thrive under the conditions required to maintain healthy turfgrass and are so adaptable that cultural manipulations alone are unlikely to resolve casting problems. Physical removal of casts by brushing, switching or dragging is laborious and of only temporary benefit (8).

*Chemical control*

During the past 20 years the problem of excessive earthworm castings interfering with play on golf courses, sport fields and other recreational turf venues has become more serious and widespread. Why? Pesticides historically used to control earthworms included mercuric chloride (also called corrosive sublimate), lead arsenate and even sodium cyanide and have long since been banned because they were highly poisonous (8). During the 1950s and 1960s, a single application of chlordane, at that time the mainstay for white grub control, would kill earthworms and eliminate casting problems for as long as seven years. But the EPA cancelled chlordane registration for turfgrass in 1983 because of its buildup in the environment, harm to wildlife and chronic human health risks. Many turfgrass pesticides used from the 1970s to mid-1990s were applied for grub control but were also acutely toxic to earthworms (14). Most of the older worm-toxic pesticides can no longer be used on turf, and presently no pesticides are labeled for earthworm control in the United States.

## Peter Lees' invention

An approach widely used used for earthworm and cast suppression from the early 20th century until about 1960 involved the use of chemical expellants that were applied to irritate the worms, causing them to come to the surface where they were swept or raked up and discarded (8). The method, pioneered by British greenkeeper Peter W. Lees during the 1890s, was so effective that it had become the mainstay for earthworm suppression on European and U.S. golf courses by the 1920s (3,4,9,10,11). (Authors' note: Lees provides a fascinating account of his experimenting with this method on pages 37-43 of his seminal book "Care of the Green," available online at http://archive.lib.msu.edu/DMC/turfgrass/PDF/careofthegreen.pdf).

***Article continued next issue.***