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Comparing the weight method and the use of the tracer Uranine for assessing pesticide drift on soils

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Drift from pesticide backpack-spraying is of major importance in the highlands of Colombia, where more than 20% be drifted by wind effects. This study assesses the usefulness of the weight method and the use of the tracer Uranine for assessing pesticide drift distribution on soils. The weight method has been used in developing countries and consists of weighing previously dried papers, installed close to the soil surface, before and after spraying a known amount of water. Relative humidity, temperature, direction and speed of the wind were monitored during the experiments. The tracer Uranine is often used for groundwater studies. Uranine was added to the water and sprayed by the farmer in the same way he would spray any pesticide mixture. The same papers used in the previous method were stored after the spraying and weighing. The tracer was extracted in water and analyzed using a fluorescent spectrometer. The advantage of Uranine over other tracers is its easy extraction with water and low detectable concentration. No solvents are required for the extraction.

The experiments were performed during two months in the wet season in the region of Vereda la Hoya, Boyaca, Colombia at an altitude of 2800 m a.s.l., from September to October. Each experiment lasted about 30 min. The fast-changing meteorological conditions in the region affected the success of the weight method. The paper's weight was very sensitive to atmospheric high relative humidity and different evaporative conditions in grass and bare ground. Location of the blanks was essential and had to represent each of the different experimental evaporative conditions. Although the method was easy to implement, we consider that it is not appropriate for areas characterized by high evapotranspiration rates, and fast-changing climatic conditions as found in the Colombian highlands above 2800 m a.s.l. Whereas Uranine was not sensitive to different evapotranspiration rates nor fast changing climatic conditions, this method is affected by radiation, limiting its explanatory power during sunny days with high radiation. Remarkably, the drift measured with the weight method was on average 80% lower than the drift measured with Uranine. Very low values were only detectable with the tracer method. Therefore, the tracer Uranine is considered particularly suitable for assessing pesticide drift on soils in the highlands of Colombia.