Rational weed control on hard surfaces

C. Kempenaar, J.H. Spijker, G.D. Vermeulen & L.A.P. Lotz
Plant Research International, Wageningen University and Research Centre,
P.O. Box 16, NL-6700 AA Wageningen, The Netherlands
c.kempenaar@plant.wag-ur.nl

Introduction

An evaluation of pesticide use on non-cropped public areas (e.g., municipal areas, railroads, semi-natural areas and water banks) in The Netherlands in 1998 showed an overall reduction in pesticide use compared to the reference period 1984 - 1988 of about 50%, but hardly a reduction for herbicide use on hard surfaces (Kerkhof & Heemsbergen, 2000). The latter is not in line with national policy targets, and a point of concern because herbicides used on hard surfaces are probably causing a more than proportional share of the pollution of surface waters in The Netherlands compared to herbicides used in agriculture. Beltman *et al.* (2001) observed glyphosate emissions (runoff) of 7 to 23% from hard surface into drains (watering into surface water) while emissions from agricultural fields to surface waters are considered to be 1 to 4% for standard conditions.

Circa 2/3 of the communities in The Netherlands use herbicides for weed control on hard surfaces. Other uses occur on hard surfaces of industrial and private areas. Interviews with managers of these hard surfaces have been carried out during the past two years to determine why decisions are made in favour of herbicide use (Kempenaar *et al.*, 2001). Key factors in these decisions are perception of efficacy, efficiency and cost/benefit ratio of available weed control methods, which are often in favour of chemical weed control.

Two ways to reduce herbicide use on hard surfaces are studied in the national research program on weed control in urban areas: optimization/innovation of non-chemical methods and rationalization of herbicide use. In co-operation with stakeholders, a decision support system (DSS) for economically and ecologically sound weed control on hard surfaces is being developed, in combination with a certification method that guarantees the use of the DSS. Some results of the program are presented here.

Material and methods

Spray deposition by different herbicide application systems were tested on a hard surface facility in Wageningen in 2000. The facility consisted of experimental plots of 25 m length and 0.9 m width, differing in type of hard surface (clinkers, paving stones or gravel), weed density (3 or 7 weed m^{-2}), and soil cover by weeds (2 - 3 or 5 - 7%). Dominant weed species on the plots were identified as *Artemisia vulgaris*, *Chenopodium album*, *Capsella bursa-pastoris*, *Rumex acetosella*, *Taraxacum officinale*, *Erigeron canadensis*, *Poa annua* and *Festuca ovina*.

The following sprayers were tested: Knapsack, Selectspray ®, Sprinkle bar ® and Weed IT ® in both swath (broadcast) and spot treatment modes. Selectspray and Weed IT use weed sensors to treat green areas of hard surfaces. The amount of spray liquid applied on plots per application system was determined by collecting liquid releases from sprayers four times per plot in a randomized block design. For details, see Kempenaar *et al.* (2000).

Results and discussion

Deposition of spray liquid ranged from 7 to 220 ml m^{-2}. The highest amount was applied by Sprinkle bar in swath treatment mode while the lowest by the weed sensing sprayers Selectspray and Weed IT in spot treatment modes. Weed density on plots had a significant effect on amount of liquid application, in contrast to type of hard surface. It was concluded that modern weed-sensing, herbicide application systems allow a substantial reduction in liquid application under practical conditions. Observed reductions were on average 69% (see Fig. 1, Sprinkle bar was excluded because the system is not suited for spot application).

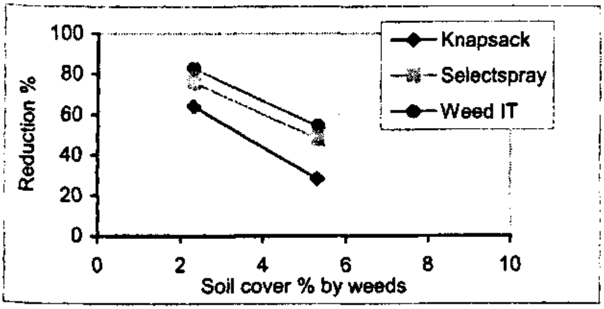

Figure 1. Relationships between average soil cover and reduction in liquid deposition on hard surfaces of three systems in spot application modes.

The data presented in Fig. 1 provide new input data for risk evaluation studies on use of foliar applied herbicides on hard surfaces. They will also be used in a, still experimental DSS for rational weed control on hard surfaces (Kortenhoff *et al.*, 2000). This DSS will advise not to use herbicides on places were runoff of herbicides to surface waters is expected. Non-chemical methods considered in the DSS are brushing, burning and hot water treatment. Innovative methods such as steaming, UV radiation, focussed IR radiation and waterjet cutting could be added in the future.

References

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