FAIRY RINGS IN ALBERTA[1]

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Introduction

The incidence of fairy ring reached a peak in 1961 making it the most important turf grass disease in southern Alberta. The fungus was so destructive that in some cases entire lawns had to be torn up and resodded with healthy turf or reseeded, Park lawns and golf course fairways were damaged or became unsightly by the development of the disease and even farmers and ranchers expressed concern over the appearance of the rings on native grass pastures.

The disease was described more than a century ago but very little is understood about the host-parasite relationships and there are, as yet, no satisfactory control measures (4).

Symptoms

The first evidence of the disease in Alberta is usually continuous or interrupted circular bands of green grass (Fig, 1a). Fruiting bodies may appear in the rings (Fig. 1c and d) from time to time under conditions of sufficient moisture. Later the affected grass often wilts, turns brown, and dies and the ring is often invaded by weeds. Invariably the soil under the dead portion of the ring is compact with mycelium and often so hard that mechanical aerators cannot penetrate it. The size of the ring will vary, depending on age, from less than one to over 200 years in diameter.

Etiology

The fungi associated with fairy rings have been identified and reported in the literature. Shantz and Piemeisel (5), in addition to their own investigations, report on the work of 31 authors dealing with 47 fleshy fungi, We were unable to obtain any fruiting bodies of the fungus causing the large rings illustrated in Fig. 1 but Marasmius oreades Fr. was identified as the causal organism of the rings reported from the other districts in southern Alberta,

Many attempts have been made to determine the nature, of pathogenesis in this disease but no general agreement has been reached. Bayliss-Elliott (2) considers that the death of the grass is due to parasitic action of the fungus and disagrees with Shantz and Piemeisel (5) who believe that the death of the grass is caused by drought produced by compact growth of the fungus in the soil. Biochemical processes that take place in the soil during the progress of the fairy ring fungi have been investigated but have not thrown much light on the host-parasite relationship. The conclusion drawn from these studies (3) is that the protein portion of the organic matter in the soil is converted by

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the fungus into compounds of nitrogen that are readily available to higher plants. The largest amounts of free ammonia were found in the ring area and less without than within the ring. No attempts, however, were made to show that any of these chemical reactions has a lethal effect on the host. Although Bayliss-Elliott (2) states that there are indications of a toxic excretion produced by the fungus that damages the roots of the grass and enables the fungus to attack them even before they are dead, she offers no substantial evidence to support his hypothesis. Albrecht and Sheldon (1) showed that grass produced from fairy rings caused by M. oreades contained twice as much protein as the non-ring grass and that all the nine essential amino acids assayed were present in higher quantities in the ring grass. This lush, high protein grass is often over-grazed and may be another contributing factor to the death of grass on range land.

Epidemiology

The tendency of fungi to grow outward from the point of germination of the spore or from the original source of infection results in circular colonies. By this procedure the size of the fairy ring increases from year to year. Bayliss-Elliott (2) found the maximum increase of a ring produced by M. oreades to be 13.5 inches per year. From this the age of the large rings on range land in southern Alberta (Fig. 1f) may be estimated to be over 200 years old. Presumably new rings are initiated from the point of germination of the fungus spore although Shantz and Piemeisel (5) claim that only on rare occasions are conditions favorable on the Great Plains for spore germination of basidiomycetes.[f] It is quite possible that the rings are often produced from fragments of very old ones.

Distribution

This distribution of fairy rings in southern Alberta is widespread and has been reported on lawns, golf courses, parks, pastures, and range land. Typical symptoms on these crops from representative districts are illustrated in Fig. 1.

Fairy rings appear chiefly in grassed soils that are dry and low in fertility. This statement is often disputed by home owners who claim they have supplied their lawns with sufficient amounts of fertilizer and water and are still plagued with fairy rings. However, the disease is prevalent on golf course fairways but seldom develops on the greens and the latter are fertilized and watered more frequently than any of our grassed areas,

Discussion

Fairy rings, regardless of their stage of development, have an undesirable effect on turf grass planted principally for ornamental and recreational purposes. These areas are costly to prepare and maintain and methods for prevention and eradication of the disease would be of practical significance.

Very little research has been done on this disease. A review of the literature reveals that most of the investigations were done prior to 1920 and no record could be found of any work done in Canada, We believe that the

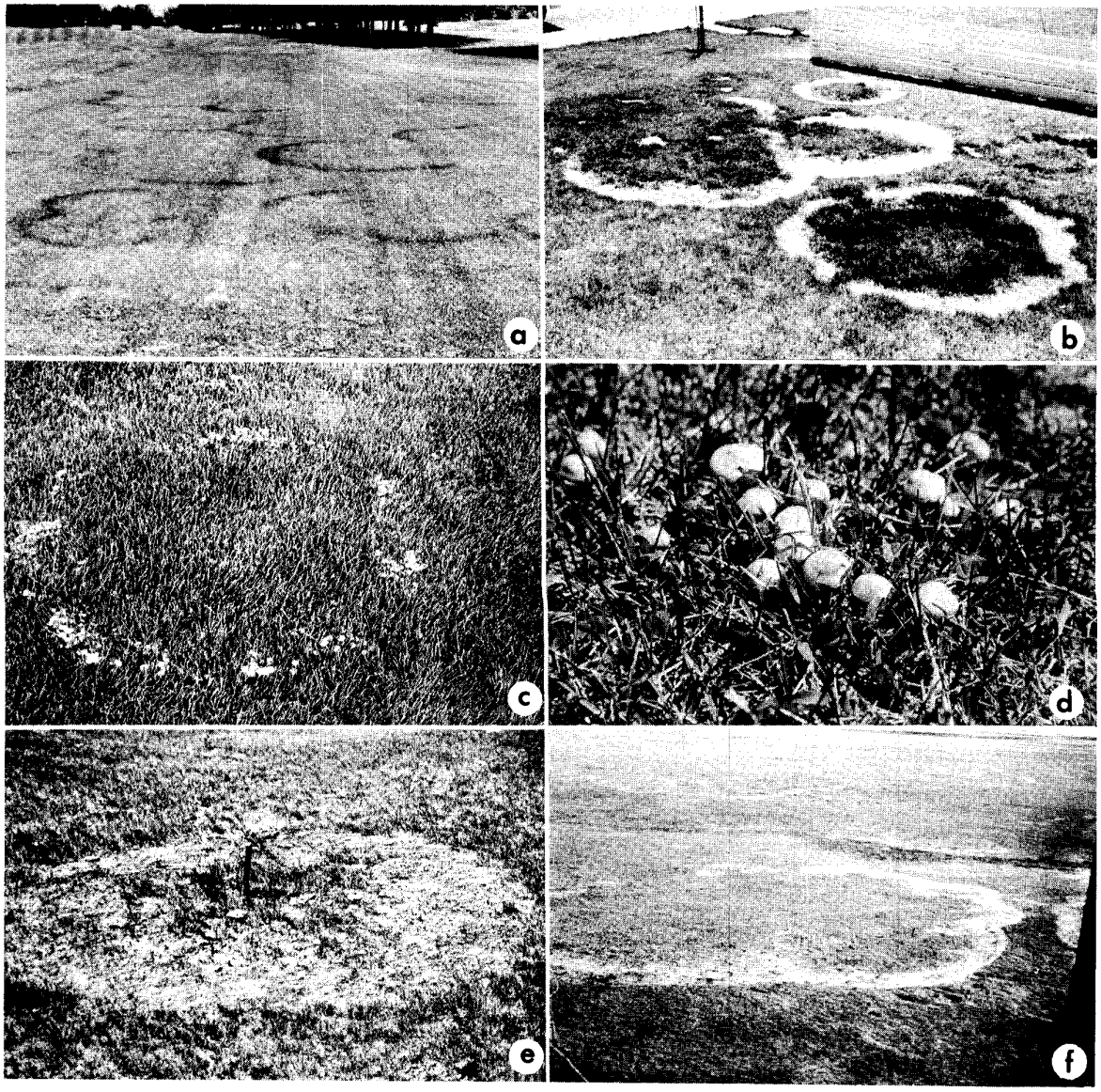

Figure 1. Fairy rings in Southern Alberta.

a) Incipient symptoms of green banding on fairway of Golf and Country Club, Calgary, Alberta.

b) Severe damage on a lawn at Lethbridge, Alberta.

c) Fruiting bodies of *M. oreades* in typical ring formation.

d) Close-up of fruiting bodies shown in Fig. 1c.

e) Damage in native pasture near Barons, Alberta.

f) Aerial photograph of range land south of Manyberries, Alberta. Large ring shown measured ½ mile in circumference.

disease warrants further investigation and have initiated a program to study the host-parasite relationship and are experimenting with several methods of control.

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