

# Investigating the use of diazinon and chlorpyrifos in the San Joaquin Valley at the grower scale

Xuyang Zhang, Alex Mandel and Minghua Zhang  
Department of Land, Air and Water Resources, University of California Davis, CA 95616

## Abstract

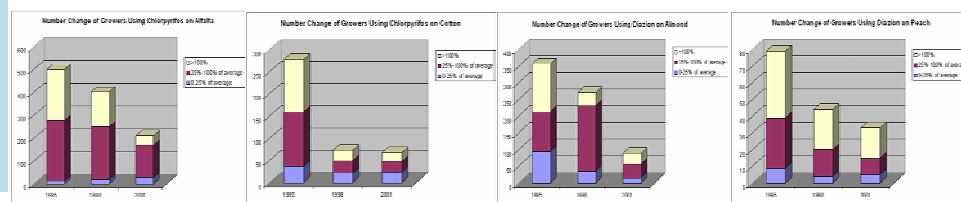
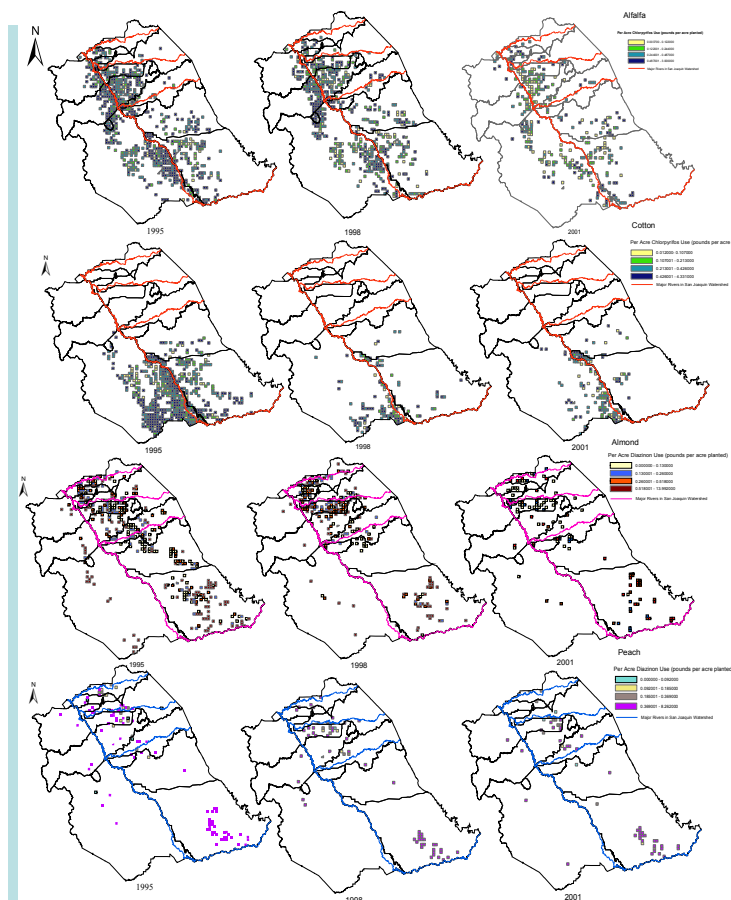
Movement of diazinon and chlorpyrifos into surface waters from any source presents an ecological risk. Studies conducted in watersheds during the winter seasons indicate that small invertebrates are killed when exposed for even short periods to these chemicals. This study investigates the use of diazinon and chlorpyrifos in the San Joaquin Watershed and to analyze the distribution and quantity of pesticide use practices among growers for almond, peach, alfalfa and cotton. Pesticide Use Reporting (PUR) data and geographic information systems (GIS) are used in data analysis. Several use patterns reveal large variability in pesticide use. The variation in lbs per acre planted among growers indicates that the highest number of growers falls into the high use group. Analyzing pesticide application provides information on alternative practices for reducing pesticide use and investigating TMDL (total maximum daily load) related water quality issues.

## Objectives

- Investigate the use of diazinon and chlorpyrifos in the San Joaquin Watershed for insect management
- Identify use variations among growers for almond, peach, alfalfa and cotton.
- Provide information to assist TMDL assessment for diazinon and chlorpyrifos

## Methods

- Data source: pesticide use reports (1993 – 2001) from California's Dept. of Pesticide Regulations
- Data organization: use Arcview GIS and Oracle programs to query and sort the PUR database by watershed, commodity and year
- Commodities: commodities with the highest contribution of total pounds of diazinon and chlorpyrifos use. Almond, cotton and alfalfa on chlorpyrifos; almond and peach on diazinon.
- Measurement: pounds of Active Ingredients (AI) per acre planted. Watershed average of lbs of AI per acre treated for each commodity each year are used to divide growers into three groups: high use growers are growers whose lbs per acre planted are higher than 100% of this average and low use growers are those with lbs per acre planted lower than 25% of this average.
- Data analysis: use S-plus, Excel, and GIS programs to analysis and organize data



**Table 1** Diazinon and Chlorpyrifos use (lbs per acre) by growers in San Joaquin watershed

Average: average of lbs per acre treated; total pounds of AI divided by total acre treated in San Joaquin watershed. For both chemicals, high use growers are the majority of all these five commodities, although the number is decreased generally. The average lbs/acre planted decreased over from 1995 to 2001, except that diazinon use on peach increased from 1998 to 2001

Year	0-25% of average	25%-100% of average	>100 %	total chemical use	total growers	average of label rates
<b>Diazinon on Almond</b>						
1995	94	120	142	341	2080	1.661
1998	36	195	39	255	2116	2.039
2001	16	42	31	88	1911	1.943
<b>Diazinon on Peach</b>						
1995	9	30	40	73	256	1.933
1998	4	16	24	42	239	1.683
2001	5	10	18	31	214	1.810
<b>Chlorpyrifos on Almond</b>						
1995	73	256	224	537	2080	1.775
1998	97	287	266	629	2116	1.620
2001	74	207	153	413	1911	1.718
<b>Chlorpyrifos on Cotton</b>						
1995	37	123	118	269	499	0.927
1998	21	29	23	72	386	0.986
2001	24	24	20	67	345	0.939
<b>Chlorpyrifos on Alfalfa</b>						
1995	13	264	224	476	740	0.614
1998	20	230	152	387	705	0.624
2001	28	143	41	206	669	0.624

## Results and Conclusion

❖ Diazinon use: For the period of 1995 to 2001, the total growers who used diazinon decreased by 74.2% in almond and 57.5% in peach. Almond growers who did not use diazinon increased from 43% to 95%, while peach growers increased from 7% to 42% in this period. A majority of growers applied diazinon above the watershed average lbs per acre planted for each commodity. However, there was a decreasing tendency from 1995 to 2001 on peach. The watershed average of lbs per acre planted decreased from 1998 to 2001 in almond but increased significantly in peach.

❖ Chlorpyrifos use: Similar trends of chlorpyrifos use were found for alfalfa, cotton, and almond. The total number of growers who used chlorpyrifos decreased in the three commodities. About 40% of growers who applied chlorpyrifos above the watershed average lbs per acre planted for each commodity. However, the watershed average of lbs per acre planted decreased over time. The range of lbs per acre planted is 0.003 - 12.68 for all three commodities.