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A Theoretical Analysis of

Downwind Drift of Herbicide Sprayed

From an Aircraft

by

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SUMMARY

The problem of drift of herbicide released from an aircraft [is] treated theoretically herein. The parameters of release are an altitude of 50 m (162.5 ft), a windspeed of 10 knots (11.5 mph), [and a] neutral temperature gradient. Two hypothetical distributions of [par]ticle size are postulated, both statistically normal and center[ed on] a median size of 300 microns. In the first case, the major frac[tion] of the particles are distributed over a fairly narrow size range: [68%] of all the particles fall within 300 ± 100 microns. In the seco[nd] case, the particles are distributed more widely: 68% of the par[ticles] fall between 300 ± 200 microns, only 38% within 300 ± 100 micro[ns].

The goal of the analysis is the determination of the percentage of released agent which drifts various distances downwind of the re-lease line. This is done in stepwise fashion, starting from an anal-ysis of the distribution of particle size by percentage within 50-micron categories for each postulated distribution. The rate of fall of particles in each of the categories is calculated, and from these data, downwind drift is determined. Next, the percentage of total output mass falling in each size range is developed, and this leads directly to the desired information on the percentage of agent out-put which drifts varying distances downwind. These data, developed for the general case, can easily be employed to ascertain the ground concentration of agent at any point downwind for any initial concen-[tration released from the] aircraft. For example, in the [case of an initial concentra]tion of agent of 3 gal/acre, it [is found that] acre will be produced some 262 m
(6[... ft ...].003 gal/acre some 348 m (1131 ft) downwind. Smaller amounts of agent will drift even further and [due to winds] and thermals, "hot spots", concentrations of agent greater than that [over the remaining] area are also likely to be formed.

[It should be pointed] out that a theoretical analysis can only p[rovide a measure of] the overall magnitude of the pro-blem of drift. It can not be substituted for real testing of the equipment act[ually under the c]onditions in which the actual operational [... such] tests can reasonably as-sure verity in the final evaluation of this problem.