Vulpia bromoides, V. myuros
Six weeks grass, silvergrass, rat's tail fescue
Poaceae

Vulpia spp. are Mediterranean annual grasses, naturalized in California grassland systems since their introduction during the period of Spanish colonization (1769-1824). *Vulpia* can produce over 200,000 seeds m^{-2} (Dowling and Nicol, 1993), and tends to mature earlier than other annuals, such as *Bromus* and *Lolium* spp. Research cited in Hitchmough et al. (1994) suggests that *Vulpia* forms a persistent seed bank, and can germinate profusely following fire. There is some evidence that the seedbank of Vulpia spp. can persist for three years (Jones, 1992). Vulpia follows the general life cycle of winter annuals, with field emergence mainly occuring over the mid-winter period. Typical field populations of *Vulpia* range from 4800 m^{-2} to 43,000 m^{-2} (Dowling, 1996). *Vulpia* is sensitive to dry soil conditions, but because it flowers relatively early it can successfully avoid drying soils in late spring. The earlier individuals establish, the more seeds they will produce. Unpublished data cited by Pratley (1996) suggests that *Vulpia* may have allelopathic capabilities, with approximately 20 identifiable compounds in leachate that have inhibitory effects on germination of wheat.

Vulpia can host take-all disease, which is caused by *Gaeumannomyces graminis* var. *tritici*, and as such has been the target of eradication efforts in cereal crops. Pratley (1996) observed the presence of substantial root rot in subterranean clover in the presence of *Vulpia* whereas control pots without *Vulpia* showed no overt symptoms of the disease.

A survey of the control-oriented literature confirms that the goal of most control efforts has not been complete eradication but rather a reduction of the proportion of *Vulpia* relative to desirable pasture species. The use of chemicals to control *Vulpia* is a relatively recent innovation (Bowran et al., 1996). Leys and Plater (1993) found that a mixture of simazine (500-700 g a.i. ha-1) plus low rates of paraquat, a contact herbicide, (at 40-60 g a.i. ha-1) gave better than 90% control of *Vulpia*. These same authors found in an ealier study (Leys et al. 1991) that simazine alone also gave good control of *Vulpia*. *Vulpia* spp. are not susceptible to grass-specific herbicides (e.g., fluazifop, sethoxydim, and haloxyfop), so the usage of such herbicides may exacerbate the *Vulpia* problem (Dowling and Nicol, 1993). Spraying annual grasses with low rates of non-selective herbicide (paraquat and simazine) during their reproductive phase is thought to be the most effective method of control, but Dowling and Nicol (1993) found that among all the species they studied, *Vulpia bromoides* was the least effected. In semi-natural vegetation, the effect of herbicides on native grasses must be considered. Hitchmough et al. (1994) found that native grasses held up fairly well under treatments of ethofumesate, sethoxydim and fluzaifop, which controlled all the grass weed seedling cohorts except *Vulpia bromoides*. These results are consistent with those of Dowling and Nicol (1993), above.

The use of fire as a control method shows some promise, although Hitchmough et al. (1994) recommend that annual burning for three to seven years is likely to be necessary to eliminate grass weeds with persistent seed banks. Furthermore, the use of fire suffers

from the disadvantage that it may have a negative impact on the recruitment potential of indigenous plants, both woody and herbaceous. Research suggests a combination of "cultural" weed management techniques (i.e., non-herbicide methods): i) reducing seed production (i.e., grazing in spring); ii) maximizing seed weathering / predation over summer (grazing); iii) minimizing seed dormancy (reducing litter in autumn) and iv) mazimizing interspecific competition (Dowling, 1996; Michalk and Dowling, 1996). Michalk and Dowling (1996) cite some evidence that application of nitrogen fertilizer to pastures with *Vulpia* should improve perennial grass production at the expense of *Vulpia*, as long as the initial populations of *Vulpia* are sparse. According to Hetherington and Auld (1996), the fungal pathogen *Pyrenophora seminiperda* may be used for biological control of *V. bromoides*, by decreasing germination, emergence, and vigor.

Literature cited:

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