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CHAPTER 11

PEST MANAGEMENT IN RYEGRASS

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Introduction

Annual ryegrass (*Lolium multiflorum* Lam.) is a very hardy specie and is normally not susceptible to many disease, insect, weed, or nematode problems. Nevertheless under climatic conditions which may favor the pathogen or insect pest, ryegrass can be severely injured or killed.

Diseases

Crown rust: The most important disease on annual ryegrass in the Southeastern US has been crown rust (*Puccinia coronata* Pers. Cda.). Crown rust is easily identified by observing the leaves of infected plants. Pustules or raised blisters of reddish orange-colored uredosporangia can be observed. The pustules are normally on the upper leaf surface and are oval-shaped. They are present on green leaf tissue and will cause the entire leaf to turn slightly yellow in color and eventually die and turn brown. From a distance the plants have a yellow cast and upon closer inspection, the pustules are easily observed. When severe infection occurs, the plants will produce little on no forage or seed yields.

Forage quality is reduced and palatability of the forage is also reduced. The only practical method to combat this disease for forage production is to plant resistant varieties. The disease is usually observed in January or February along the Gulf Coast and gradually increases in severity and moves northward if conditions favor development. Heavy dew and mild weather are the conditions which favor disease development. The disease has normally only been a problem in Texas within a distance of 100 miles from the Coast. In 1994-95 crown rust was observed in the Uvalde area on ryegrass pastures which had been irrigated and had above normal rainfall with heavy forage growth and very heavy dew. This region has just recently began planting annual ryegrass and has had no crown rust history.

Annual ryegrass did not become a major winter annual until the rust resistant varieties Gulf (Weihing, 1963), 'Magnolia' (Bennett and Johnson, 1968), and 'Florida 80' (Chapman and Webb, 1965) were developed in the late 1950's and 1960's. Although not extremely winterhardy,

these varieties were very productive and reliable. The acreage of ryegrass expanded along the entire Gulf Coast from Florida to Texas in the area where crown rust was most devastating. Even common ryegrass, which had been very susceptible, became resistant indicating that common seed produced in Oregon was primarily from one of the resistant varieties. After several years, when crown rust was not a problem, new varieties with less resistance were released and the disease began to show up once again. An example is 'Marshall' (Arnold et al., 1981), which is a highly productive and winterhardy but very susceptible to crown rust. This in turn increased plant breeding efforts which resulted in the selection of crown rust resistant plant types out of Marshall and the release of 'Jackson' (Watson et al., 1990) and 'Surrey' (Prine et al., 1989) ryegrass which are presently resistant. In addition, the release of 'TAM 90' (Nelson, et al., 1992) another crown rust resistant variety provides at least some genetic diversity for resistance to the disease.

In the seed production areas, fields are often sprayed for crown rust and also for stem rust (*P. graminis* Pers.). Stem rust has not been a significant problem in the Southern US, however, it is a serious problem in Oregon and other parts of the world where seed is produced.

Seedling diseases: Because annual ryegrass must be reseeded annually, seedling diseases can be a problem under very wet growing conditions. Seedling diseases which can attack annual ryegrass are generally referred to as the seedling blights. They include Fusarium species, rhizoctonia foliage blight, (*Rhizoctonia solani*, Kuhn) as reported by Ehlig and Hagemann, 1981. These diseases are often associated with decaying organic matter and/or high nitrogen levels which may be prevalent in pastures at planting time.

Barley yellow dwarf virus: Barley yellow dwarf virus (BYDV) may be a problem in some pastures especially after warm fall or winter periods if high levels of aphids are present to spread the virus. Leaf symptoms are chlorotic streaks on leaves, red to yellow color on stunted leaves, and sometimes no symptoms, however, reduced growth. Catherall and Parry (1987) indicate that reduced root growth on BYDV infected plants was the major cause of reduce growth and lower forage production. Holmes and Channor, (1977) report that ryegrass mosaic virus can be widespread in England, Wales and Continental Europe and has caused large reduction in forage and seed yields. We are not aware of this virus disease being reported in the USA.

Ryegrass blast: Ryegrass blast (*Pyricularia grisea* (Cooke) Sacc.), also called gray leaf spot, can be a serious pathogen on annual ryegrass in the Southeastern US. It was reported by Bain et al., (1972) in Mississippi and by Carver et al., (1972) in Louisiana. In 1990-91 blast caused significant yield reduction in annual ryegrass swards and perennial ryegrass lawns in Florida (Prine, personal communication). Ryegrass blast is described at length by Trevathan et al. (1994).

Initial disease symptoms are small brown spots or gray-green, water-soaked spots on seedling leaves. Spots may develop into round or oval lesions with gray or blue-gray centers and dark brown or purple margins. Leaf tips have gray-white to reddish brown lesions. Plants have the appearance of being flaccid, water-soaked, and dark green in color.

In the field, patches of severely diseased plants results in thick mats of dead ryegrass. If warm, wet weather conditions continue which favor the disease, the above ground portion of the ryegrass plants appear to have be hit by a flame thrower. The disease will also attack a wide range of hosts which include corn (*Zea mays* L), crabgrass (*Digitaria sanguinalis* (L) Scop.), oats (*Avena sativa* L.), wheat (*Triticum aestivum* L.), and rice (*Oryza sativa* L.), among others. Therefore, there will likely be reservoirs of inoculum in most areas of the Southeastern US. The disease can be spread on the seed, however, this is not thought to be an important mechanism for dissemination.

The disease does require long wet periods such as hurricanes to become severe. Ryegrass blast has caused significant yield losses in Mississippi, Louisiana, and Texas. Temperature ranges between 22 and 29°C (71 to 84°F) are reported by Suzuki (1975), to be ideal for rice blast and therefore warm temperature probably favor development of the disease on ryegrass. Trevathan et al., (1994) reported that with ryegrass cultivars, temperatures between 20 and 28°C favor development of the disease. With small seedlings, entire plants are likely to be killed, however, with more mature plants only leaf spots and necrosis may occur. Differences in resistance between varieties probably also exist. Trevathan et al., (1994) reported that 'Gulf' was more susceptible than 'Marshall', 'Sunbelt', or Tetrablend 444. They also reported that germplasm from Europe appeared to have more resistance than other introductions.

Acid soils: Soil acidity and aluminum toxicity are significant shortcomings to forage production in East Texas and the Southeastern US. Research at Overton (Hillard et al., 1990) on ryegrass indicated that soil pH increases produced by limestone application had a much greater effect on yields than did residual soil P. Optimum yields were estimated to occur above pH 6, implying that exchangeable aluminum may have had a significant role in limiting yields at lower soil pH. Aluminum tolerance screening procedure similar to the procedure described by Polle et al. (1978) have been utilized in the ryegrass breeding project at Overton. This procedure utilizes hematoxylin to stain root tips of ryegrass seedlings. We have selected tolerant genotypes for two cycles in some populations. Preliminary data (Nelson et al., 1989) indicated that we were successful in differentiating Al tolerance between cultivars and in selecting tolerant genotypes. Germplasm selected to be tolerant to acid soil conditions may lose some yielding potential under

soils with neutral soil acidity. Therefore, their benefit would only be realized in acid soils and potential acreage for such varieties is questionable. Recently a procedure has been reported (Bona et al., 1991) on screening four-day old seedlings for acid soil tolerance. Plants were grown in acid soil for three days and root lengths are measured. In an effort to determine whether our elite aluminum tolerant germplasm will have a significant advantage when growing in an acid soil, we will test several lines in the near future under both greenhouse and field conditions.

Insect Pests

Insects have not been a serious problem on annual ryegrass in the Southeastern US. Greenbugs or aphids are not a problem with the possible exception that they may transmit virus diseases.

Grubs (*Costyletra* spp.) can cause yield loss on annual ryegrass in pastures. The damage by this pest usually goes unknown to the cattleman as little or no visible symptoms normally appear. Infestation of ryegrass by grubs result in damage by grub larvae to roots which causes reduced growth and susceptibility to drought and heat. East et al. (1979) indicates ryegrass is a preferred host specie of the insect.

The fall armyworm and true armyworm generally are the most damaging insect pests of fall planted annual ryegrass. Damage usually occurs before growers notice an infestation, however, they are easily controlled with insecticidal treatments as described in the following TAES table (Allen and Hoelscher, 1988).

Table 1. Suggested fall armyworm control on pastures.

Insecticides (listed alphabetically)-toxicant per gallon or pound	Concentrate per acre	Days from last application to: Harvest	Grazing
Carbaryl			See remarks
(Sevin® 80S)	1 1/4 - 1 7/8 lbs.		
(Sevin® XLR Plus)	1 - 1 1/2 qts.		
Naled			See remarks
(Dibrom® 8 lb.)	1 pt.		
Parathion (8 lb.)	1/4 - 1/2 pt.	15	15

Remarks

Carbaryl. Zero days for harvest and grazing with aerial application, 14 days for ground application.

Naled. Animals may be present during treatment. Do not graze lactating dairy animals on treated areas.

Weed Control

Weeds in ryegrass being grown for forage are normally not a serious problem. Broadleaf weeds can easily be controlled with 1/2 pound per acre of 2,4-D in 15 to 20 gallons of water. Application of 2,4-D should occur after ryegrass has tillered but before the boot stage. Do not graze for two weeks after application. Other products may be applied in combination with 2,4-D to control some problem weeds. Caution should be used and always follow grazing restriction on the label of any herbicidal product.

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