

## **Foxtail Barley**

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### **Abstract**

Foxtail barley (*Hordeum jubatum* L.) is a simple perennial weed that reproduces by seed only and has been increasing in prominence in recent years. Foxtail barley prefers growing in soils with a high water table and is also moderately tolerant to saline soils. Seed production occurs from July to September and seeds are easily dispersed by water and wind. In the seedbank, seeds can persist for up to 7 years and germinate in late summer and spring. Foxtail barley can be managed by tillage, growing competitive crops, application of herbicides, and by managing the water table.

### **Introduction**

Many factors including management, soil types and climate affect the distribution of weeds in agricultural systems. The relatively higher precipitation experienced in Manitoba over the past decade have contributed to shifts in the abundance of certain weed species. For example, in a recent survey that determined the presence of residual weeds in winter wheat fields conducted in Manitoba in the summer of 2009, foxtail barley (*Hordeum jubatum* L.) was the tenth most abundant weed in these fields (Gulden and Lewis 2010) and was sufficiently abundant in some fields in the Aspen Parkland ecoregion of Manitoba to be considered a locally abundant weed. In comparison, the relative abundance of foxtail barley was 2.5 times lower (rank 17) in a similar survey conducted in winter wheat fields in Saskatchewan in 1985-1988 which were considerably more dry (Thomas and Wise 1989). A similar change in relative abundance also was observed in biennial wormwood (*Artemisia biennis* L.), another weed that prefers wet soil conditions. Also contributing to the increase in foxtail barley is the inherent biology of the species.

### **Biology and concern**

Foxtail barley is a short-lived simple perennial grass that is native to North America and reproduces only by seed. As a result, foxtail barley is a prolific seed producer. Individual plants produce spikes from July until late fall. Seeds on each spike mature from the distal end to the base. As the seeds mature, the awns spread out and mature seeds are readily dispersed by wind, water, and by clinging to animals (Best et al. 1978). Seeds tend to germinate in fall and the following spring resulting in a cohort of various growth stages if fall seedling were not managed before freeze up. Seedbank persistence is relatively short with maximum persistence for up to 7 years and high mortality rates during the first year (Best et al. 1978). Despite a relatively small seed size, foxtail barley seeds can emerge from a depth of up to 7.5 cm.

Foxtail barley often grows in dense patches surrounding low areas of the field. Foxtail barley is considered a facultative halophyte with medium tolerance to salt which contributes to its competitive advantage in these areas. Although the species gains a competitive advantage as soil salinity increases, the species performs best in non-saline conditions. More important than salinity is the depth of the water table. Foxtail barley is associated with high water tables and tends to dominate the community in these areas where crops often struggle or fail to survive (Best et al. 1978).

Foxtail barley is palatable to livestock at the vegetative stage, but is unpalatable after heading. Heading occurs early in the growing season leaving only a short window for grazing this species. Numerous long awns on each seed are irritable to livestock (Best et al. 1978).

## Management

As foxtail barley is closely linked to shallow water tables, reducing the water table through drainage or growing crops that use water is a good long-term strategy for managing this species. Although effective, this may not be practical in all situations.

As a simple perennial, the lack of vegetative reproduction suggests that tillage is a viable control strategy provided that rootstocks including the crown are pulled to the surface to desiccate. This indeed is an effective control strategy and fall tillage has proven to be more effective than spring tillage. The reasons for this are increased seed burial and less re-establishment of uprooted plants (Donald 1990). Tillage followed by the establishment of a dense, competitive annual crop is an effective management strategy.

Another effective, but time consuming strategy is to prevent seed production by mowing or grazing. Foxtail barley seed mature very quickly and therefore, to be effective seeds must be removed no later than 10 days after heading (Best et al. 1978).

There are a number of herbicides that can be used to manage foxtail barley, but achieving complete control can be challenging. Top growth control can be achieved readily, however, for complete control, sufficient quantities of the herbicide must be translocated to the root system. To facilitate translocation of the herbicide to the roots, carbohydrate flow in the plant should be towards the roots. This occurs only in the fall, after reproduction, when the plant is building root reserves for winter survival and growth during the following spring. Herbicides such as glyphosate are therefore best applied in the fall to control mature plants and small seedlings that have recently emerged (see special weed problems in the Manitoba Guide to Crop Protection) (Anonymous 2011). The efficacy of glyphosate on foxtail barley can be enhanced effectively with Ammonium sulfate only when very low rates of glyphosate are applied (Donald 1988).

If herbicides cannot be applied in the fall to manage this weed, spring application can be used with relatively good success. Early spring applications of glyphosate are best followed with an in-crop application of an effective Group 1 herbicide (Sapsford, pers. comm.) to control late emerging seedlings and plants that survived the glyphosate treatment. This is particularly important when an uncompetitive crop such as flax (*Linum usitatissimum* L.) is grown that will not compete effectively with foxtail barley plants. Later spring glyphosate applications tend to be more efficacious, but crop yield may be compromised due to delayed seeding. Blackshaw et al (1998) showed that within Group 1 herbicides efficacy on foxtail barley varies among products with Assure II < Poast Ultra < Select < Venture L. There are no known herbicide-resistant populations of foxtail barley (Heap 2011).

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