

# FAIRY RINGS IN GRASSLAND

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Fairy rings can be found in grassland most parts of the world, although they also occur in many other habitats. Most prairie lawn owners are familiar with these slightly rings or arcs of dark green grass and associated fruits (mushrooms, toadstools or puffballs) in lawns.

Supernatural agents were often cited as the causes of fairy rings before their biology was understood. William Shakespeare ascribed them to the "little people," but he also noted the association between the rank rings of grass and mushrooms (toadstools) which seemed to spring up very quickly:

Prospero: "you demi-puppets that  
By moonshine do the green sour  
ringlets make,  
Wherof the ewe not bites; and you  
whose pastime  
Is to make the midnight mushrooms"  
(*Tempest*, Act 5, Scene 1)

In Europe also there was a commonly held belief that elves caused them: "They [elves] make so deep an impression on the earth that no grass grows there, being burned with extreme heat... the rings are most frequently seen by moonshine; then they dance their rounds in the high grass." (Olaus Magnus in *History of the Goths* (1628))

Other mythologies associated their association with assemblies of witches on Walpurgis Night. In Germany, fairy rings were named after these witch ring dances "hexenringen"—and in the Tyrol they were said to be due to scorching by a fire-breathing dragon passing over the field (an early report of UFOs ???). In Holland

they were thought to mark a spot where the Devil's butter churn had rested. Celtic belief associated them with worship cults.

Fairy rings in pastures, meadows, lawns, golf greens and fairways are usually caused by fungi, and most belong to the Class Basidiomycetes. There are three kinds of ring-formers: **Grassland ring-formers** are true soil-inhabiting fungi which use as a source of nutrients the accumulated organic matter in the soil. **Woodland ring-formers** are often ectomycorrhizae which parasitize and form sheaths on roots of trees growing in grassy areas. These are rings "tethered" to the tree roots and they produce their fruiting bodies above ground. One species in Saskatoon is associated with birch roots. **Waste colonizers** are fungi which grow on pieces of wood buried in the soil or on dead tree roots and their fruits also develop above ground. When their food supply is exhausted they cease fruiting. They can cause problems on new building sites or after incomplete removal of tree roots.

Some species usually produce their fruits in rings or arcs, whereas the fruits of other potential ring-formers are often solitary or grow in troops. Rings are formed because the fungus body (mycelium, consisting of tubular threads of cells) grows in a radial direction from a point source of infestation. The ring may break down into arcs because of physical, nutritional or microbiological barriers in the soil. When environmental conditions are suitable, the fungus fruits around the ring circumference. This often takes place in summer or fall after the weather

has been wet and warm and the fungus has accumulated adequate food reserves. The fruits produce myriads of microscopic spores, which are formed on gills or in tubes on the undersurfaces. These spores are the main method by

which the fungus reproduces and spreads.

Many of the species which grow in rings do not have visible effects on vegetation other than producing a ring

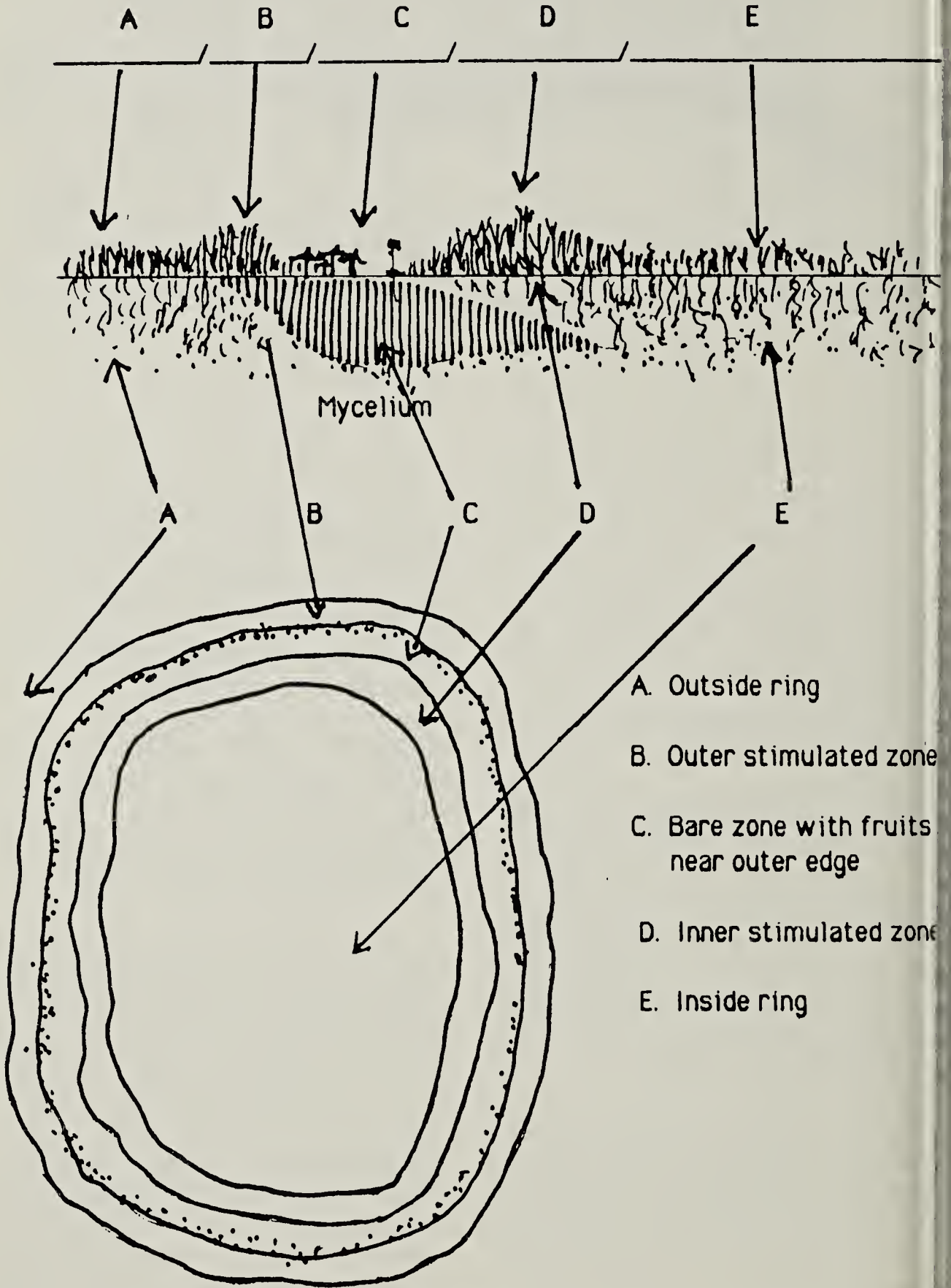


Figure 1. Vertical section (upper) and plan (lower) of a fairy ring caused by *Marasmius ordes*



fruits. Some, like the common field mushroom or some puffballs, have an associated ring, arc or ribbon of stimulated (darker green) grass growth. The **Fairy Ring Mushroom**, the most common cause of the unsightly rings in lawns on the Prairies, is called *Marasmius oreades*. A 1972 survey in Saskatoon showed the heaviest infestation in domestic lawns 6-15 years old. Of 270 lawns in this age group approximately 80 per cent exhibited *M. oreades* rings. This declined to 2 per cent in lawns over 20 years old. Eventually rings are blocked by obstructions or by another ring of the same species.

In fairy rings caused by *M. oreades* the distinct rings are often visible (Figure 1). There is an outer ring (B) of stimulated green grass, a bare zone (C) where grass growth is absent or sparse with a ring of tan-coloured fruits and its perimeter and an inner green zone (D) where grass growth is luxuriant. The stimulation of the outer zone results from the liberation of nitrogen from the organic matter by the fungus as it grows. This nitrogen is taken up by the grass. The bare zone is formed mainly because of the dense growth of water repellent mycelium of the fungus, which resists drought conditions. The soil of the bare zone may have a strong, mouldy smell and the greyish-white mycelium of the fungus may colonize the soil deeply, usually the fungus is most abundant in the top 5 cm. The inner green zone is where the fungus mycelium in the soil is being decomposed by soil microorganisms yielding nitrogen, which stimulates grass growth.

*M. oreades* will not grow back through

soil it has colonized, at least for several years. Where *M. oreades* rings make contact they eliminate each other. When the rings of other fairy ring fungi meet they may eliminate each other or continue to grow through each other, or one or both may be obliterated. In growing through the soil, *M. oreades* exhausts the nutrients it needs and leaves self-inhibitory waste products (metabolites) of its own growth. Several of the microorganisms in uninfested soil have been shown to be antagonistic to *M. oreades*. This discovery has been used to develop a biological control method for *M. oreades* rings by mixing ring and non-ring soil. Other non-chemical methods are available for suppression and elimination of ring symptoms in lawns. Elimination of the fungus by fumigation with volatile fungicides is possible, but not suitable for the homeowner. Recently, effective elimination of the fungus has been achieved in Saskatchewan tests in some cases with experimental fungicides applied as soil drenches, but none of the chemicals is registered for use in Canada.

#### For further information

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