Spray Swath Analysis/ Drift Management

Project No.: **07-ENVIR9-Stoltz**

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Interpretive Summary:

Agricultural aircraft were tested to monitor spray pattern variability and drift potential. None of the aircraft tested were out of compliance for pattern variability. Only one of the aircraft tested showed a high propensity to drift. Some showed little potential for drift but may have droplets too large to give adequate coverage. This information will help improve efficacy, off site movement by drift, and off site movement by runoff due to material being on the ground rather than the tree.

Objectives:

To minimize off target movement and to improve infield efficiency and distribution of almond crop production products.

Materials and Methods:

Swath analysis is accomplished by a process using the California Agricultural Aircraft Association (CAAA) Fluorometer. The aircraft is loaded with water and Rhodamine Dye. The aircraft flies over and sprays a specially treated string. The string is then analyzed by the Fluorometer. A pattern is displayed and swath variability is determined. If variability is too high (grater than 20 percent) then adjustments are made to the spray boom and the aircraft is retested. Also, certain pattern characteristics may indicate a potential to drift. If these are noticed, the usual correction is to shorten the boom length.

Drift potential is measured by flying over a set of Syngenta water sensitive cards. These cards are then scanned and analyzed utilizing the WRK DropletScan System. Data derived provide droplet spectra analysis for Volume Medium Diameter (Dv 0.5), (Dv 0.1), and (Dv 0.9). Dv 0.5 means that half of the spray volume is made up of droplets that size or larger and one half the volume is made up of droplets that size or smaller. Dv 0.1 means that ten percent of the spray volume is made up of droplets that size or smaller and Dv 0.9 means that ten percent of the spray volume is made up of

spray droplets that size or larger. Droplets are measured in microns. The other key data relating to drift potential, and possibly the more important one, is the percent of spray volume below 200 microns. This latter information is related to the driftibility to droplets. The lower the volume below 200 microns, the less potential there is for drift.

This study looked at two issues. Swath variability and droplet analysis.

Results and Discussion:

SWATH ANALYSIS

All aircraft tested at or below the minimum industry accepted swath variability of 20 percent. Thus, all aircraft would give a uniform distribution of the spray. Therefore, this data is not reported.

DROPLET ANALYSIS

Thirty aircraft were tested for those droplet parameters that would indicate a drift potential. Only one exceeded the ten percent of spray volume below 200 microns. The others all met or greatly exceed this industry standard (Table 1).

The Dv 0.1 is also an indication of drift potential. The nominal number is 200 microns. If smaller, the potential for drift increases. Generally, those aircraft that had Dv 0.1 below 200 microns tended to have a larger percent of the spray volume below 200 microns. Conversely, those aircraft that tested for larger Dv 0.9 tended to have smaller percentages of the spray volume below 200 microns. This means less drift potential but when droplets become too large, the potential to decrease coverage, and thus efficacy, increases.

Table 1 Droplet Spectra Analysis

Aircraft	Dv 0.5	Dv 0.1	Dv 0.9	% < 200 micron
1	463	205	752	5
2	575	235	1421	3.8
3	356	190	584	7.6
4	388	200	739	6.2
5	481	208	739	5
6	505	271	688	3.1
7	510	263	725	3.1
8	540	292	744	2.5
9	491	251	702	3.1
10	468	261	691	3.5
11	387	221	560	4
12	426	217	692	4.1
13	427	210	674	5
14	347	191	519	6
15	365	179	544	7.5
16	431	214	662	4.5
17	292	160	450	12.5
18	397	220	625	5
19	476	278	652	3
20	459	231	737	3.5
21	419	202	711	6.5
22	515	262	773	2
23	440	230	630	3.5
24	435	228	649	4
25	496	257	718	2
26	519	226	885	4
27	616	305	824	2.4
28	449	728	687	3.5
29	539	260	801	3
30	482	240	724	3
31	416	216	626	3.9
32	441	199	697	6
33	469	260	673	3.8
34	401	250	538	4
35	460	284	580	2.5
36	458	287	661	2
37	534	223	791	3.9
38	374	191	565	6.5
39	500	263	731	2.5
40	433	219	651	3.9
41	480	237	746	2.7
42	379	203	577	6
43	488	240	746	2.8
44	492	259	701	2.1
45	398	192	610	7
46	457	229	690	3.9
47	417	211	725	4.5
48	450	245	655	3.9
49	362	181	567	8

Recent Publications:

Stoltz, R. 2003. Drift Trial for Pattern Variability and Droplet Characteristics with Four Different Tank Mixes. Valent USA Corp. Richvale, CA.

_____ 2004. Deposition Testing and Pattern Refinement for Spray Swath Analysis and Drift Minimization. Annual Summary. Cotton, Inc. Tulare, CA.

_____ 2005. Deposition Testing and Pattern Refinement for Spray Swath Analysis and Drift Minimization including Variable Rate Application. Annual Summary. Cotton, Inc. Tulare, CA.

_____ 2005. Down Wind Drift Comparing Four Tank Mixes. Valent USA Corp. Oakdale, CA