

BROMES

Grasses which are commonly called in English 'brome' mostly fall into the following genera:

BROMUS, BROMOPSIS, ANISANTHA [ZERNA], CERATOCHLOA, BRACHYPODIUM, FESTUCA.

These genera, with the exception of *Brachypodium* and *Festuca* form the tribe Bromeae.

Anisantha and *Bromus* are annuals which frequently behave as weeds in arable crops. *Anisantha* has 'seeds' (in this note 'seed' refers to the entire caryopsis) which are at least 5 times longer than wide and an awn longer than the main part of the 'seed'. *Bromus* and most other genera have 'seeds' that appear broader (<5 times as long as wide) and have awns which do not exceed the length of the 'seed'. The remaining genera contain mainly perennial species. Both annual and perennial bromes may be considered weeds in arable and intensive grassland, but in dry climates they may provide useful grazing in poor pasture.

The names and synonyms of the commoner agronomically important 'bromes' are listed below. Synonyms which are still widely used by weed scientists are in bold type. This list includes the main species established in northern Europe but it is not exhaustive!

MODERN NAME	CODE	ENGLISH NAME	SYNONYMS
<u>Bromus secalinus</u>	BROSE	'rye brome'	Serafulcus arvensis
<u>Bromus arvensis</u>	BROAV	'field brome'	
<u>Bromus hordeaceus</u>	BROMO	'soft brome'	Bromus mollis , B. ferronii, B thominii
<u>Bromus japonicus</u>	BROJA	'Thunberg's brome'	Bromus patulus
<u>Bromus racemosus</u>	BRORA	'smooth brome'	
<u>Bromus commutatus</u>	BROCO	'meadow brome',	Bromus racemosus ssp commutatus , B.pratensis,
<u>Bromopsis erecta</u>	BROER	'upright brome'	Bromus erectus Zerna erecta
<u>Bromopsis inermis</u>	BROIN	'Hungarian brome'	Bromus inermis Zerna inermis
<u>Bromopsis ramosa</u> ramosa	BRORM	'hairy brome'	Bromus ramosus , B. asper, Z.
<u>Anisantha diandra</u>	BRODI	'great brome'	Bromus diandrus A. gussonii
<u>Anisantha rigida</u>	BRORI	'ripgut brome'	Bromus rigidus
<u>Anisantha tectorum</u>	BROTE	'drooping brome'	Bromus tectorum
<u>Anisantha sterilis</u>	BROST	'barren brome'	Bromus sterilis
<u>Anisantha madritensis</u>	BROMA	'compact brome'	Bromus madritensis
<u>Ceratochloa cathartica</u>	BROCA	'rescue brome'	Bromus catharticus
			Bromus wildenovii , Ceratochloa unioloides , Bromus unioloides
<u>Ceratochloa carinata</u>	BROCN	'California brome'	Bromus carinatus
<u>Brachypodium sylvaticum</u>	BRCSI	'false brome'	
<u>Brachypodium pinnatum</u>	BRCPi	'chalk false brome', 'tor grass'	
<u>Brachypodium distachion</u>	BRCDi	'stiff brome', 'false brome'	
<u>Festuca gigantea</u>	FESGI	'tall brome', 'giant fescue'	Bromus giganteus

A BRIEF GUIDE TO THE PRACTICAL TAXONOMY OF BROMES

Apart from *Festuca gigantea*, all of the 'bromes' are closely related, and were formerly placed in the tribe *Brachipodieae* but are now split into *Bromeae* and *Brachipodieae*. This indicates the closeness of their relationship and the difficulty of differentiating between them. They all are more or less hairy, the ligule is membranous and the leaf sheath splits when young. However, the following is a rough guide aimed at helping the weed technologist identify a 'brome' to its genus without resorting to detailed taxonomic characteristics.

TECHNICAL TERMS

Awn: The thin spike or bristle which sticks out of the end of the caryopsis in many species. Awn length relative to the whole caryopsis is diagnostic, *but it is essential to consider the average lengths from several fruits on the plant, as position in the seed head modifies relative awn length.*

Caryopsis: The true seed plus its persistent surrounding bracts (glumes and paleas). What is colloquially called the 'seed' in grasses is in fact the entire caryopsis.

Spikelet: The group of flowers close together (with virtually no stem separating them) on a single branch of the flower head. The outline shape of the spikelet *when fully hydrated and in flower or seed* is an aid to identification.

THE GENERA

BROMUS (short-awned annual bromes) Invariably annuals, spikelets ovoid, narrowing at the top. Awn <12 mm and generally no longer than the length of the rest of the caryopsis (but *B. japonicus* and *Bromus lanceolatus* are exceptions with bent awns up to 14mm long). The caryopsis tends to be ovoid in outline rather than linear.

ANISANTHA (long-awned annual bromes) Invariably annuals, spikelets broader at the top than the middle. Awns longer than the rest of the caryopsis, which is linear in outline. (*A. rubens* awns are sometimes slightly shorter than the rest of the fruit, but the stiff 'loobrush' inflorescence of *A. rubens* is unmistakable). Many of the spikelets in a sample do not break apart giving rise to 'double fruits' (like in *Avena sterilis*)

BROMOPSIS [formerly ZERNA] (rhizomatous perennial bromes) Invariably perennial with short to long rhizomes. Spikelets are parallel in outline. Awns generally <10mm, no longer than the rest of the fruit, absent in some species (*B. inermis*).

CERATOCHLOA (tufted perennial bromes) Usually tufted short-lived perennials. Spikelets ovoid to lanceolate, narrowing at the top. Awns <12mm, shorter than rest of the fruit.

BRACHYPODIUM (false bromes) Annuals and rhizomatous perennials. Main stem of flower head unbranched, with one spikelet per node inserted edgewise in two opposite rows, with a tendency to look intermediate between a 'brome' and 'couch grass' (*Elymus*). Spikelets ovoid, narrowing at the top. Awn short (*B. pinnatum*) or more usually long (5-15mm).

FESTUCA *Festuca gigantea* is the only species in this genus which is called a 'brome'. It is a tufted perennial, completely without hairs, with auricles (ear-like projections of the leaf base) clasping the stem and broad, stiff, rough leaves. Inflorescence branches usually in pairs with angular stems. Awns short to (mostly) longer than rest of fruit.

AGRICULTURAL SIGNIFICANCE

The annual bromes, of the genera *Bromus* and *Anisantha*, are significant weeds of cereal crops grown in temperate and Mediterranean climates around the world. Some of the annual species provide opportunistic grazing in dry climates, some perennial species of *Ceratochloa* are deliberately sown for pasture and several perennial species are unpalatable weeds of pasture.

In Europe, *Anisantha sterilis* is important in maritime climates, *A. tectorum* in the continental climates of East Europe and the Balkans and *A. diandra* in some Mediterranean areas. *Bromus hordeaceus* occurs widely, particularly where grass is included in the rotation. *Bromus arvensis*, *B. interuptus*, *B. secalinus* and *B. commutatus* were formerly common but have declined in agronomic significance. *B. lepidus*, *B. racemosus* and several other species may be of local significance.

In Australia, *Anisantha rigida* and *A. diandra* are widespread in pasture and arable crops

In USA, A large number of *Bromus* species are important on rangelands and in cereals. The most frequent weed species are *B. commutatus*, *B. hordeaceus*, *B. japonicus* and *B. secalinus*. *Anisantha tectorum*. *Bromopsis inermis* are of local significance as weeds. Several indigenous species are important rangeland grasses especially in winter rainfall areas, with *Ceratochloa cathartica*, 'rescue brome', being sown for fodder.

ECOLOGY AND GERMINATION

The annual 'bromes' are adapted to open habitats and many species are not strongly competitive. Thus the dense canopy of intensive cereal crops has led to the decline of many formerly common species in northern Europe. The species which are successful in intensive cereals are those which establish rapidly in early autumn (*A. sterilis*) and/or can persist as residual populations in field margins and headlands (*A. sterilis*, *A. tectorum*, *B. mollis*, *B. racemosus*). The perennial species are characteristic of non-intensive grassland and woodland edges, and seldom establish in arable crops. Annual and perennial 'bromes' are important suppliers of early fodder on dry rangelands with seasonal or sporadic rainfall due to their rapid establishment and high seed production. However their poor late season productivity leads them to be considered weeds in intensive grassland.

The weedy species have no special requirements for germination beyond an adequate supply of moisture. Post harvest dormancy is usually short and shallow, but varies between populations even within species. From a practical standpoint, the seed tends to have a limited shelf life and seldom remains viable for more than three years in conventional dry storage. Similarly, the seed does not persist in the soil seed bank.

It is possible that adaptations to germination in open habitats such as a need for red light, thermal- and photo- periods occur in some species, but most of the species listed above seem to germinate readily if lightly covered with soil (2mm) in the field or cool glasshouse or in a 10/20C thermoperiod

SEED AVAILABILITY

Herbiseed stocks most of the above species and can supply further information on their establishment and economic importance.