DISSIPATION OF ANILINE HERBICIDE TRIFLURALIN AND BENFLURALIN IN SOILS

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The possibility of aniline herbicides pendimethalin and oryzalin contaminated of groundwater in three soils were assessed by behavior assessment model (BAM) and ground water pollution-potential model (GWP). The dissipation coefficients of pendimethalin and oryzalin in three soils (Yangmin mountain loam, Tauyuan clay loam and Lukuo sandy clay loam) at different temperatures (10, 25 and 40   ) and soil water contents (30, 60 and 90% of soil water holding capacity) were studies. The columns packed with three soils, separately, were used to study the mobility of herbicides in a constant leaching rate.

The absorption coefficient (K_d) of pendimethralin was higher than oryzalin in all three soils.(Table 1) Specially, the K_d of both herbicides in Yangmin mountain loam was much higher than in the other two soils.   In the leaching experiment, oryzalin was easier than pendimethalin to be leached out from all soil columns.(Fig 1)   Dissipation rate ($t_{1/2}$) of Pendimehtalin and oryzalin was extremely depended on soil condition.   Pendimethalin have half-life from 12 to 200 days and Oryzalin have from 6 to 650 days in different temperatures, soil types and soil water contents.(Table 2 & 3)   Oryzalin was found to have longer half-life and lower k_d values it may lead to the contamination of groundwater in the experiment soils.   For BAM modeling, the mobility of oryzalin was faster than pendmethalin.(Fig 2)   In the GWP model assessment, the residue of oryzalin was found at 1m depth of groundwater of Lukuo sandy clay loam after leaching for 55 day.   But no pendmethalin residues was found at the 1m depth of groundwater in all three soils.
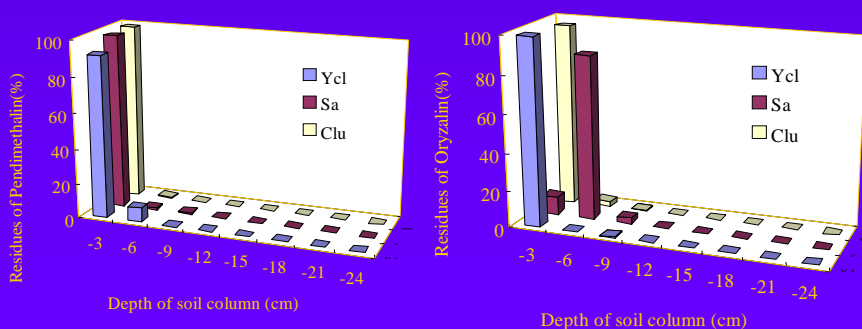

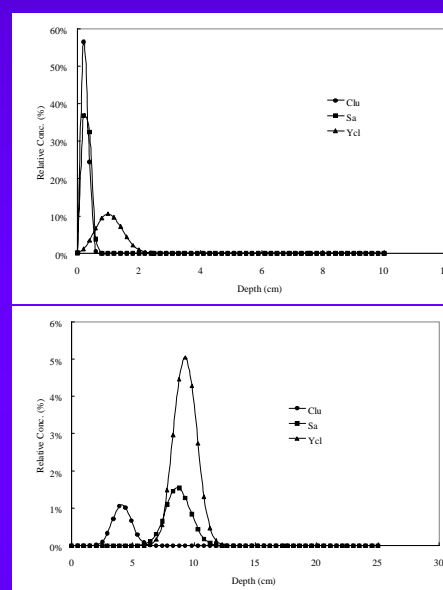Fig 1. Distribution of pendimehtalin and oryzalin in three soil columns for 42day

Fig 2. The distribution of pendimehtalin and oryzalin in the soil profile simulated by BAM at 42 days after application

Table 1. The Kd values of pendimehtalin and oryzalin in three soils at 25 and 37

Temp.( )	Pendimethalin			Oryzalin		
	Clu	Sa	Ycl	Clu	Sa	Ycl
25	2080.1	820.5	764.3	32.1	10.5	10.1
37	2115.3	865.5	818	41.9	11.2	10.7

Table 2. Dissipation coefficient (K) and half-life ($t_{1/2}$) of pendimehtalin in the soils under different conditions

T	Moisture	Clu				Sa				Ycl		
°C	%WHC	K(day^{-1})	$t_{1/2}$(day)	R^2		K(day^{-1})	$t_{1/2}$(day)	R^2		K(day^{-1})	$t_{1/2}$(day)	R^2
10	90	0.00149	201.7	0.239		0.00165	182.3	0.145		0.00145	207.8	0.165
25	30	0.00173	173.8	0.712		0.00548	54.9	0.684		0.00523	57.6	0.444
25	60	0.00242	124.6	0.207		0.00515	58.5	0.731		0.00442	68.2	0.569
25	90	0.00419	71.9	0.149		0.00552	54.5	0.363		0.00535	56.3	0.475
40	90	0.02444	12.3	0.967		0.02239	13.4	0.866		0.00838	35.9	0.601

Table 3. Dissipation coefficient (K) and half-life ($t_{1/2}$) of oryzalin in the soils under different conditions

T	Moisture	Clu				Sa				Ycl		
°C	%WHC	K(day^{-1})	$t_{1/2}$(day)	R^2		K(day^{-1})	$t_{1/2}$(day)	R^2		K(day^{-1})	$t_{1/2}$(day)	R^2
10	90	0.00231	130.3	0.190		0.0015	201.3	0.092		0.00095	317.2	0.774
25	30	0.00153	197.3	0.526		0.00156	193.0	0.564		0.00047	647.4	0.291
25	60	0.00462	65.1	0.937		0.00638	47.2	0.977		0.00079	383.2	0.039
25	90	0.02748	11.0	0.940		0.02094	14.4	0.644		0.00971	31.0	0.945
40	90	0.05030	5.98	0.656		0.03228	9.3	0.914		0.00121	249.2	0.278