

DEQ Clopyralid Study Laboratory Results Phase I, Phase II and Follow-up Testing

Phase I Samples taken in June, 2002		Phase II Samples taken in October, 2002			Follow-up Samples taken in October, 2003 (see Note 1)		Follow-up Samples taken in October 2004 (see Note 2)	
EPA Analytical Method 8151 A dry weight parts per billion (ppb)	Bioassay Visual Score [See Scale Below]	EPA Analytical Method 8151 A dry weight parts per billion (ppb)	GC/MS Method dry weight parts per billion (ppb)	Bioassay Visual Score [See Scale Below]	GC/MS Method dry weight parts per billion (ppb) (% decrease or increase from Phase II)	Bioassay Visual Score [See Scale Below]	GC/MS Method dry weight parts per billion (ppb) (% decrease or increase from Phase II)	Bioassay Visual Score [See Scale Below]
38	Bean 3 Pea 2 Red clover 1	49	94.2	Bean 1 Pea 2	37 (-61%)	Bean 1 Pea 2	2.3...(-98%)	Bean 0 Pea 0 Red clover 1
*	Bean <1 Pea 1 Red clover 1	28	58.4	Bean 1 Pea 2	27.5 (-53%)	Bean 1 Pea 2	9.6 (-84%)	Bean 1 Pea 0 Red clover 1
7.6	Bean 1 Pea 1 Red clover 1	32	56.2	Bean 1 Pea 2	11.9 (-79%)	Bean 1 Pea 1	3.3 (-94%)	Bean 0 Pea 0 Red clover 1
23	Bean 3 Pea 1 Red clover 1	28	39.3	Bean 1 Pea 2	16.6 (-58%)	Bean 2 Pea 2	16.9 (-57%)	Bean 2 Pea 1 Red clover 1
*	Bean <1 Pea <1 Red clover <1	9.9	36.8	Bean <1 Pea 2	14 (-62%)	Bean 1 Pea 0	7.9 (-79%)	Bean 1 Pea 1 Red clover 1
12	Bean <1 Pea 1 Red clover 1	33	29.3	Bean <1 Pea 2	11.3 (-61%)	Bean 1 Pea 1	<1.0. (-97%)	Bean 0 Pea 0 Red clover 1
*	Bean 3 Pea 2 Red clover 1	9.1	25.4	Bean 0 Pea 1	16.6 (-35%)	Bean 1 Pea 2	12.5 (-51%)	Bean 1 Pea 0 Red clover 1
No Detection	Bean 0 Pea 0 Red clover 0	12	21.3	Bean 0 Pea <1	25.3 (19%)	Bean 1 Pea 1	4.7 (-88%)	Bean 0 Pea 0 Red clover 0
No Detection	Bean 0 Pea 0 Red clover 0	8.3	17.2	Bean <1 Pea 1	11.3 (-34%)	Bean 0 Pea 1	8.6 (-95%)	Bean 1 Pea 1 Red clover 1
*	Bean 1 Pea <1 Red clover 0	**	16.7	Bean 0 Pea 1	35.9 (115%)	Bean 3 Pea 3	55.6 (+233%)	Bean 2 Pea 1 Red clover 2
*	Bean <1 Pea 1 Red clover 1	**	11.4	Bean 0 Pea 1	11.1 (-3%)	Bean 1 Pea 2	4.1 (-64%)	Bean 0 Pea 0 Red clover 1
*	Bean 0 Pea <1 Red clover <1	**	6.3	Bean 0 Pea 0	4.3 (-32%)	Bean 0 Pea 0	2.8 (-74%)	Bean 1 Pea 2 Red clover 1

KEY

The Scale for the bioassay visual assessment of herbicide symptoms:

0 = healthy 1 = slight leaf curling/ cupping 2 = moderate leaf curling, apical meristem abnormal, swollen stems present
3 = severe leaf curling or twisting of stem or petioles 4 = death

The (*) (**) are samples in which clopyralid was observed but the test was unable to provide confirmation. Analytical Laboratory Notation: Qualified identification because no second column confirmation. There was a retention time shift on second column.

* Phase I results marked with * ranged from a high of 21 ppb to a low of 6.1 ppb.

** Phase II results marked with ** ranged from a high of 19 ppb and a low of 7.6 ppb.

Bioassay tests: All bioassays were scored 21 days after seeds were planted. Phase I was conducted in June when the day length was very long, approximately 16 hours. Phase II was conducted in late October when day length was very short, so artificial light was provided for 12 hours per day. For both phases temperature control in the greenhouse was set for 65 F day / 55 F night. Pea growth in Phase I and II was similar, but there was less growth in bean and red clover by 21 day in Phase II.

Notes:

- Comparing the GC/MS analytical method in the October, 2002 samples and the October, 2003 samples, clopyralid decreased in 10 of the 12 facilities average of 48%.
- Comparing the GC/MS analytical method in the October, 2002 samples and the October, 2004 samples, clopyralid decreased in 11 of the 12 facilities average of 80%.
- The EPA analytical method 8151 was not used in the October 2003 and October 2004 follow-up sampling.
- The original 12 facilities participated in Phase I, Phase II and the two follow-up testing.