ith decreased phytotoxicity to the seedlings. elayed application at 12 DAS resulted in ecreased weed control. Granular herbicides ecorded more weed population than the EC ormulation. Individual herbicides were also found be inferior to the herbicide mixture. Higher doses anilofos +2, 4-D EE and butachlor +2,4-D EE mixture recorded decreased weed dry matter roduction but caused high phytotoxicity. The eatments anilofos +2, 4-D EE 0.3 + 0.4 kg applied 10 DAS, thiobencarb +2, 4-D EE mixture were fficient in reducing the weed dry weight with less hytotoxicity to the seedlings. The crop stand was igher in the delayed application at 12 DAS than e other application times. But the weed control fficiency got decreased. Hand weeding twice, iobencarb +2, 4-D EE mixture and anilofos +2, -D EE 0.3 + 0.4 kg applied at 10 DAS favoured he dry matter production of crop through efficient veed control. Highest grain yield was recorded in and weeding twice followed by anilofos +2, 4-D EE 0.3 + 0.4 kg applied at 10 DAS, thiobencarb +2, -D EE mixture and anilofos +2, 4-D EE 0.24 + 0.32 kg applied at 8 DAS. Unweeded control recorded the lowest grain and straw yield. The benefit cost ratio was high in hand weeding twice and anilofos +2, 4-D EE 0.3 + 0.4 kg applied at 10 DAS (Table. 1).

Considering the high labour cost, labour shortage and difficulty in hand weeding under wet seeded condition, application of anilofos +2, 4-D EE at 0.3 + 0.4 kg ha^{-1} at 10 DAS may be recommended as an efficient and economical weed control method.

REFERENCES

DE DATTA, S.K. (1979). Weed problems and methods of control in tropical rice. In : **Symposium on Weed Control in Tropical Crops.** Weed Science Society Philippines, Inc., and Philippine Council for Agriculture and Resources Research, pp. 9-44.

MOODY, K. (1983). The status of weed control in rice in Asia. **FAO Pl. Prot. Bull., 30** : 119 - 124.

SHARMA, H.C., SINGH H.B. and FRIESEN, G.H. (1977). Competition from weeds and their control in direct seeded rice. **Weed Res. 17** : 103 - 108.

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DEGRADATION AND PERSISTENCE OF HERBICIDES IN DIRECT SEEDED PUDDLED RICE

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ABSTRACT

Field experiments were conducted at wetlands of Tamil Nadu Agricultural University, Coimbatore, during 1992-93 to find out the degradation and persistence of anilofos and 2, 4-D EE in soil and their terminal residues in rice grain and straw under direct seeded puddled condition. The results revealed that application of anilofos at 0.4 kg persisted in the soil upto 56 days after treatment. The terminal residue after two successive rice crop was below the level of detection. At higher doses both anilofos and 2,4-D EE residues were recorded in rice grain and straw, but the residue levels were far below the maximum residue limit.

KEY WORDS : anilofos, 2,4-D EE, degradation, persistence, terminal residue

Some of the applied herbicides persist in the soil for a longer period and some others degrade quickly. Baldi *et al.* (1979) studied the persistence of molinate, propanil and MCPA used in rice fields and found that molinate and propanil were rapidly degraded but MCPA was more persistent in soil. Gottesburan *et al.*,(1992) investigated the pesticide persistence after long term application at different intensities of crop management. They reported that pendimethalin persisted in the soil for more than one growing period at a very low concentration. In this study, residues of anilofos and 2,4-D EE in soil and their terminal residues in rice grain and straw were analysed to find out their degradation and persistence under direct seeded puddled condition.

Table 1. Anilofos residue (ppm) in soil, rice grain and straw at different rates in the *rabi* and summer crop

Treatment	Dose (kg ha^{-1})	DAT 0	7	14	28	56	Harvest	Grain	Straw
rabi crop									
Anilofos+2,4-D EE	0.3+0.4	0.680	0.470	0.212	0.083	ND	ND	ND	ND
Anilofos+2,4-D EE	0.45+0.6	0.781	0.512	0.398	0.214	0.093	ND	0.012	0.021
Anilofos+2,4-D EE	0.6+0.8	0.913	0.614	0.416	0.274	0.112	0.008	0.020	0.041
Anilofos	0.4	0.723	0.504	0.362	0.263	0.098	ND	0.008	0.018
Anilofos+2,4-D EE	0.3+0.4	0.623	0.493	0.291	0.132	ND	ND	ND	ND
Summer crop									
Anilofos+2,4-D EE	0.24+0.32	0.512	0.314	0.171	0.020	ND	ND	ND	ND
Anilofos+2,4-D EE	0.3+0.4	0.613	0.393	0.214	0.063	ND	ND	ND	ND
Anilofos	0.4	0.714	0.492	0.293	0.114	0.026	ND	0.006	0.028
Anilofos+2,4-D EE	0.3+0.4	0.632	0.367	0.215	0.085	ND	ND	ND	ND

DAT-Days after treatment; ND-Not detectable

MATERIALS AND METHODS

Two field experiments were conducted at Wetlands of Tamil Nadu Agricultural University, Coimbatore during *rabi* and summer seasons of 1992-93. The soil was clay loam in texture with low, medium and high for nitrogen (210 kg ha^{-1}, phosphorus (20.8 kg ha^{-1}) and potassium (421.0 kg ha^{-1}) respectively. IR-20 and ADT-36 were raised during *rabi* and summer season respectively. Anilofos +2,4-D EE ready mix as emulsifiable form at different doses, granular formulation and each as individual herbicides were applied at 7 days after sowing. After the herbicide application, soil samples were collected in the net plot area at five randomly selected places at 0,7,14,28 and 56 days after spraying of the herbicides and at harvest. The soil samples were shade dried, powdered and sieved through 2 mm mesh sieve and then used for analysis. Grain and straw samples were drawn at harvest at the rate of five samples per plot. The anilofos residue present in the soil, rice grain and straw was estimated, (Jayakumar, 1991), using High Performance Liquid Chromotography. Th retention time for anilofos was 1.86 min and th peak area was used for quantification. The 2,4-D EE residue was estimated using Gas Liq Chromatography (Grover *et al.* 1985).

RESULTS AND DISCUSSION

Anilofos at 0.24 and 0.3 kg degraded in the soil within 28 days. Increased dose of anilofos at 0.6 kg persisted in the soil upto harvest. The residue of anilofos was at non detectable limit after the harvest of the second crop. This indicated that there was no residue left out in the soil after the application of anilofos for two successive seasons (Table 1). This was in confirmation with the findings of Srinivasan (1989), who reported that the residue level in the soil was at non detectable limit at harvest even after the application of anilofos 0.3 kg for three consequetive seasons.

With regard to 2,4-D EE residue in soil, application of 2,4-D EE at 0.8 kg persisted in the

Table 2. 2,4-D EE residue (ppm) in soil, rice grain and straw at different rates in the *rabi* and summer crop

Treatment	Dose (kg ha^{-1})	DAT 0	7	14	28	56	Harvest	Grain	Straw
Rabi crop									
Anilofos+2,4-D EE	0.3+0.4	0.0890	0.0562	0.0313	0.0213	0.0084	BDL	BDL	BDL
Anilofos+2,4-D EE	0.45+0.6	0.1424	0.0893	0.0542	0.0398	0.0124	0.0072	0.0014	0.0018
Anilofos+2,4-D EE	0.6+0.8	0.2350	0.1524	0.0824	0.0524	0.0342	0.0108	0.0036	0.0072
2,4-D EE	0.8	0.2182	0.1413	0.0719	0.0438	0.0301	0.0092	0.0035	0.0067
Anilofos+2,4-D EE	0.3+0.4	0.1568	0.0921	0.0512	0.0294	0.0148	0.0086	BDL	BDL
Summer crop									
Anilofos+2,4-D EE	0.24+0.32	0.0624	0.0484	0.0214	0.0078	BDL	BDL	BDL	BDL
Anilofos+2,4-D EE	0.3+0.4	0.0780	0.0542	0.0302	0.0207	0.0084	BDL	BDL	BDL
2,4-D EE	0.8	0.2413	0.1714	0.0928	0.0432	0.0132	0.0053	0.0021	0.0078
Anilofos+2,4-D EE	0.3+0.4	0.0682	0.0473	0.0271	0.0092	0.0080	BDL	BDL	BDL

DAT - Days after treatment ; BDL - Below detectable limit soil after both rice crops. However, the lesser dose of 0.4 kg and below did not leave any residue after the harvest of the summer crop. 2,4-D EE residue was detected in rice grain and straw when it was applied at 0.6 and 0.8 kg (Table 2).

More amount of residues were accumulated in the straw than in grain. Similar reports were noted from Chen (1981) who reported that butachlor left very small concentration of residue in both grain and straw and the residues were comparably higher in straw than in grain. Though small amount of residues were detected in grain and straw, all these were far below the maximum residue limit and these herbicides thus found safe to use.

REFERENCES

BALDI, M., BOVOLENTA, B and ZANONI, L.(1979). Resistance of some herbicides (Ordram, Propanil, MCPA) used in rice fields. *Riso* **28**: 325-333.

CHEN, Y.L.(1981). Degradation of butachlor in paddy fields. **Tech. Bull. Food and Fert. Tech. Centre. Taiwan. 57**: 22.

GOTTESBUREN, B., PESTEMER, W., KREUZIG, G. and EBING, W. (1992). The pesticide residue situation in the soil when applying winter wheat - winter barley - sugar beet crop rotation according to different cropping concepts. **Berichte iiber land wirtschaft 70**: 259-279.

GROVER, R., SHEWCHUK, S.R., CESSNA, A.J. SMITH, A.E. and HUNTER, J.H.(1985). Fate of 2,4-D iso-octal ester after application to a wheat field. **J. Environ. Qual. 14**: 203-210.

JAYAKUMAR, R.(1991). **Dynamics of Anilofos and 2,4-D EE in Soils and Their Bio efficacy in Rice.** Ph.D. Thesis. Tamil Nadu Agricultural University., Coimbatore, Tamil Nadu.

SRINIVASAN, G.(1989). Influence of **Integrated Weed Management on Weed Dynamics in Rice Based Cropping System.** Ph.D. Thesis, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu.

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POPULATION TRENDS OF RICE GREEN LEAFHOPPERS IN CAUVERY DELTA ZONE OF TAMIL NADU

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ABSTRACT

Peak occurrence of green leafhoppers (GLH) was observed during September and October months of the three years 1991 - '93. The species composition in light-trap and field collections revealed that *Nephotettix virescens* dominated over *N. nigropictus*. The seasonal incidence of GLH in the three defined seasons of Cauvery Delta Zone revealed that early planting of the crop in *Kuruvai* season *i.e.*, July 25 recorded low incidence of GLH than the late planted crop. The early as well as late planting of *samba* and *thaladi* season was susceptible to GLH. Among the weather factors, relative humidity and minimum temperature influenced the pest population.

KEY WORDS : Green leafhopper, species, rice, season, field population, light-trap, correlation, regression

Green leafhopper (GLH) complex is one of the most destructive groups of rice pest through out South and South-east Asia. *Nephotettix virescens* (Distant) and *Nephotettix nigropictus* (stal.) populations are the dominant species in India (Ramakrishnan, 1983). N. Virescens appearing in epidemic and endemic forms in certain areas has been reported to be a vector for the Rice Tungro Virus. Hence the pest population occurrence in the three defined seasons of the Cauvery Delta Zone and its dominance in each season and its relationship to metereological factors was focussed for the current studies.

MATERIALS AND METHODS

The GLH population was monitored using a Robinsom light-trap at the Tamil Nadu Rice Research Institute, Aduthural with a source light of 125 watts mercury vapour lamp, for three years (1991 - 1993). The light-trap was operated for 12h daily from 6.00 P.M. to 6.00 A.M. and daily

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