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Lucas et al.

[45] **Date of Patent:** **Jul. 1, 1997**[54] **FUNGICIDAL COMPOSITIONS FOR THE ENHANCEMENT OF TURF QUALITY**[75] Inventors: **Leon T. Lucas**, Raleigh, N.C.;
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Raleigh, N.C.[21] Appl. No.: **415,635**[22] Filed: **Apr. 3, 1995****Related U.S. Application Data**[63] Continuation-in-part of Ser. No. 3,632, May 12, 1994, Pat.
No. 5,336,661.[51] **Int. Cl.⁶** **A01N 47/14**; A01N 57/12;
A01N 59/06[52] **U.S. Cl.** **504/126**; 504/143; 504/129;
504/116; 514/141; 514/491[58] **Field of Search** 504/126, 143,
504/116; 514/141, 491[56] **References Cited****U.S. PATENT DOCUMENTS**

2,129,013	9/1938	Linstead et al.	260/314
2,214,454	9/1940	Dent	260/314
2,276,860	3/1942	Niemann et al.	260/314
2,452,606	11/1948	Roselle	106/289
2,460,779	2/1949	Brouillard et al.	260/314.5
2,460,783	2/1949	Lecher et al.	260/314.5
2,471,794	5/1949	Sumner	260/314.5
2,485,167	10/1949	Rintelman	260/314.5
2,485,168	10/1949	Rintelman	260/314.5
2,556,729	6/1951	Bridgeton	260/314.5
2,613,128	10/1952	Baumann et al.	8/28
3,379,610	4/1968	Lyon et al.	167/22
3,632,328	1/1972	Gaskin et al.	71/3
3,935,242	1/1976	Fulconis et al.	260/429
3,950,265	4/1976	Albrecht et al.	252/311
4,394,316	7/1983	Chao	260/429
4,806,445	2/1989	Horriere et al.	514/141
4,956,183	9/1990	Miki et al.	424/630
5,171,853	12/1992	Thorp et al.	536/27
5,336,661	8/1994	Lucas	504/126
5,350,843	9/1994	Itoh et al.	540/138
5,380,842	1/1995	Itoh et al.	540/128

FOREIGN PATENT DOCUMENTS

1-562-940	3/1969	France
25 11 077	3/1975	Germany
2412324	9/1975	Germany
2511077	9/1976	Germany
82034781	7/1982	Japan
1-157904	6/1989	Japan
6-73397	3/1994	Japan

OTHER PUBLICATIONS

FORE, Specimen Label, Apr. 1985.

CHIPCO, Specimen Label, 1992.

S. Lessage, Reduction of the Formation of Ethylenethiourea from Ethylenebis (dithiocarbamates) by Cupric Ions in Aqueous Media, *J. Agric. Food Chem.* 28(4), pp. 787-790 (1980).A. Stevenson, Fungicidal Compositions, *Patent Journal*, p. 39 (Jul. 26, 1967).N. M. Bigelow et al., Phthalocyanine Pigments, *The Chemistry of Synthetic Dyes and Pigments*, pp. 577-606. (1972).W. S. Struve, Phthalocyanine Dyes, *The Chemistry of Synthetic Dyes and Pigments*, pp. 607-624 (1972).T. Ostmeyer, The Color Green, *Golf Course Management* pp. 40-44 (Aug. 1994).M.E. Fenn et al; Studies on the In Vitro and In Vivo Antifungal Activity of Fosetyl-Al and Phosphorous Acid, *Phytopathology* 74 No. 5, pp. 606-611 (1984).*Primary Examiner*—Richard L. Raymond*Assistant Examiner*—Brian G. Bembnick*Attorney, Agent, or Firm*—Bell, Seltzer, Park & Gibson

[57]

ABSTRACT

Fungicidal compositions for the protection of turfgrass against crown and root rot are disclosed. The compositions comprise, as the active material, (a) a monoester salt of a phosphorous acid (preferably aluminum ethyl phosphite), (b) an ethylene bisdithiocarbamate contact fungicide (preferably manganese-zinc ethylene bisdithiocarbamate), and (c) a benzoporphyrin compound. Preferred compositions comprise 1 part by weight of the monoester salt, 2 parts by weight of the ethylene bisdithiocarbamate, and between about 0.01 and about 0.1 parts by weight of the benzoporphyrin compound.

40 Claims, No Drawings