

ROBOTIC WEEDING OF FIELD VEGETABLES OFFERS POTENTIAL REDUCTION IN HERBICIDE INPUTS OF AT LEAST 90%

Alistair J Murdoch¹, Nikolaos Koukiasas¹, Paul De La Warr¹,
Robert A Pilgrim² and Shane Sanford²

¹*School of Agriculture, Policy and Development, The University of Reading
Earley Gate, PO Box 237, Reading RG6 6AR, U.K.*

²*Concurrent Solutions llc, USA
Email: a.j.murdoch@reading.ac.uk*

Weed control in field vegetables in the UK is increasingly challenging due to the loss of herbicide actives. Actives have been lost due to loss of approval by regulatory authorities and there is also little incentive to develop new selective herbicides for vegetables. Equally, policy makers and consumers demand fewer agro-chemical inputs. Selective herbicides are not, however, needed if weed leaves are identified by image analysis and if droplets of herbicides are targeted to these leaves. No chemical is applied to the crop and none directly to the soil.

Research at Reading in conjunction with Concurrent Solutions llc in the USA, is developing a robotic weeder for field vegetables in the UK.

This paper describes

- 1) dose-response relationships for glyphosate (Roundup Biactive, 360 g/l glyphosate) applied to individual leaves of weeds, and
- 2) proof of concept field experiments with manually applied droplets to the naturally occurring weed population in a cabbage crop.

Efficacy of glyphosate droplet applications to control weeds in glasshouse and field and to prevent crop yield loss was assessed in comparison to weed-free (hand-weeded), and weedy controls. Reductions in herbicide were compared with use of the pre-emergence herbicide, pendamethalin (Stomp Aqua, 455 g/l pendimethalin at 2.9 l/ha before transplanting). For the field study, Savoy cabbages were transplanted at the 4-leaf stage in June 2016 using a randomized complete block design with 4 blocks.

Droplet applications, 3, 5 and 7 weeks after transplanting gave most effective weed control, reducing weed biomass by 92% compared to the weedy control and giving a crop yield, which did not differ significantly from the weed-free control. At the same time, the amount of herbicide applied was 94% lower than the recommended rate for pendamethalin and 85% less than a band spraying (inter-row) glyphosate treatment. Pre-emergence and band spray treatments gave significantly lower yields than the weed-free. Provided a systemic herbicide is used, droplets only need to be applied to one leaf but three treatments were essential to allow for differences in weed emergence times. The efficacy of droplet applications for controlling natural weed infestation in cabbages was demonstrated.

Editor's Note: An extended manuscript has not been submitted for this presentation.