation can be given for 50 q ha^{-1} yield in sorghum based on soil test values for the red soils of Irugur series in the western as well as in the north western zone.

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MANAGEMENT OF ATRAZINE RESIDUES IN SOIL

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ABSTRACT

Green house studies and field experiments were conducted at Tamil Nadu Agricultural University farms during 1991 and 1992 to screen the amendments to reduce atrazine toxicity and to test verify the effective amendments in the field. FYM, compost, phosphoric acid and poultry manure were screened in green house studies and under field conditions application of FYM at 12.5 t/ha or charcoal at 5.0 kg/ha along the seed line found to mitigate the atrazine residual toxicity in the sensitive crop soybean.

Atrazine (2-Chloro - 4 - ethylamino - 6 - isopropyl amino - 1,3,5 triazine) ia a persistent herbicide widely used for weed control in sorghum, maize and sugarcane (Sankaran and Mani, 1974). Ideally a given herbicide should persist just long enough to control the target weeds and then be

Table 1. Atrazine content in soil (ppm) and dry weight of soyabean seedlings at 30 days after germination

Treatments	I Experiment		DMP g/pot	II Experiment		DMP g/pot
	20 DAA	40 DAA		20 DAA	40 DAA	
FYM 12.5 t/ha	0.112	0.091	13.1	0.134	0.022	15.4
Compost 12.5 t/ha	0.138	0.094	13.0	0.149	0.026	13.9
Poultry manure 2.5 t/ha	0.165	0.111	11.6	0,138	0.066	12.8
Phosphoric acid 50 ppm	0.165	0.103	11.6	0.173	0.078	13.2
Urea 50 ppm	0.203	0.134	8.1	0.193	0.091	10.8
Citric acid 50 ppm	0.208	0.131	7.1	0.217	0.093	11.8
Super Phosphate 45 Kg P2O5/ha	0.221	0.138	6.8	0.190	0.092	12.4
Control	0.339	0.133	7.0	0.209	0.095	7.7
C.D. (P=0.05)	0.070	0.019	2.8	0.032	0.030	2.3

rapidly degraded to their constituent atoms. If the persistence period is too long, injury to susceptible plants planted/sown subsequently may occur or long term environmental pollution problem could arise (Rajukkannu, 1985). Atrazine is fairly a high persistent chemical and often exhibit residual toxicity to the succeeding susceptible crops.Hence, there is a need to mitigate the atrazine toxicity in the sensitive crops and the present study was conducted in soybean with various amendments to mitigate the atrazine toxicity in soil.

Table 2. Germination and plant height of soybean

Treatments	Germination (No/m^2)		Plant Height	
	1991	1992	1991	1992
FYM 12.5 t/ha	30.7	31.0	40.8	38.1
Compost 12.5 t/ha	30.7	31.3	38.2	38.2
Poultry Manure 2.5 t/ha	28.0	29.0	37.7	37.4
Maize Stalk 5t/ha	31.0	30.7	31.4	29.8
Charcoal 5 kg/ha	30.7	31.0	34.0	33.4
Phosphoric Acid 50 ppm	31.3	31.3	33.0	33.1
Super Phosphate 45 kg P_2O_5/ha	31.3	32.0	34.9	33.9
Control	26.0	26.0	32.0	28.0
CD (P=0.05)	2.0	1.9	2.9	1.8

Table 3. Yield and yield attributes of soybean

Treatments	No. of pods /plant	1991 1000 Seed weight	Seed yield kg/ha	No.of pods/plant	1992 1000 seed wt.	Seed yield kg/ha.
FYM 12.5 t/ha	61.0	146	1387	65.3	157	1717
Compost 12.5 t/ha	57.7	142	1120	64.3	154	1542
Poultry Manure 2.5 t/ha	49.0	143	913	60.7	147	1225
Maize Stalk 5t/ha	48.3	141	720	57.0	136	917
Charcoal 5 kg/ha	58.3	145	1200	58.7	143	1442
Phosphoric Acid 50 ppm	55.7	135	620	55.3	128	816
Super Phosphate 45 kg P_2O_5/ha	58.7	142	1147	62.0	136	1467
Control	49.3	135	860	48.3	126	658
CD (P=0.05)	8.7	3.0	369	11.0	11	383

MATERIALS AND METHODS

Green house studies were conducted twice to screen the amendment materials in order to mitigate the atrazine residue in soil.

Soil sample was collected from Eastern Block, TNAU, and processed. Exactly 7.5 kg soil was filled in each pot and atrazine was fortified at the rate of 0.5 kg/ha and the following treatments were imposed before sowing soybean. The treatments constituted FYM and compost 12.5 t/ha, poultry manure 2.5 t/ha, phosphoric acid, urea and citric acid @ 50 ppm. Super phosphate 45 kg P_2O_5/ha and control. The soybean seeds (Var.Co.1) were sown. The experiment was replicated thrice in a RBD. The soil samples were collected at 20 and 40 days after application (DAA) and were analysed for atrazine content using GC procedure (Sankaran *et al* ., 1993). Repeated sowings at 10 days interval were taken and dry matter accumulation 30 days after germination was recorded.

Field experiments were conducted in 1991 and 1992 at TNAU. Initially sorghum crop was raised as a residue development crop. Atrazine at 0.5 kg/ha was applied to sorghum crop as pre-emergence on third day after sowing. After the

harvest of sorghum crop the terminal residue in soil was estimated.

Soybean var.Co.1 was sown in the field after removing the sorghum stubbles. The following treatments based on the results from green house studies conducted elsewhere were given. FYM and compost 12.5 t/ha, poultry manure 2.5t/ha, maize stalk 5t/ha, charcoal along the seed line at 5 kg/ha, phosphoric acid 50 ppm, super phosphate to 40 kg P_2O_5/ha were compared with control. The experiment was conducted in a RBD replicated thrice. The germination count was taken seven days after sowing. The plant height was taken at 30 DAS and the yield and yield attributes were taken at harvest.

RESULTS AND DISCUSSION

1. Green House Studies : The experimental soil is clay loam consisting of 35.6 per cent clay. The pH of the soil is 8.2 and EC 0.72 dS/m. The atrazine content in the soil samples collected at 20 and 40 DAA are presented in Table-1. Almost all the amendments found to reduce the atrazine content in soil when compared to control. However, the atrazine content was lowest in FYM and compost applied pots. This might be due to the adsorption of atrazine in the organic matter complex and enhanced degradation, The atrazine content drastically reduced at 40 DAA in the above treatments. Similar results were obtained in the second experiment also.

The dry weight of plants were taken 30 days after germination (i.e. 60 DAA) consequent to the third sowing and are presented in Table- 1. The dry weight of soybean was highest in FYM and compost applied pots followed by phosphoric acid and poultry manure. The urea and citric acid did not influence the DMP of soybean.

2. Field Experiment : The experiments were conducted at Tamil Nadu Agricultural University farm during 1991 and 1992. The soil is a clay loam having a pH of 8.2. The available N,P and K were 162.39 and 660 kg/ha respectively. The germination and plant height of soybean from the different treatments were recorded and presented in Table-2.

The germination count indicated that application of amendments mitigate the atrazine toxicity significantly and among them, the FYM, compost, charcoal, maize stalk, phosphoric acid and super phosphate application were superior in enhancing the germination. The plant height taken at 30 DAS revealed the FYM and compost increased the plant height considerably than the other amendments, indicating the superiority in enhancing the atrazine degradation.

The yield and yield attributes of soybean are presented in Table -3 Among the various amendments tried FYM and compost application recorded the highest number of pods/plant, 1000 seed weight and seed yield followed by the application charcoal and super phosphate.

To conclude, the atrazine toxicity in the sensitive crops viz., soybean/pulses due to atrazine application to previous crop may be reduced by application of FYM or compost 12.5 t/ha or application of charcoal at 5.0 kg/ha along the seed line.

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