Madras Agric. J., 82(4): 296-298 April, 1995
https://doi.org/10.29321/MAJ.10.A01191

EVALUATION OF ANILOFOS 50 EC RESIDUES IN TRANSPLANTED RICE

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ABSTRACT

Field experiments were conducted during *rabi* 92, summer 93 and *kharif* 93 to evaluate anilofos 50 EC residues in transplanted rice. The treatments constituted anilofos 50 EC at 0.2, 0.4 and 0.8 kg/ha and anilofos 30 EC at o.4 kg/ha. The residues of anilofos in soil and plant samples were analysed using HPLC and the results revealed that the soil residues of anilofos were degraded within 56 days at 0.2 kg/ha, within harvest at 0.4 kg/ha and beyond harvest at 0.8 kg/ha respectively. The anilofos residues were at detectable levels in rice grain and straw at 0.8 kg/ha of anilofos 50 EC which again were below the Maximum Residue Limits.

KEY WORDS : Anilofos, Residues, Rice Grain, Soil

Anilofos, a new rice herbicide is reported to be versatile, having good control of weeds associated with rice. At present, Anilofos is available as 30 EC formulation and another formulation with increased a.i. content from 30 to 50 per cent to mimimise the production cost and enhance the efficiency. Continuous use of the same chemical, season after season, may result in residue accumulation in soil and may cause residual toxicity to the succeeding crops. An ideal herbicide should provide the required period of weed control and then should be degraded to inocuous products. However sometimes, herbicides persist in the soil beyond harvest and cause residual effect on subsequent crops. Besides, some quantity is also taken by crop plants and accumulated in the crop produce as residues. The residue accumulation should not exceed the Maximum Residue Limits (MRL) prescribed by the International and National Standards. Chen (1981) reported that butachlor in aqueous solution was quickly degraded under sunlight and produced atleast 24 compounds. Keeping these in mind, experiments were conducted in rice to monitor anilofos residues in soil, rice grain and straw.

MATERIALS AND METHODS

Field trials were conducted in field No.C_1 of wetlands during *rabi* (November - March), summer (March - June) and *kharif*, seasons with rice (July - Nov.). The soil was clay loam, low (175 kg/ha) in nitrogen, medium (9.0 kg/ha) in phosphorus and high(560 kg/ha) in potassium. Herbicides Anilofos 50 EC0.2, 0.4 and 0.8 kg/ha, anilofos 30 EC 0.4 kg/ha were compared with butachlor 1.25 kg/ha, thiobencarb 1.25 kg/ha, farmers practice of two hand weedings and unweeded control. All the herbicides were applied as pre-emergence on third day after transplanting. The design used was randomised block design. The details of the varieties used and dates of transplanting and harvesting are presented in Table 1.

Estimation of anilofos

Fifty g of the soil sample was extracted with 100 ml of acetone and washed with three 25 ml portions of acetone. Powdered rice grain and straw were extracted with 150 ml of 80:20 acetone: water and reextracted with 100 ml of acetone. The residues were partitioned into dichloromethane using three 50 ml portions after diluting acetone extract with 100 ml of 2% NaCl. The residues in dichloro methane were concentrated to near dryness and dissolved in methanol (soil) or hexane (rice grain and straw.) The residues in hexane were further cleaned up by column chromatography filled with silica gel (60-120 mesh). The residues eluted with 150 ml of 1:1 hexane : ethyl acetate were concentrated and dissolved in HPLC methanol

The high performance Liquid Chromatography (HPLC) Shimadzu Model equipped with UV detector was used for final determination. The column used was inertsil ODS2 under the wave

Table 1. Datails of the varieties used, dates of planting and harvesting

Particulars	*Rabi* '92	Summer '93	*Kharif* '93
Variety	ADT 36	IR 20	ASD 18
Spacing	15 x 10 cm	15 x 10 cm	15 x 10 cm
Date of planting	18-11-92	19-3-93	2-07-93
Date of harvest	16-03-93	25-6-93	7-10-93

Table 2. Recovery of anilofos from soil, rice grain and straw

ppm added	Soil		Rice grain		Rice straw	
	ppm detected	Recovery %	ppm detected	Recovery %	ppm detected	Recovery %
0.1	0.0904	90.4	0.0892	89.2	0.086	86.0
0.5	0.4620	92.4	0.453	90.6	0.435	87.0
1.0	0.924	92.4	0.902	90.2	0.890	89.0
2.0	1.840	92.0	1.800	90.0	1.762	88.1
Mean		91.8		90.0		87.5

Table 3. Residues in soil (ppm)

Treatments	Days after application					
	0	7	14	28	56	Harvest
Anilofos 50 EC 0.2 kg/ha	0.320	0.235	0.124	0.035	ND	ND
Anilofos 50 EC 0.4 kg/ha	0.854	0.608	0.355	0.180	0.032	ND
Anilofos 50 EC 0.8 kg/ha	1.182	0.823	0.576	0.286	0.112	0.014
Anilofos 30 EC 0.8 kg/ha	0.947	0.613	0.372	0.208	0.040	ND

ND : Not detectable

length of 230 mm. The mobile phase was methanol 100% at the rate of lml/min.

Recovery test

Fifty g of soil, grain and straw samples, collected from control plots were fortified separately in duplicate with 0.1, 0.5 1.0 and 2.0 ppm of anilofos and analysed for anilofos residues. The percentage recovery of anilofos in soil, rice grain and straw were 91.8 90.0 and 87.5 respectively. The sensitivity of this method was 0.1 ppm and the minimum detectable limit was 0.01 ppm. (Table 2).

Table 4. Residues in rice grain and straw.

Treatments	Post harvest		
	Soil	Grain	Straw
	Rabi 1992		
Anilofos 50 EC 0.2 kg/ha	ND	ND	ND
Anilofos 50 EC 0.4 kg/ha	ND	ND	ND
Anilofos 50 EC 0.8 kg/ha	0.014	0.016	0.0238
Anilofos 30 EC 0.4 kg/ha	ND	ND	ND
	Summer 193		
Anilofos 50 EC 0.2 kg/ha	ND	ND	ND
Anilofos 50 EC 0.4 kg/ha	ND	ND	ND
Anilofos 50 EC 0.8 kg/ha	0.021	0.010	0.0240
Anilofos 30 EC 0.4 kg/ha	ND	ND	ND
	Kharif 1993		
Anilofos 50 EC 0.2 kg/ha	ND	ND	ND
Anilofos 50 EC 0.4 kg/ha	ND	ND	ND
Anilofos 50 EC 0.8 kg/ha	0.039	0.0096	0.0174
Anilofos 30 EC 0.4 kg/ha	ND	ND	ND

RESULTS AND DISCUSSION

Anilofos residues in soil

During *rabi* 93, soil samples were collected from anilofos treated plots at 0,7,14,28, and 56 days after herbicide application and at harvest and analysed for their residues in HPLC. The data are presented in Table 3.

The anilofos 50 EC at 0.2 kg/ha degraded within 56 days. However with increase in dose upto 0.8 kg/ha registered residues upto harvest. There was no difference between the anilofos 50 EC and 30 EC (0.4 kg/ha) in degradation and persistence.

Anilofos residues in rice grain and straw

The anilofos residues in rice grain and straw collected at harvest of the each crop are presented in Table 4.

The anilofos residues in both grain and straw were registered only in anilofos 50 EC at 0.8 kg/ha while the residues were below detectable levels in all other treatments. However, the residues found were below the MRL.

The soil residues of anilofos were degraded within 56 days at 0.2 kg/ha, within harvest at 0.4 kg/ha and beyond harvest at 0.8 kg/ha. The anilofos residues were at detectable levels in rice grain and straw only in anilofos 50 EC at 0.8 kg/ha which again were below the MRL.

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Madras Agric. J., 82(4): 298-301 April, 1995

EVALUATION OF SOIL TESTS FOR ZINC IN SEMI ARID SOILS FOR MAIZE

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ABSTRACT

A greenhouse experiment was conducted with 20 soils representing semiarid soils of Coimbatore district to peredict the most reliable soil test method for determining the available Zn status in the soil. Therewere four levels of Zn (0, 2.5, 5.0 and 7.5 ppm) and each treatment was replicated two times. Maize (Ganga 5) was used as the test crop and the crop was allowed to grow for seven weeks. The results showed that among the six extractants tried, EDTA + $(NH_4)_2 CO_3$ and DTPA were found to be the most reliable soil test methods as compared to the other four methods employed. Between the two methods, DTPA soil test method could be recommended for determining the available Zn status in the soils of Coimbatore district as it had given higher relationship with the actual yield, Bray's per cent yield, Zn content in leaves and leaf sheath and stem.

KEY WORDS : Soil Test, Evaluation, Zinc Status, Maize, Coimbatore District

Deficiency of Zn usually appears early in the growing season. For soils of diversified physical and chemical characteristics, the same extractant may not be suitable. Therefore, a reliable soil test is needed to determine the Zn fertiliser requirement prior to planting. The present study was contemplated to fix the most reliable soil testing method with suitable extractant for assessing the available Zn status in four great soil groups *viz* chromusterts, ustorthent, ustivertept and Rhodustalf of the Coimbatore district.

MATERIALS AND METHODS

Soils

Twenty surface soils, representing the major maize growing areas of the Coimbatore district of Tamil Nadu, were Collected. Both Zn deficient and sufficient soils were included. The soils had the following characteristics; texture sandy loam to clay loam; pH 7.6 to 8.7; organic matter 1.34 - 3.10 per cent; available Zn (DTPA) 0.26-3.90 ppm. Available Zn was extracted using different extractants, viz: 0.1 NHC1 (wear and Sommer, 1948), 0.05 N HC1 + 0.025 N H_2SO_4 (Lea *et al.*, 1980) 2N $MgCl_2$ (Stewart and Berger, 1956, 0.01 M EDTA + 1.0 $M(NH_4)_2 CO_3$ (Trierweiler and Lindsay, 1969) and 0.005 M DTPA + 0.01 M $CaCl_2$ + 0.1 M Triethanolamine (TEA) adjusted to pH 7.3 (Lindsay and Norvell, 1978).

Green house study

A green house study was conducted employing 20 test soils to determine the suitable extractant for extracting available Zn. Four levels of Zn (0, 2.5, 5.0 and 7.5 ppm) were used as treatments and each treatment was replicated two times. Zinc sulphate was used to supply different level of Zn.

Four kg in each of the air dried 2 mm sieved soils were transferred to polythene lined pots. Basal applications of N, P and K were applied in solution form to provide 54 ppm N, 27 ppm $P_2 O_5$ and 18 ppm K_2O in the form of urea, diammonium phosphate and muriate of potash respectively. Half of the N was top dressed at knee-high stage (30 days after sowing).

Eight seeds of maize (Ganga 5) were sown in each pot. The soil was brought to field moisture capacity daily by the addition of de- ionized water.