



AGROECOLOGY FOR WEEDS

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AGROECOLOGICAL WEED MANAGEMENT REPOSITORY

The Agroecological Weed Management (AWM) Repository

<https://www.goodhorizon.eu/platform/awm-practices/>

is a virtual space where you can freely and openly find information and educational material on current and agroecological weed management practices in the European Union. You can browse and learn about several weed management practices and crops.

The **Agroecological Weed Management (AWM) Toolbox**, our Decision Support System that supports the user to reduce the use of synthetic herbicides and/or improve weed management by combining different Agroecological Weed Management (AWM) strategies with cover crops is LIVE !

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MECHANICAL WEEDING + REDUCED TILLAGE

DESCRIPTION & BENEFITS

Mechanical weeding + reduced tillage is a combination of mechanical weed management practices in which weeds are controlled physically while avoiding intensive or repeated full-width soil inversion. Mechanical weeding may include inter-row hoeing, harrowing, rotary hoeing, finger weeding, brush weeding, undercutting, camera-guided cultivation or high-residue cultivators. Reduced tillage refers to systems that minimize soil disturbance compared with conventional ploughing, for example through shallow cultivation, strip tillage, non-inversion tillage or reduced cultivation frequency. This combination:

- **aims to control weeds directly** while preserving more soil cover, soil structure and biological activity than intensive tillage systems
- **protect soil structure and reduce erosion** compared with repeated intensive tillage
- **conserve soil moisture and organic matter** when residues remain on the surface
- **support** organic, low-input and integrated weed management systems
- **reduce weed competition during early crop growth** when mechanical operations are timely
- **limit** the repeated burial and redistribution of weed seeds caused by deep inversion tillage

STRENGTHS

- Reduces reliance on synthetic herbicides by physically controlling weeds while supporting organic, low-input and integrated weed management systems
- Protects soil better than intensive tillage by limiting soil inversion, maintaining more residues and reducing erosion risk
- Improves early-season weed control when combined with accurate sowing, suitable row spacing, shallow cultivation and timely field operations

OPPORTUNITIES

- Could support herbicide-reduction strategies by replacing or complementing chemical control with physical weed control and preventive agroecological weed management practices
- Integration with camera guidance, precision cultivation, high-residue cultivators and robotics can improve accuracy while reducing crop damage and soil disturbance
- Could be combined with crop rotation, cover crops, false seedbed, mulching and competitive varieties

WEAKNESSES

- Requires very precise timing, because mechanical weeding is most effective when weeds are small and soil conditions allow uprooted weeds to desiccate
- Crop residues and reduced soil disturbance can make mechanical weeding more difficult
- May be less effective against perennial weeds or deep-rooted species, which can survive, regrow or spread after shallow mechanical disturbance

THREATS

- Delayed operations due to rain, wet soils or narrow field windows can allow weeds to become too large for effective mechanical control
- Repeated shallow disturbance may stimulate new weed flushes, favour surface-germinating weeds or shift the weed flora towards species adapted to reduced-tillage systems
- Incorrect machinery choice, aggressive cultivation or unsuitable soil conditions can damage crops, reduce residue cover and compromise soil health benefits

TIPS

- choose mechanical weeding tools that are compatible with reduced-tillage conditions and crop residues such as high-residue hoes, camera-guided inter-row cultivators, rotary hoes or shallow undercutters
- target weeds at very early growth stages when mechanical control is most effective
- avoid excessive soil disturbance because deep or aggressive cultivation can bring new weed seeds to the surface and reduce the benefits of reduced tillage
- adjust working depth carefully to cut or uproot weeds while preserving soil structure and avoiding crop root damage
- operate when soil conditions are suitable, preferably when soil is dry enough for uprooted weeds to desiccate and not re-root
- avoid mechanical weeding when soils are very wet as this can cause compaction, reduced effectiveness and damage to soil structure
- manage crop residues so that they suppress weeds without blocking or reducing the effectiveness of mechanical tools
- use straight rows, accurate sowing, guidance systems or camera-guided equipment where possible to improve precision and reduce crop injury
- monitor fields after each pass to assess weed mortality, crop injury, soil disturbance and weed regrowth
- pay special attention to perennial weeds, which may be spread or stimulated by shallow mechanical disturbance if not managed strategically

LIABILITY DISCLAIMER

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