

Risk assessment of glyphosate/AMPA in wind-eroded dust derived from agricultural soil in North-Netherlands

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INTRODUCTION

Glyphosate (GLY) worldwide mostly used herbicide, especially in the cultivation of genetically modified crops. Glyphosate and its main metabolite aminomethylphosphonic acid (AMPA) attached to soil particles can be transported by wind erosion. Mostly attached to the finest long relevant particles, GLY and AMPA can form a risk for humans exposed to the dust (Fig. 1). Field studies on GLY and AMPA transport with wind erosion are scarce.



Fig. 1: Wind-erosion event occurred in agriculture area

OBJECTIVE

Assess the short and longer distance transport of GLY and AMPA by wind erosion. Case study: potato cultivation area of North-Netherlands.

METHODOLOGY

- Field experiment setup in Spring 2017 (Fig.2)
- Dust collection: 7 bottles installed from 20 cm to 120 cm height of each collector (C1-C5 with 150 cm each) and dust collected at 50 days after GLY sprayed.
- Soil samples: taken from the treated land and untreated land after 3 and 50 days of Roundup (2.5 L ha⁻¹, Ultimate) sprayed (9-May) surrounding dust collectors (short distance [10 m] and long distance [>100 m]).

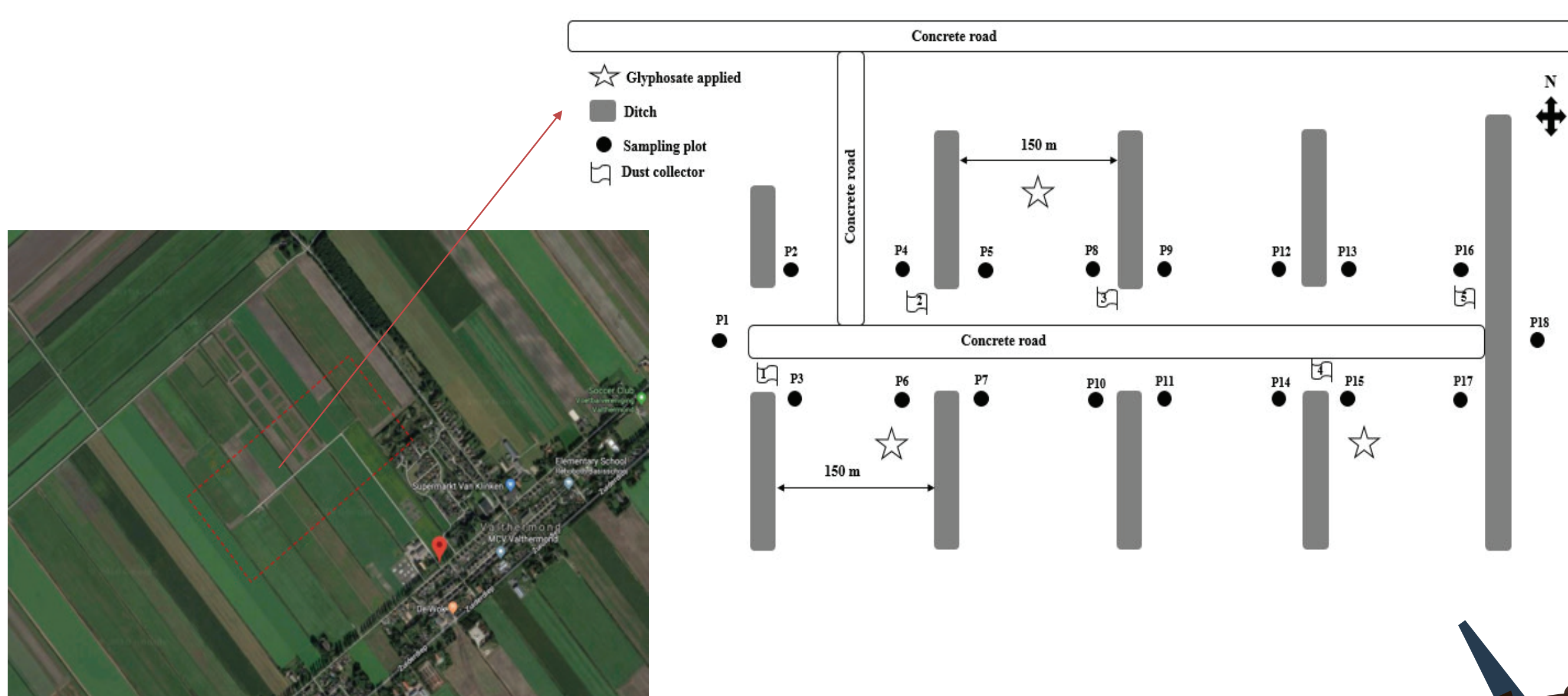


Fig. 2: Study site and sampling strategies

MAIN RESULTS

- Temperature: 7-23°C, total precipitation 109 mm from May to June.
- Dust amount varied from 0.6 to 4.54 g and clustered in the height of 30-60 cm above ground (Fig. 3).
- GLY content in soil: 16.6-23.1 μg g⁻¹ after 3 days (D3) application 0.2 to 1.3 μg g⁻¹ after 50 days application (D50) in treated field. AMPA content: 1.4-1.8 μg g⁻¹ at D3 and ranged between 0.5 to 1.0 μg g⁻¹ in treated field soils at D50.
- GLY contents in dust: 1.0 to 9.9 μg g⁻¹ and from 2.0 to 2.1 μg g⁻¹ collected from treated field and untreated field, respectively. AMPA contents in dust: 0.5-0.9 μg g⁻¹ collected from treated field and 0.9-1.5 μg g⁻¹ collected from untreated field.
- At D50, GLY content in dust of C3 (cross location with NW/WN/N wind direction) was much higher than other dust samples and its surrounding soil samples indicating that GLY accumulated in dust fraction.

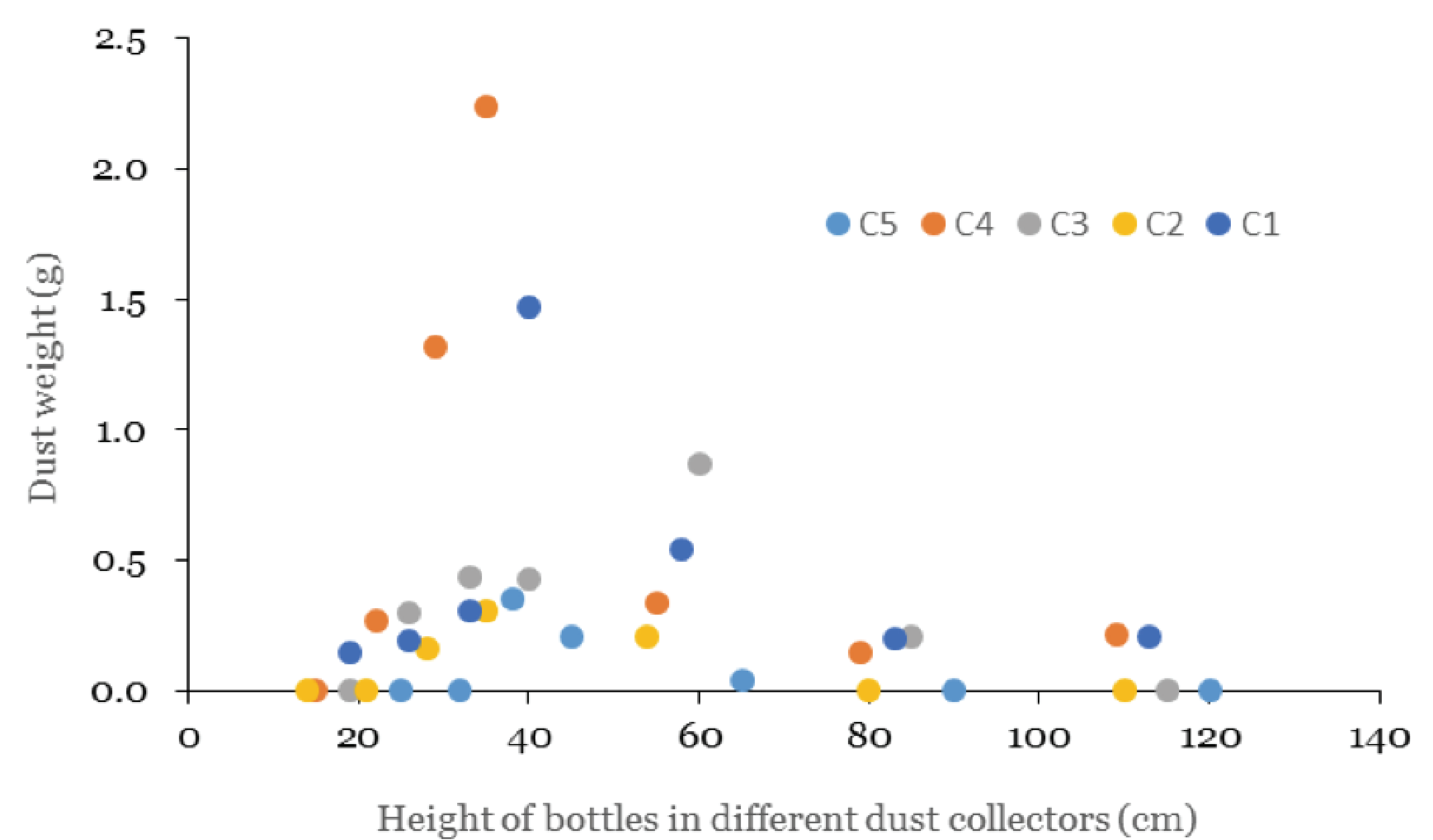


Fig. 3: Dust weight in different height of collectors

CONCLUSION

- GLY contamination of windborne deposit from surrounding fields.
- Strong accumulation of GLY and AMPA in the dust fraction.
- High content of GLY transported by dust should be concerned for human exposure.

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