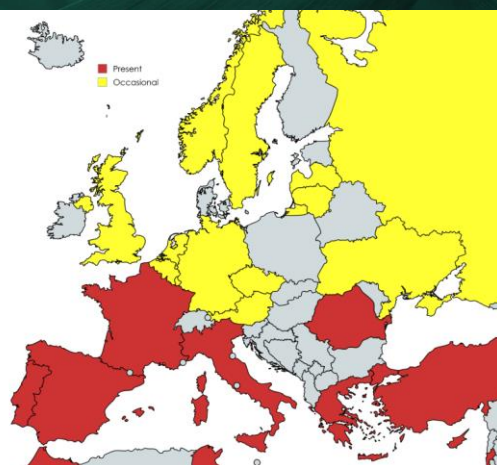


Weed Fact Sheet

Amaranthus palmeri



Amaranthus palmeri is the most important alien invasive resistant plant in summer crops in Europe. It is highly competitive, with the potential to produce a hundred thousand seeds per plant. Infestations can increase rapidly and cause huge (total) yield losses in spring sown crops.



Weed Biology

EPPO-codes (Latin and common names)	AMAPA - <i>Amaranthus palmeri</i> ; <i>Palmer amaranth</i>
Life cycle	Annual
Germination window	May - September
Max. generation/year	1, rarely 2
Occurrence in crop or cultivation system	Road and field margins, maize, soybean, other summer arable fields
Yield loss	1 plant/m ² = 14 % yield loss in soybean 8 plants/m ² = 37 % yield loss in soybean 3 plants/m ² = 20 % yield loss in maize 10 plants/m ² = > 50 % yield loss in maize
Preferred environmental conditions	Thrives in conservation tillage systems in summer crops. Prefers well-drained soils, pH not being limiting.

Ploidy	Diploid (2n=34)
Type of reproduction	Dioecy
Pollination	Wind cross-pollination
pollen dispersal	By wind
Seed shattering	>90% at Harvest
Fecundity (seeds/plant)	2.000-1.000.000
Seed dispersal	wind/ water / animals / machinery
Distance of seed dispersal	Few meters from plant. Moved in crop seed, straw, manure and machinery
Dormancy	low
Seed bank longevity	2-4 years
Seed decline per year	44-61%

Impact of Agronomic measures on Occurrence and Spread

Germination & dormancy

- Germination predominantly from May to July.
- Primary dormancy lasts from a few days to a few months.
- Warm temperatures and light break dormancy. Absence of light inhibits germination.
- Emergence occurs from 0 to 5cm below the soil surface.

Soil cultivation

- Thrives in all cultivation systems.
- Ploughing seed to a depth of 20-30cm can be effective in controlling AMAPA.
- A fallow period of one year can result in 80% control, two years 98% control.

Crop sowing date & Seed set

- Early planting is better than late sowings.
- Delayed drilling is recommended only with stale seedbed preparation.
- Some newly matured seeds can germinate immediately.
- Plants should not be allowed to seed.

Crop rotation, cover crops and competitiveness

Crop rotation with alternation of winter and summer crops, dense cover crops, competitive crops (row spacing and sowing density) and any measure which prevents weed emergence are useful control tools.

Weed Fact Sheet

Amaranthus palmeri

Observed Resistance in Europe

- Resistant populations have been confirmed in Southern Europe and are increasing
- ALS target site resistance blocks the site of group 2 herbicides and can confer broad cross-resistance across group 2 families. Reported in Spain, Italy and Turkey
- EPSPS target site resistance (gene amplification) to glyphosate (group 9) has been reported in Spain and Turkey
- Enhanced metabolism resistance results in herbicide detoxification and effects most herbicides, but is still rare in Europe, affecting ALS inhibitors.

Target-site Resistance (TSR)

- To both ALS (mutation) and glyphosate (gene amplification). ALS is present in the majority of populations.

Multiple herbicide resistance (MHR)

- MHR populations to ALS and glyphosate have been described in Spain and Turkey.

Best Management Practices



- To prevent and mitigate resistance development, follow the [Guideline to the Management of Herbicide Resistance](#) published by GHRAC
- Rotate herbicides from different modes of action on the same weed target throughout the crop rotation and apply them when the plants are small (BBCH11-14)
- Integrate sequential application of soil residual and post-emergence herbicides, always mixing \geq MoAs, to reduce selection pressure
- Do not base the chemical strategy on a post-emergence treatment
- monitor results of herbicide applications to allow a timely adjustment of weed control strategies when necessary
- Integrate non-chemical methods:
 - Ploughing down seeds to a depth of 20 - 30 cm is an effective weed control method
 - Do not let plants set seed as some can germinate immediately
 - Mowing: consider that plants can easily regrow when cut, even below 3 cm above soil surface; several cuts may be necessary (i. e. with an alfalfa rotation)
 - Fallowing the land including autumn can deplete the seed bank
 - Cover crops can significantly reduce germination and emergence
 - Interrow mechanical control combined with in-row chemical control to reduce herbicide selection pressure

Weed Fact Sheet

Amaranthus palmeri



References:

EPPO (2020) *Amaranthus palmeri* S.Watson. Data sheets on pests recommended for regulation. EPPO Bulletin 50 (3), 535-542. <https://doi.org/10.1111/epp.12715>.

Heap, I. The International Herbicide-Resistant Weed Database. Online. Friday, July 25, 2025. Available www.weedscience.org.

Kaya-Altop, E., Jabran, K., Pala, F. & Mennan, H. (2025) Multiple resistance to EPSPS and ALS inhibitors in Palmer amaranth (*Amaranthus palmeri*) identified in Turkey. *Weed Research*, 65(1), e12618.

Maity, A., Lamichaney, A., Joshi, D.C., Bajwa, A., Subramanian, N., Walsh, M., Bagavathiannan, M. (2021) Seed Shattering: A Trait of Evolutionary Importance in Plants. *Frontiers in Plant Science*, 12, 657773.

Manicardi A, Mora G, Araujo ALS, Gaines TA, Lozano-Juste J, Torra J (2025). Analysis of multiple-herbicide resistant *Amaranthus palmeri* populations from Spain points to an introduction of the eccDNA from America. *Pest Management Science* 81(10), 6807–6819.

Matzrafi, M., Scarabel, L., Milani, A., Iamónico, D., Torra, J., Recasens, J. et al. (2025) *Amaranthus palmeri* S. Watson: A new threat to agriculture in Europe and the Mediterranean region. *Weed Research*, 65(1), e12596.

Roberts, J. & Florentine, S. (2022) A review of the biology, distribution patterns and management of the invasive species *Amaranthus palmeri* S. Watson (Palmer amaranth): current and future management challenges. *Weed Research*, 62(2), 113–122.

Sosnoskie, L.M., Webster, T.M., Grey, T.L. and Culpepper, A.S. (2014), Severed stems of *Amaranthus palmeri* are capable of regrowth and seed production in *Gossypium hirsutum*. *Annals of Applied Biology*, 165, 147-154.