

EFFECT OF RESIDUE MANAGEMENT ON ATRAZINE RETENTION AND SUGARCANE YIELD GROWN ON COMMERCE SOIL

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In this study we investigated the effect of sugarcane residue (mulch cover) resulting from the combine harvester on sugarcane variety L97-128. Our focus was on sugarcane yield (biomass and sugar) and the decay of residue post harvest. Three residue management practices were implemented at the St. Gabriel Research Station. The three treatments were; (i) burning the mulch after harvest, off-barring and cultivating in the spring; (ii) sweeping the mulch off the top of the row after harvest, off-barring and cultivating in the spring; and (iii) leaving the mulch on the field after harvest, off-barring and cultivating in the spring. The last treatment where the mulch is not removed may be best regarded as a no-till treatment which is a commonly used soil conservation measure. The sugarcane was planted on August 15, 2006 on Commerce loam soil. Sugarcane population, yield, and amount of mulch residue left on the soil surface were measured for each treatment. We summarize results for plantcane and first stubble (2007-2009).

Yields

The Commerce site consisted of six plots (two replications \times three treatments). Each plot consisted of nine rows 440 ft length with levees between plots. Second stubble was harvested, using a combine harvester, on November 19, 2009. The yields from the second stubble were 28.7, 28.2, and 28.9 tons/acre, for the burn, no-till, and sweep treatments, respectively. The respective sugar yield for the three treatments were 6141, 5848, 6220 lb per acre. We found no statistical differences obtained for the sugar yield among all the treatments from first stubble (see Table 1). Moreover, these yields were lower than that for plantcane of 2007 but higher than the first stubble.

Arazine Sorption by Mulch Residue

We investigated the effectiveness of residue on retention of applied atrazine on sugarcane. The residue was collected randomly on November 7, December 8, 2008, January 8, February 4, and March 6 2009. Variety L97-128 was used and was planted on August 15, 2006. Our results are from the first stubble which was harvested November 3, 2008. Multiple 1 m² areas were collected within the plots. The residue was dried at 55C or 24 and weighed. The soil was Commerce silt loam. Atrazine retention by the residue and the Commerce soil were measured in laboratory using batch methods where radioactive isotope (14C-UL ring labeled) was used. The rate of decay of the sugarcane residue was also quantified. The results indicated that the rate of atrazine retention by the residue was similar for the entire growing season with an average value of $K_d = 17.9$ and standard errors ranging from 0.62 to 72 ml/kg, and r^2 of 0.99 (see Table 2). Earlier work on the same soil for sugarcane varieties LCP85-384, the average atrazine retention rate was 16.3 ± 0.21 ml/kg. @e found that retention capacity of the residue for atrazine did not change significantly with the age of the decaying residue over the growing season. Such a

finding is consistent with earlier for other varieties namely; LCP85-384, and CP70-321. Therefore, we conclude that only one retention parameter (or K_d) is necessary to describe herbicide retention, regardless of when atrazine application is made.

Table 1. Sugarcane yields of L97-128 for second stubble on Commerce soil: Harvest was on November 19, 2009. Sugarcane was planted on August 15, 2006.

TREATMENT	Rep. Number	Number of Stalks (1000/ acre)	Cane Yield tons/acre	Sugar Yield lbs/ acre
Burn	1 2	34.8	29.5	6649
		34.4	27.9	5633
	Average		34.6	28.7
No – Till	1 2	35.0	28.8	6244
		33.5	27.5	5451
	Average		34.3	28.2
Sweep		35.1	29.5	6360
		35.1	28.2	6080
	Average		35.1	28.9
LSD 0.05		NS	NS	NS

Table 2. Estimated linear parameter model $K_d (mL g^{-1})$ for Atrazine adsorption by sugarcane mulch residue (L97-128) along with 95% confidence interval. The residue was sampled at several dates following sugarcane harvest of the first stubble on November 3, 2008.

Date	Age of Residue (Days)	Linear Model $K_d (mL g^{-1})$	r^2
7-Nov-08	4	17.39±0.72	0.9948
8-Dec-08	37	18.69±1.43	0.9828
8-Jan-09	68	17.47±0.99	0.9904
4-Feb-09	105	16.82±0.62	0.9959
6-Mar-09	136	19.16±0.61	0.9969

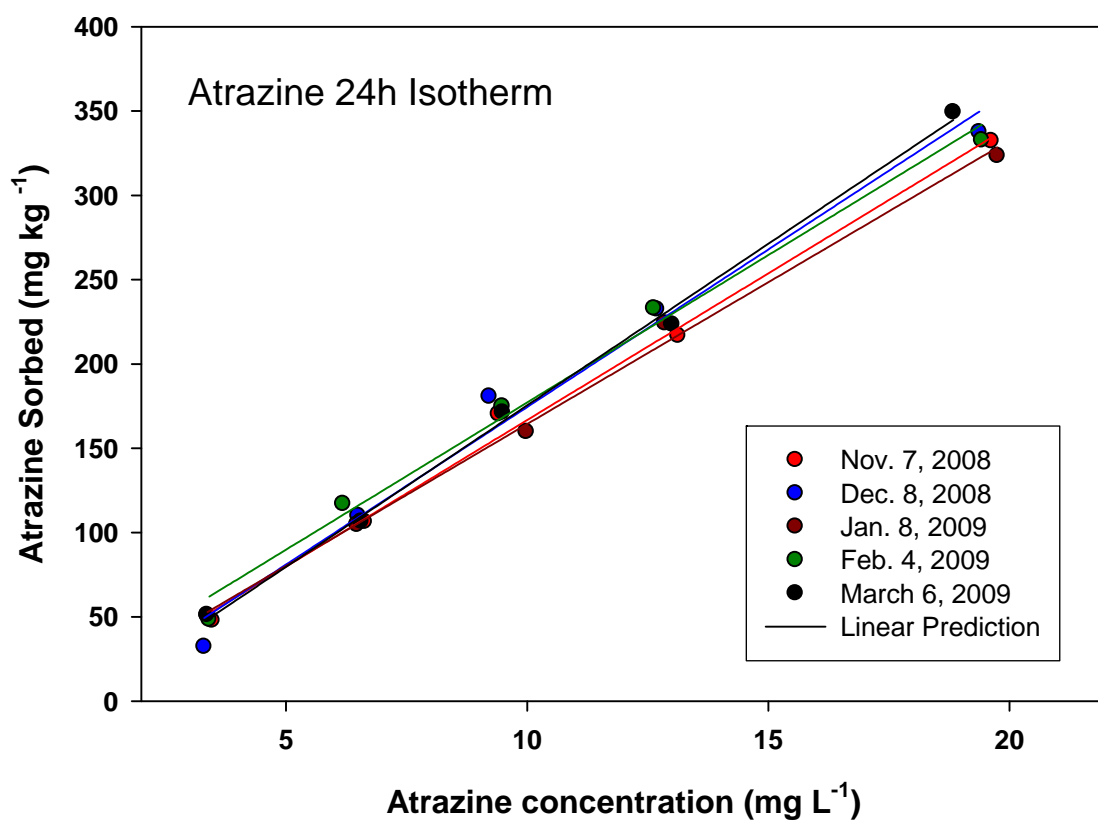


Figure 1. Atrazine sorption isotherms of atrazine by sugarcane mulch residue (variety L97-128) as a function of the age of residue. First stubble was harvested November 3, 2009.