

# Post-emergence herbicides

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Factsheet about integrated weed management



## Introduction

***In an integrated weed management strategy herbicides can be used to support other non-chemical measures. Different herbicides are focused on one of the different growth stages of the weeds, on specific weed groups and either on establishment or growth of the weeds. Herbicides are basically divided in three groups based on their moment of application: pre-emergence, post-emergence or pre-harvest herbicides. This factsheet focuses on post-emergence herbicides***

## Post-emergence herbicides

Post-emergence herbicides reduce the impact of weeds on crop growth and therefore prevent yield reductions. Since the introduction of chemical herbicides, post-emergence application of herbicides is the mainstay of many weed control programs. This is mainly due to low costs for application of herbicides, especially in terms of labour, and high efficacy rates. With the rise of herbicide resistance, the role of post-emergent herbicides has changed and is combined with other tactics.

## Applicability and efficacy



Post-emergence herbicides allow to control weeds that have emerged. As the weeds are already present, farmers can adjust the active ingredients to match the weed species that need to be controlled. For this reason, selective herbicides are often used to control specific weeds.

## Equipment

A handbook for local flora can be used to identify the weed species, as well as apps on the mobile phone that use algorithms to identify weeds. However, the latter is not reliable for weeds at young developmental stages. See the factsheets about sensing technology, monitoring and evaluation and decision support system for more information about the equipment that can be used.



Figure 2| Post-emergence herbicide spraying

## Factors affecting herbicide resistance <sup>1]</sup>

**Weed flora:** Dose-response studies and field experiments have revealed major differences in the susceptibility of weed species. Highly susceptible species can be controlled with doses two to four times lower than the least susceptible species within the group of weeds listed as susceptible on a label.

**Growth stage:** Annual weed species are often more susceptible to herbicides at early growth stages. Grass weeds may be less susceptible to foliar-applied herbicides at the very early growth stage. The leaves of grass species are more erect and spray retention therefore can be lower than at later growth stages.

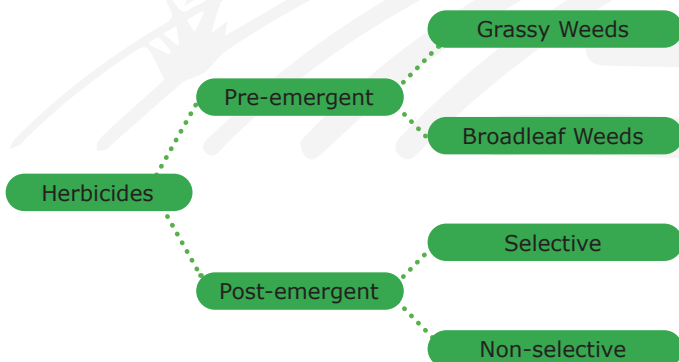


Figure 1| Classification and application of post- and pre-emergence herbicides.

1] Riemens, M., Sanderskov, M., Moonen, A., Storkey, J. and Kudsk, P., 2022. An Integrated Weed Management framework: A pan-European perspective. *European Journal of Agronomy*, 133, p.126443.

2] Robinson, B.L., Moffitt, J.M., Wilkerson, G.G., Jordan, D.L., 2007. Economics and effectiveness of alternative weed scouting methods in peanut. *Weed Technol.* 21 (1), 88–96. <https://doi.org/10.1614/WT-05-190.1>.



Furthermore, earliness of application should always be adjusted to the pattern of seed germination, to account for multiple flushes.

**Climatic conditions:** Climatic conditions can influence herbicide performance significantly, but labels rarely contain information on reduced doses under favorable conditions. Little studies have been performed to quantify the effect of climate on herbicide performance.

**Herbicide mixtures:** Adjuvants and other formulation ingredients may increase retention and/or uptake of the herbicide. The effect of adjuvants on herbicide performance can be easily found and this information can be used for dose recommendations.

**Crop competitiveness:** In a competitive crop, weeds grow less vigorously. Therefore the effect of herbicides that is needed to control the weeds and prevent yield losses is less. Any surviving weeds will have less opportunity to regrow and cause yield losses.

### What to consider?



Scouting is important when selecting a herbicide and is the main obstacle for farmers to exploit the differences in susceptibility between weed species<sup>1</sup>. Knowing which weeds are in the field and where the weed seeds are located (shallow or deep) is needed but can also be difficult at early growth stages because the leaves of seedlings may look similar. This aspect requires more attention by farmers and their consultants.



The use of decision support systems (DSS) can help to determine the timing and dosing of post-emergence herbicides. This helps improving the efficacy and may reduce herbicide use. Examples of DSS's are the Dutch Minimum Lethal Herbicide Dose<sup>2</sup> and the Danish Crop Protection Online<sup>3</sup>.



Band or patch spraying of post-emergence herbicides can help to reduce herbicide inputs and to prevent crop growth reductions.



Figure 3| Band spraying at post-emergence

### Extra information

See <https://iwmpraise.eu/publications/> for all crop diversification strategies and their definitions, and for more information on integrated weed management.

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<sup>1</sup> Kudsk, P., & Streibig, J. C. (2003). Herbicides – a two-edged sword. *Weed Research*, 43(2), 90-102. doi:<https://doi.org/10.1046/j.1365-3180.2003.00328.x>

<sup>2</sup> Kempenaar, C., & Lotz, L. A. P. (2004). Reduction of herbicide use and emission by new weed control methods and strategies. *Water Science and Technology*, 49(3), 135-138.

<sup>3</sup> Sønderkov, M., Rydahl, P., Bøjer, O., Jensen, J. E., & Kudsk, P. (2016). Crop Protection Online—Weeds: A Case Study for Agricultural Decision Support Systems. In (pp. 303-320).