

Lolium multiflorum L. (Poaceae)
Annual Ryegrass, Italian Ryegrass

Description. Annuals, sometimes short-lived perennials, 3-10 dm tall, stems usually solitary, erect to ascending, sometimes procumbent, glabrous. Leaves alternate, ligules 0.5-2 mm long, truncate, entire, auricles present, to 1.5 mm long; sheaths glabrous; blades linear, flat to folded, 3-7 (10) mm wide, glabrous to minutely scabrous. Inflorescence a terminal spike, 10 to 25 (30) cm long, the spikelets arranged alternately along the axis. Spikelets 8-30 mm long; glume usually 1, on the side of the spikelet opposite the stem, 4-9 (10) mm long, linear-lanceolate, 7-9-nerved, the apex obtuse to rounded; florets 10-20, the lemmas 5-7 (8) mm long, acute, the upper ones with an awn 1-5 (8) mm long. In California, flowering from March to June. (Arnow 1987, Holmgren and Holmgren 1977, Humphries 1980, Sutherland 1986).

Lolium perenne L., perennial or English ryegrass, a closely related taxon, is characterized by being perennial and spreading from short rhizomes, having spikelets with 2-10 florets with awnless lemmas, and with leaf blades 1-3.5 mm wide. In California, it flowers from April to September.

Note: The above descriptions of *L. multiflorum* and *L. perenne* are given in the narrow sense, as treated by some authors (e.g., Arnow 1987, Holmgren and Holmgren 1977, Humphries 1980, Sutherland 1986, Terrell 1966). Other descriptions (e.g., Munz 1959; Junak et al. 1993, Wilken 1993) are broader, based on materials as collected in California and which may have been influenced by hybridization or introgression. The two species are apparently distinct in their native habitats, but hybridize widely (*L. Xhybridum* Hausskn.). Furthermore, breeding programs have resulted in numerous annual and perennial strains that have recombined the distinguishing characters of both species. Thus, both naturalized annual and perennial strains may have awnless or awned lemmas, which has resulted in loss of distinction between them in some areas where they have been introduced (Gould 1975, Humphries 1980, Terrell 1966). Substantial variation in isozyme loci in naturalized populations of *Lolium multiflorum* may have resulted from interactions among selection, adaptive polymorphisms, and multiple introductions (Von der Pahlen 1969).

Lolium multiflorum, *L. perenne*, their natural hybrids, and cultivar selections from breeding programs have been used extensively as preferred pasture grasses (e.g., Europe, Great Britain, New Zealand, United States) and as a cover crop in no-tillage cultivated fields, mined-lands reclamation, and short-term cover following chaparral fires (e.g., Cuomo and Blouin 1997, Hamilton 1956, Marshal and Sagar 1965, Nelson et al. 1991, Papanastasis 1973, Rosello Beltran 1976a, 1976b, 1976c, Terrell 1966, Williamson and Johnson 1991). In some cases, they are preferred as an alternative to tillage and herbicide treatment of cultivated crops, because of they offer a more economical means of weed suppression (e.g., Cuomo and Blouin 1997, Huslig et al. 1993, Nelson et al. 1991). The potential use of herbicide-resistant strains for low-tillage pastures also has been evaluated (Moss et al. 1993).

Geographic distribution. A native of Mediterranean Europe (Humphries 1980), Italian rye has been introduced and become naturalized throughout North America (southern United States and Mexico), temperate South America, Australia, Hawaii, Japan, and southern Africa (Arnold and

de Wet 1993, Chapman 1991, Gibbs Russell et al. 1955, Montenegro et al. 1991, Munz 1959, Ohwi 1965, Terrell 1966, Wagner et al. 1990, Webb et al. 1988, Wells 1991).

Plant fragments identified as *Lolium multiflorum* were found in adobe bricks in some of the Spanish missions (Hendry 1931). *Lolium perenne* was first reported from San Francisco by Watson (1880). Both species were first used as lawn grasses, but reported as having escaped from cultivation by the end of the 19th Century (Robbins 1940). *Lolium multiflorum* has been reported from all northern California Channel Islands and Santa Barbara Island (Junak et al. 1997). *Lolium perenne* is known only from Santa Cruz Island (Junak et al. 1997). Both species are widespread in most California counties west of the Great Central Valley (Anonymous 1998).

Reproductive and Vegetative Biology. *Lolium multiflorum* is strongly self-incompatible and depends on wind pollination and outcrossing to set full complements of seed (McCraw and Spoor 1983a, 1983b, Spoor 1976). Seeds of both *Lolium* species germinate readily after rains under relatively cool temperatures, but young seedlings are intolerant of freezing conditions (Harper 1977, Young et al. 1975). Under competitive conditions with broad-leaved dicots and other grasses, seedlings of *Lolium perenne* usually experience relatively low levels of establishment (Campbell and Swain 1973, Harper 1977, Whittington and O'Brien 1968). However, once established, at least *Lolium perenne* can spread by short rhizomes and becomes a strong competitor (Donald 1958, Kays and Harper 1974). Under conditions of high density *Lolium multiflorum* shows strong allelopathic effects (Naqvi 1972, Naqvi and Muller 1975).

Both cattle and sheep grazing appear to selectively reduce above-ground biomass in *Lolium perenne* grasslands and pastures, but without a significant effect on overall dominance (Jones 1933a, 1933b, 1933c). Furthermore, genetic strains with lower palatability are favored and may become more dominant (Baker 1937, Brougham and Harris 1967, Harper 1977). Field and experimental studies have demonstrated the existence of multiple ecotypes in both *L. multiflorum* and *L. perenne*, which have evolved in response to interactions either involving inter-specific competition or grazing (Turkington 1975, Harper 1977, Weiner 1985, Weiner and Thomas 1986). In California mainland chaparral, *Lolium multiflorum* may decline as vegetation recovers from fire (Papanastasis 1973)

Ecological distribution. *Lolium multiflorum* and *L. perenne* generally occur in cool, moist sites of waste areas and roadsides. In California, *Lolium multiflorum* is an important element in coastal Mediterranean grasslands, but is apparently not well established in interior habitats (Heady et al. 1977). In naturalized regions, both *Lolium multiflorum* and *L. perenne* have been reported from somewhat moist sites, including lawns, disturbed areas, pastures, roadsides, and fallow fields (Arnou 1987, Humphries 1980, Munz 1959, Sutherland 1986).

Weed status. Neither *Lolium multiflorum* nor *L. perenne* are considered noxious weeds in agricultural or horticultural practice, at least at a global level (not listed by Holm et al. 1977), nor are they considered noxious by the State Dept. of Food and Agriculture (Anonymous 1996). Only *L. multiflorum* is listed for the United States in Lorenzi and Jeffery (1987). However, the related annual, *L. temulentum* (darnel) is considered a significant weed on a global basis (Holm et al. 1977), primarily because it is a weed in cultivated cereal crops and because its seeds contain a poisonous alkaloid. It is not listed for the United States (Lorenzi and Jeffery 1987). A

combination of cleaned bulk crop seeds and poor establishment, at least in cultivated fields, has contributed to a decline in darnel in Great Britain and elsewhere (Forsyth 1968).

Microbial and insect pathogens. No literature was found that reported microbial diseases or insects infesting *Lolium multiflorum* or *L. perenne*. However, at least one fungus, *Gloeotinia*, has been reported as a potential biocontrol of *Lolium temulentum*. (Alderman 1992).

Herbicide control. Several herbicides have been used to control annual ryegrass, including diclofop, barban, triallate, diuron, metribuzin (Blowes, 1987, Robinson 1983, Stanger and Appleby 1989, Velloso and Dal'Piaz 1982). Evolution of strains resistant to diclofop have been reported (Gronwald et al. 1992, Martinez-Ghersa et al. 1997, Shaw and Wesley 1991, Stanger and Appleby 1989). Stanger and Appleby (1989) have reported, however, that diuron and metribuzon are effective in controlling strains resistant to diclofop.

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