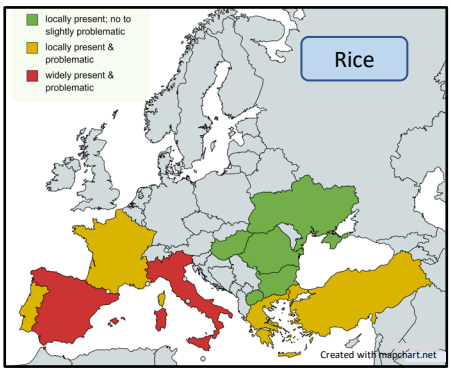
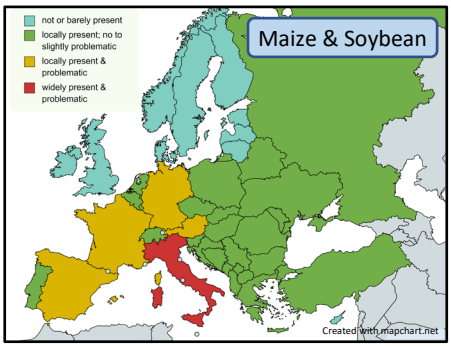
Weed Fact Sheet
Echinochloa crus-galli


Wikipedia.org

Echinochloa crus-galli (barnyard grass) is an important weed species in all countries where spring-summer crops are cultivated - mostly in southern, western and central Europe. In northern Europe it is not common, but can be found locally as well. Present mainly in rice, maize, sunflower and soybean, but also sugar beet and potatoes, the agronomical importance relates to its high competitive ability, high densities and several flushes during the season.





Weed Biology

EPPO-code (latin and common names)	ECHCG (*Echinochloa crus-galli*, barnyard grass)
Life cycle	Annual, spring-annual
Germination window	April – September, peaking in May-June
Max. generation/year	1 per year, but several late germination flushes are possible
Seed shattering	Seeds are shed as soon as they mature which can occur over extended periods of time
Occurrence in crop or cultivation system	Almost all arable crops sown in spring, mainly rice, maize, soybean and sunflower
Yield loss	More than 35% in maize and rice
Photosynthesis	C4-plant, with improved growth under warm, sunny conditions, better than C3-plants e.g. rice, soybean , sunflower, sugar beet, potato
Preferred environmental conditions	Germination requires warm soil (>10°C) and humidity, even flooded conditions
Ploidy	Hexaploid (2n = 54)
Pollination	Self-pollinating. but not 100%
pollen dispersal	By wind

Fecundity (seeds/plant)	2,000 - 40,000 depending on agroclimatic conditions; the warmer and longer the growing season the higher the seed production
Seed dispersal	Wind, water, animals/birds (+humans)
Distance of seed dispersal	Several metres from the parent, except in paddy rice (water movement).
Dormancy	Low-moderate
Seed bank longevity	At least 6 - 8 years
Seed decline per year	~10-20%

Impact of Agronomic Measures on Occurrence and Spread

Soil cultivation

- Timely soil cultivation improves germination before sowing
- Rotational ploughing (≥ 3 years) ➔ ≥ 30-60% seed decline
- In case of rice, soil levelling is critical to maintain water level

Crop sowing date

- Late drilling or stale seedbed preparation allows control of first flush before sowing
- In irrigated crops, a light watering could improve weed germination before sowing

Crop competitiveness

- Maize and rice are more competitive than broadleaved crops like sunflower and soybean

Crop rotation

- Occurence and spread favored by spring cropping (esp. rotations with maize, soybean and/or sunflower)
- Germination predominantly in April, May and June
- Minor problem in maize or soybean when sown in June as a second crop after winter cereals
- Occurence in spring barley in northern areas is possible, but not common

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Observed Resistance in Europe

- Herbicide resistance for *Echinochloa* is not very widespread
- Specific cases of resistance are known throughout Europe, but number of affected fields is increasing, particularly on rice crops
- Resistance mainly reported to post-emergence herbicides, with:
  - ALS- and ACCase resistance in all major rice growing countries, favored by continuous rice cultivation and limited availability of a diverse range of graminicide mode of action
  - Single cases of ALS-resistance in maize in France, Spain, Germany and Austria
  - More frequent observations of ALS-resistance in maize and soybeans in Italy
  - Cases of resistance to PSII-inhibitors (atrazine, propanil) are not of practical relevance anymore

Mode of Action	HRAC	Resistance level
ACCase	1 (A)	+
ALS	2 (B)	+++
PSII	5 (C2)	+
VLCFA	15 (K3)	+
Auxin	4 (O)	n

n = no reports

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

Target-site resistance (TSR)

- ALS-inhibitors:
  - Well documented with two main mutations (Pro197, Trp574)
  - Rarely occurring mutation at Ala122 confers fitness cost
- ACCase-inhibitors:
  - Mutation at the position (1781 (Ile➔Leu)
- Cases of multiple target site resistance have also been reported

Non Target-Site Resistance (NTSR)

- Biotypes with NTS resistance are also found assumed to be caused by enhanced metabolic activity by enzymes like P450-monooxygenase
- Affects all post-emergence herbicides (ACCase, ALS)
- As a self-compatible polyploid plant, accumulation of resistance genes are slowed down

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 effective on the same target weed throughout the crop rotation
- Integrate sequential application of soil residual and post-emergence herbicides to reduce selection pressure on post-emergence herbicides
- Use mixture of products with different modes of action if the related active substances give high levels of control on the targeted weed
- Monitor results of herbicide applications to allow a timely adjustment of weed control strategies when necessary
- Integrate non-chemical methods:
  - Combination of adapted early soil cultivation supporting a faster soil warming and delayed sowing promotes germination of *Echinochloa* and allows mechanical or chemical control before sowing of the crop (stale seedbed)
  - Extension of crop rotation with autumn/winter sown crops
    - reduces seed soil bank by allowing seed decline and avoiding additional seed supply
    - offers additional control options during summer fallow esp. in Southern European Countries
- Maintain high water levels in paddy rice to hinder *Echinochloa* development as much as possible

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