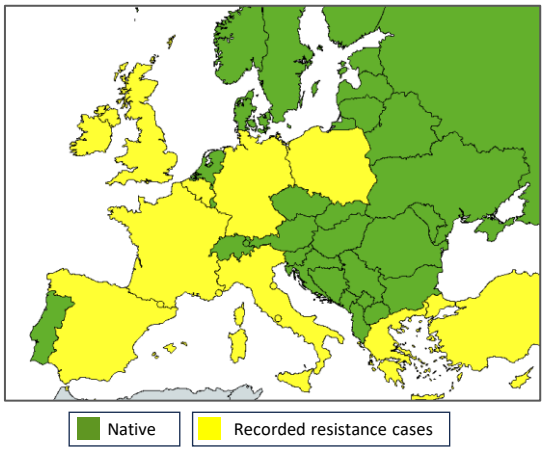
Weed Fact Sheet
Avena species

Wild oat (*Avena fatua*) and Sterile oat (*Avena sterilis*) are *Poaceae* and are among the world's most common and economically damaging agricultural weeds.

In Europe, *A. sterilis* predominates more in the south and *A. fatua* in the North; however, both co-exist in many central regions.

The species are agronomically and biologically similar, with similar control measures and susceptibilities and are therefore combined for this Fact Sheet.



Weed Biology

EPPO-codes (*Latin*/common name)	**AVEFA** - *Avena fatua* L., wild oat **AVEST** - *Avena sterilis* L., sterile oat **AVELU** – *Avena sterilis* L. ssp. *ludoviciana*, winter wild oat
Life cycle	Annual
Germination window	Seedling emergence occurs from the autumn (south) through to spring (north) according to temperature
Max. generation/year	1
Occurrence in crop or cultivation system	Arable crops sown in autumn-early spring, notably cereals; orchards, vineyards
Yield loss	Crop yield loss can be as high as 50-60%, varying greatly according to weed density, crop and pedo-climatic conditions
Preferred environmental conditions	Present in most soils and weather conditions
Ploidy	Allohexaploid (2n=6x=42)
Pollination	Self-pollinated. Outcrossing for *A. fatua* ranges between 0% and 10%.

Seed shattering	High, more than 60% before cereals harvest. It may begin 2–3 weeks before cereal harvest
Fecundity *(seeds/plant)*	From 20 to 150 seeds/plant in most cropping systems
Seed dispersal	Grain seed lot admixture, hay, farm equipment, birds, animals
Distance of seed dispersal	Near the parent plant, but combine harvesters can spread seeds over long distances (more than 150 m)
Dormancy	Variable. Seeds are mostly dormant at maturation. Seeds produced in hot dry summers are less dormant than those produced in cool/moist summers
Seed bank longevity	Moderately persistent (3–5 years)
Seed decline per year	Follows an exponential trend, the greatest decline taking place in the first and second year

Impact of Agronomic Measures on Occurrence and Spread

No single chemical or agronomic treatment can efficiently manage *Avena* spp, therefore an integrated weed management strategy is required. Important cultural methods are:

- A proper rotation which allows the use of alternative herbicides to suppress weed growth
- Narrow crop row spacing and high seeding rates can improve crop competitiveness
- Wild oat has large seeds and therefore a delay in cultivation (or no cultivation) can encourage seed predation from the soil surface, or further decrease seed viability

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Resistance in Europe

- *Avena* spp. resistant to Group 1 (ACCase) and/or Group 2 (ALS inhibitors(are widespread. Resistant *Avena fatua* is most frequently found in France, Germany, UK, Ireland and Poland, whereas resistant *Avena sterilis* is more frequent in Italy, Spain, Greece and Turkey
- *Avena* spp. are prone to evolving cross-resistance and multiple herbicide resistance to commonly used products
- Multiple resistance between ACCase and ALS has been increasing substantially
- Generally, resistance to ACCase appeared first in Europe (and globally), followed by resistance to ALS, which at times has led to the evolution of multiple resistant populations

Mode of Action	HRAC	Resistance Level
ACCase	1	+++
ALS	2	++

+ = low
++ = medium
+++ = high

Resistance Mechanisms

- There are a diversity of mechanisms and levels of resistance depending on specific selective conditions. This is particularly true for self-pollinated weed species such as *Avena* spp.
- Interpretation of resistance in hexaploid species such as *Avena* spp. can be challenging
- Both target-site (TSR) and non-target site resistance (NTSR) play an important role

Target-site resistance (TSR)

- ACCase (Group 1): all 7 known point mutations have been identified; 'fop' specific mutations appear to be more common in *Avena* spp. than in other grasses exhibiting ACCase-resistance
- ALS (Group 2): only the Ser-653-Asn and Ser-653-Thr mutations have been identified in *Avena* spp; enhanced metabolic NTSR likely plays a bigger role in resistance to ALS-inhibiting herbicides

Best Management Practices

- To prevent and mitigate resistance development, follow the Guideline to the Management of Herbicide Resistance published by Global HRAC.
- Effective management of *Avena* spp. requires an Integrated Weed Management approach combining diverse cultural, mechanical and chemical control methods throughout the cropping programme
- Rotate herbicides with different modes of action which are effective on the same target weed throughout the crop rotation and integrate sequential applications of soil residuals as well as post-emergence herbicides to reduce the selection pressure on post-emergence herbicides
- The availability of alternative herbicides varies according to the crop and the country. As examples, use herbicides of groups 15 + 12 or 5 + 12 in pre-emergence; use herbicides of groups 5 + 12, 3 + 12 or 15 + 12 in early post-emergence, when *Avena* plants are at the 2-3 leaf stage
- If treated post-emergence: use Group 1 herbicides on populations resistant to Group 2 and *vice versa*, for not more than 2 consecutive years. If populations are multiple resistant to both Group 1 and 2 herbicides, do not treat in post-emergence only
- Integrate non-chemical methods: effective crop rotation, increased competitiveness of cereal crops (e.g. higher seeding rates, narrower row spacing) and stale seedbed preparation where feasible

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