

## ON FARM MONITORING OF BUTACHLOR AND THIOMBENCARB RESIDUES IN RICE GRAIN

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### ABSTRACT

Rice grain samples were collected during *kharif* and *rabi* seasons of 1991-93 from farmers' holdings at Coimbatore district to monitor the butachlor/thiobencarb residues. Out of 43 rice grain samples collected from butachlor applied fields, 30 samples registered residues at detectable levels ranging from 0.0120 to 0.0246 ppm. Similarly 33 out of 45 samples registered thiobencarb residues ranging from 0.012 to 0.0284 ppm. Based on the percentile distribution class, contamination of equal or less than 0.0046 ppm of butachlor and 0.0055 ppm of thiobencarb was observed in 50 per cent of the samples analysed.

With the recent introduction of a number of selective herbicides, chemical weed control is gaining momentum among farmers and extensive work had been carried out in evaluating the bioefficacy of butachlor (Gogai and Kalita, 1990). Similarly, pre-emergence application of thiobencarb resulted in good weed control when applied at 4.0 kg/ha and at 1.5 kg/ha (Lokras *et al.*, 1986). Once the herbicides are added to the soil, besides undergoing decomposition and physical removal, a portion of them may be taken up by plant and accumulated in the edible parts as metabolites which may pose serious health problems.

The residue accumulation should not exceed the Maximum Residue Limits (MRL) prescribed by the International and National standards. Repeated usage of the same herbicide in intensive cropping system, improper time and method of application as well as higher doses account for indiscriminate usage of herbicides, which aggravate the associated pollution hazards. As such, vigilance is warranted on the herbicide residues and their toxic metabolites in crops (and crop produces), though considerably low to exhibit any visible symptoms, may cause cumulative effects in the long run when used as food or feed. Hence the present study was aimed to monitor the probable residue hazards in rice on the farmers holdings at Coimbatore district where extensive chemical weed control is practised.

### MATERIALS AND METHODS

Rice grain samples were collected at harvest (88 Nos.) during *kharif* and *rabi* seasons of 1991, 92 and 93 at farmers holdings of Coimbatore district. The varieties included were Co 43, Co 44, IR 20, A 13, ADT 38, IR 50, ADT 36, Vellai Ponni

and Basumathi. The common herbicides used were butachlor and thiobencarb. The collected grain samples were processed and analysed for butachlor residues following the method of Mabbayad *et al.* (1986) and thiobencarb residues following the method of Yamada (1982) using gas chromatograph equipped with electron capture detector. The data were analysed by constructing frequency tables and the percentiles were worked out using the formula (Kohout, 1974).

$$i \text{ th percentile} = 1 + \frac{c (N_i - CF)}{f \cdot 100}$$

where

$l$  = lower class value in the percentile class

$c$  = Class interval

$f$  = Frequency in the percentile class

$N_i$  = Sample size

$CF$  = Cumulative frequency upto percentile class

### RESULTS AND DISCUSSION

The butachlor / thiobencarb residues in rice grain analysed through gas chromatograph are presented in Table 1.

Out of 43 samples analysed for butachlor residues, 30 samples registered residues at detectable levels and the residue content in rice grain ranged from 0.0012 to 0.0246 ppm which is below the maximum residue limits. With regard to thiobencarb, out of 45 samples analysed, 33 samples registered detectable residues. The thiobencarb residue in rice grain ranged from 0.012 to 0.0284 ppm which is below the maximum residue limits. However, the residues in rice grain and straw were at detectable levels but below the prescribed maximum residue limits. Jayakumar

Table 1. Residues of butachlor and thiobencarb in rice grain.

Sample No.	Butachlor residue (ppm)	Sample No.	Thiobencarb residue (ppm)
1	0.0028	1	0.0182
2	0.0013	2	0.0197
3	ND	3	ND
4	0.0016	4	ND
5	0.0124	5	0.0217
6	0.0186	6	0.0183
7	ND	7	0.0190
8	0.0120	8	0.0284
9	0.0089	9	0.0012
10	0.0124	10	0.0120
11	ND	11	0.0213
12	0.0162	12	ND
13	0.0112	13	ND
14	ND	14	0.0124
15	ND	15	0.0115
16	0.0113	16	0.0243
17	0.0246	17	0.0184
18	0.0012	18	ND
19	ND	19	0.0212
20	0.0018	20	0.0189
21	0.0134	21	0.0018
22	0.0096	22	0.0024
23	ND	23	ND
24	ND	24	0.0036
25	0.0024	25	0.0018
26	0.0108	26	0.0012
27	0.0162	27	0.0014
28	ND	28	ND
29	ND	29	ND
30	0.0033	30	0.0012
31	0.0068	31	0.0024
32	0.0031	32	0.0018
33	ND	33	0.0023
34	0.0131	34	ND
35	0.0068	35	0.0096
36	0.0073	36	0.0132
37	0.0126	37	0.0081
38	0.0140	38	ND
39	ND	39	0.0034
40	0.0028	40	ND
41	0.0092	41	ND
42	0.0014	42	0.0124
43	ND	43	0.0076
		44	0.0029
		45	0.0049

Table 2. Frequencies of herbicide residues in rice grain collected from Coimbatore District.

Percentile	Butachlor	Thiobencarb
10	0.0009	0.0012
20	0.0019	0.0024
30	0.0028	0.0035
40	0.0037	0.0053
50	0.0046	0.0055
60	0.0146	0.0348
70	0.0265	0.0401
80	0.0470	0.1680
90	0.0730	-

(1991) also observed detectable levels of butachlor and thiobencarb residues in rice with application of butachlor and thiobencarb at 1.25 kg/ha.

The residue data were subjected to statistical analysis by constructing the frequency tables and the percentiles were worked out (Table 2). Based on the percentile class distribution, it was observed that contamination of equal or less than 0.0046 ppm of butachlor and 0.0055 ppm of thiobencarb was in 50 per cent of the samples analysed.

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