Reprinted from *Agronomy Journal*
Vol. 86, No. 5

SYMPOSIUM ON RHIZOSPHERE RESEARCH IN HONOR OF HOWARD M. TAYLOR

Preface

Dan R. Upchurch,* W. J. Busscher, and J. E. Box

HOWARD M. TAYLOR was born in Lynn County, Texas, on 20 Jan. 1924. He passed away in Germany on 6 Sept. 1991 during his internationally distinguished career in soil science. Howard began his career in soils when he graduated cum laude from Texas Tech University with a Bachelor of Science degree in agronomy in 1949. Dr. Taylor earned his Ph.D. in soil science from the University of California, Davis, in 1957. He did postgraduate work at the Massachusetts Institute of Technology in 1960.

Between his undergraduate and graduate training, Howard Taylor worked with the USDA Soil Conservation Service, involved in mapping the soils of West Texas from 1949 to 1955. After his Ph.D., Howard took a position as a soil physicist with the USDA Agricultural Research Service (ARS). His association with the ARS was to last from 1957 until 1982. His first position with the ARS was at the Southwestern Great Plains Research Center at Bushland, TX. During his eight years there, Dr. Taylor published 30 technical articles dealing with the effect of soil compaction on plant growth, emphasizing on root development. Dr. Taylor's early work on the limitations of soil penetration resistance to growth began here (Taylor and Gardner, 1960, 1963; Taylor and Burnett, 1964; Taylor et al., 1966). This work continues to influence the direction of root research. His early work in Texas was also the foundation for many current management practices employed on soils that are susceptible to compaction (Taylor and Hauser, 1962; Taylor and Burnett, 1963; Taylor et al., 1964).

During his early years with the ARS, Dr. Taylor established a pattern of interaction with other scientists that continued throughout his career. Twenty-eight other scientists are listed as authors and co-authors on the 30 publications produced at Bushland. In this tradition of cooperative research, Dr. Taylor's scientific insights were never guarded secrets, but were freely offered to his peers. These served as inspiration for literally hundreds of productive careers through the years, including but not limited to the students that he advised.

In 1965, the Taylors were transferred to Auburn, AL. There Dr. Taylor focused his efforts on understanding soil-plant-water relations, with an emphasis on plant root systems (Taylor and Klepper, 1971, 1973, 1974). He was involved in the design and construction of the Auburn rhizotron. This rhizotron remains one of the premier facilities for root studies in the world. Another 26 technical articles were published during this period. Our current computer models of root water uptake can be traced to much of the work completed by Taylor and his coworkers (Taylor et al., 1970; Taylor and Klepper, 1975). Results of his work form a critical basis for continued developments in this area of science, demonstrating the innovative and farsighted nature of Taylor and his co-workers.

In 1972, the Taylors moved to Ames, IA, where Howard assumed the role of Supervisory Soil Scientist and Research Leader with ARS and Professor of Agronomy at Iowa State University. At Ames, Dr. Taylor was again responsible for the construction of a rhizotron facility. This rhizotron was used in various studies to expand our knowledge base concerning root growth and root function (Taylor, 1980). Howard also collaborated with breeders to develop root systems that would better exploit deep soil moisture (Taylor, 1983).

An additional 50 technical articles were published from work conducted at Ames. The impact of Dr. Taylor's work was increasingly apparent during this 10-year period. The result of his work was to transfer the depth of his experience into practice and to transfer his knowledge on an ever broadening scope. He traveled extensively within the USA and internationally, hosted international students and scientists, and trained local and international students. He

D.R. Upchurch, USDA-ARS, Cropping Systems Res. Lab, Rt. 3, Box 215, Lubbock, TX 79401; W.J. Busscher, USDA-ARS, P.O. Box 3039, Florence, SC 29502; and J.E. Box, Jr., USDA-ARS, P.O. Box 555, Watkinsville, GA 30677. Symposium on rhizosphere research in honor of Howard M. Taylor (ASA-CSSA-SSSA annual meeting, Minneapolis, MN, 2 Nov. 1992) sponsored by Div. S-6, S-1, and S-7. Organizing committee: D.R. Upchurch, W.J. Busscher, and J.E. Box, Jr. Received 24 May 1994. *Corresponding author (Email: dupchurch@lubbock.ars.ag.gov).

Published in Agron. J. 86:743-744 (1994).

ingrained in them his desire for a deeper understanding of the processes involved in root growth and function.

After retiring from the ARS in 1982, Howard accepted the position of Rockwell Professor of Soil Science at Texas Tech University. His work here focused on the hydraulic conductivity of plant root systems and root temperature effects on growth (Taylor and Yamauchi, 1991; Taylor et al., 1992). At least 30 more publications have resulted from his work at Texas Tech. He continued to actively influence scientific research concerning root system function throughout the world by his extensive travels and consultations with other scientists. Howard directed the graduate training of at least 21 graduate students, 10 of them at Texas Tech University.

Howard was active in several professional societies, including the American Society of Agronomy, the Soil Science Society of America, the Crop Science Society of America, and the International Soil Science Society. He served as associate editor for *Agronomy Journal*, *Soil Science Society of America Journal*, and *Soil and Tillage Research*. He has served as editor, advisory editor, and collaborating editor for numerous other scientific journals, proceedings, and books.

Dr. Taylor's consulting activities were extensive. These included advising the U.S. Department of Energy, the Tennessee Valley Authority, the University Institute of Evora (Portugal), the International Institute of Tropical Agriculture (Ibadan, Nigeria), and the Institute of Agrophysics (Lublin, Poland) on root observation laboratory design and construction.

He advised the government of South Africa on the development of a national program to assess soil compaction hazards to crop production. He advised the government of New Zealand on the nationwide completeness and organization of their soil management and plant water relations research. Howard conducted short courses and presented seminars on soil management, plant root growth, and plant water relations in several countries, including Venezuela, Brazil, Great Britain, Australia, Portugal, West Africa, and Poland. He helped design and reviewed projects for the U.S. Agency for International Development in Portugal and West Africa.

Howard Taylor's career is replete with awards and honors. In 1965, he was recipient of the Andre Mayer Fellowship from the Food and Agricultural Organization of the United Nations. He was named University Scholar at Aberdeen University, Scotland, in 1974. In 1981, he was named Senior Research Fellow in New Zealand. Howard was named Fellow of four scientific societies during his lifetime. In 1963, he was named Fellow of the American Association for the Advancement of Science, the premier scientific society of the USA; he was named Fellow of the American Society of Agronomy in 1971, Fellow of the Soil Science Society of America in 1976, and Fellow of the Crop Science Society of America in 1988.

In addition to being a highly successful and respected scientist, Howard Taylor was a man of the highest moral fiber. He was not only a colleague and mentor to his peers and students, he was a dependable friend. Howard and Marjorie Taylor have always opened their home to the people around them and actively participated in the lives of their friends. This was most apparent when, as the Taylors traveled around the world, they frequently stayed in the homes of colleagues and friends.

The inspiration, insight, and generosity of Howard Taylor will be missed by the agricultural community, but not forgotten.

REFERENCES

Taylor, H.M. 1980. Soybean growth and yield as affected by row spacing and seasonal water supply. Agron. J. 72:543–547.

Taylor, H.M. 1983. A program to increase plant available water through rooting modifications. p. 463–472. *In* W. Böhm et al. (ed.) Root ecology and its practical application. Bundesanstalt für Alpenländische Landwirtschaft, Irdning, Austria.

Taylor, H.M., and E. Burnett. 1963. Some effects of compacted soil pans on plant growth in the Southern Great Plains. J. Soil Water Conserv. 18:235–236.

Taylor, H.M., and E. Burnett. 1964. Influence of soil strength on the root growth habit of plants. Soil Sci. 89:174–180.

Taylor, H.M., and H.R. Gardner. 1960. Relative penetrating ability of different plant roots. Agron. J. 52:579–581.

Taylor, H.M., and H.R. Gardner. 1963. Penetration of cotton seedling taproots as influenced by bulk density, moisture content and strength of soil. Soil Sci. 96:153–156.

Taylor, H.M., and V.L. Hauser. 1962. Deep plowing and vertical mulching increase intake rates on cultivated land. Crops Soils 15:23.

Taylor, H.M., M.G. Huck, B. Klepper, and Z.F. Lund. 1970. Measurement of soil-grown roots in a rhizotron. Agron. J. 62:807–809.

Taylor, H.M., and B. Klepper. 1971. Water uptake by cotton roots during an irrigation cycle. Aust. J. Biol. Sci. 24:853–859.

Taylor, H.M., and B. Klepper. 1973. Rooting density and water extraction patterns for corn (*Zea mays* L.). Agron. J. 75:965–968.

Taylor, H.M., and B. Klepper. 1974. Water relations of cotton: I. Root growth and water use as related to top growth and soil-water content. Agron. J. 66:584–588.

Taylor, H.M., and B. Klepper. 1975. Water uptake by cotton root systems: An examination of assumptions in the single root model. Soil Sci. 120:57–67.

Taylor, H.M., A.C. Mathers, and F.B. Lotspeich. 1964. Pans in the Southern Great Plains soils: I. Why root-restricting pans occur. Agron. J. 56:328–332.

Taylor, H.M., G.M. Roberson, and J.J. Parker, Jr. 1966. Soil strength root penetration relations for medium- to coarse-textured soil materials. Soil Sci. 102:18–22.

Taylor, H.M., D.R. Upchurch, and B.L. McMichael. 1992. Root hydraulic resistance: Implications in modelling nutrient and water uptake. J. Plant Nutr. 15:727–736.

Taylor, H.M., and A. Yamauchi. 1991. Opportunities and problems in manipulating cereal root systems. *In* E. Acevedo et al. (ed.) Physiology-breeding of winter cereals for stressed mediterranean environments. Proc. Int. Symp., Montpellier, France. 3–6 July 1989. INRA Colloq. 55. INRA, Paris.