Bernard Tinker (1930–2021); in Memoriam

It was with sadness and dismay that we, Bernard Tinker's former colleagues here at Rothamsted, learned belatedly of Bernard's death more than four years ago. The world had lost an able scientist who had contributed much to its understanding of the role of soil in plant nutrition. And we had lost a friend and one-time guide and former head of our department. We cannot let this loss pass without remembrance.

Philip Bernard Tinker was born in Lancashire in the north of England. Shortly afterwards the family moved to Norway where his father was engaged to manage a cotton mill. Come the war Bernard's father was sent to a prison camp in Germany, and the family endured hardship under German occupation. The family moved back to England, and Bernard completed his schooling in Rochdale, Lancashire, before heading to Sheffield University. He graduated with a first-class honours degree in chemistry, and then studied aspects of tropolones for his doctorate under R.D. Howarth, a leading natural-product chemist at the time. Bernard successfully applied for a post in the the Colonial Service and was assigned to the West African Institute for Oil Palm Research (WAIFOR) in Nigeria. In preparation for work there he was awarded a Colonial Office scholarship to learn techniques in the design of field experiments and the subsequent statistical analysis with G.W. Cooke at Rothamsted.

Bernard spent 7 years at WAIFOR as soil chemist under the directorship of C.W.S. Hartley where he investigated the responses of oil palm to varied regimes of soil fertility. He then returned to Britain to join the Rothamsted staff at Broom's Barn Experimental Station in Suffolk to work similarly on the nutrition of sugar beet in the field. In 1965 he left Broom's Barn to become lecturer in the soil science at Oxford University. There he collaborated with Peter Nye, then Reader in Soil Science and head of the Soil Science Laboratory, on the movement of plant nutrients in the soil. The fruits of their work together culminated in their influential book: *Solute Movements in the Soil–Root System*, published in 1977, and up-dated in 2000 with a new title: *Solute Movements in the Rhizosphere*. Bernard's next step in 1971 was to Leeds University as Professor of Agricultural Botany where, in addition to his teaching, he focused his research on the role of mycorrhizas in plant nutrition. Six years later he was back in a major restructuring of Rothamsted as head of the new Soils and Plant Nutrition Department. He rebuilt the department with new staff to work on plant nutrition, mycorrhizas and crop roots; within 3 years had a staff of more than 60. Shortly afterwards the small Department of Soil Microbiology was incorporated into his domain to become the logical place for his continuing research on mycorrhizas.

Rothamsted's research stemmed originally from the agricultural interests of its founder, Sir John Lawes. In the first half of the 20th century the research broadened over an ever-widening field of science and technology. Soil science itself embraced physics and physical chemistry, agronomy, X-ray diffraction and clay mineralogy, Quaternary geology, microbiology, organic matter, mathematical modelling and the emerging pedometrics. These all had bearing on agriculture and the understanding of plant nutrition. Bernard set to work with vigour to give these separate lines of research

greater coherency. In the 1980s, however, the institute's budget shrunk year on year, and Tinker reluctantly had to close some of these lines and focus narrowly on the needs of farmers, and specifically British farmers. At the same time both scientists and the public at large were becoming increasingly concerned with the natural environment. Bernard Tinker was one of those scientists. He saw the Natural Environment Research Council (NERC) as the most appropriate organization in which to pursue what he foresaw as necessary for environmental protection and management, and so in 1986 he left Rothamsted to become the Council's Director of Terrestrial and Freshwater Sciences until his retirement in 1992. He had, nevertheless, appreciated the value of Rothamsted's long-term experiments in revealing slow but significant impacts on land management and their causes. This appreciation accorded with that of ecologists within the NERC and ones in universities funded by it. Bernard played a leading role in establishing the Environmental Change Network of the United Kingdom with 11 terrestrial sites. Data on soil, water quality, plant growth, and populations of birds and insects continue to be recorded there. He also set up the Terrestrial Initiative in Global Environmental Research to study the effects of climate on the terrestrial carbon cycle, greenhouse gases, and energy and water budgets, matters which 30 years on are taxing environmental scientists and politicians in a warming world. Bernard also helped to plan and then lead projects within the Global Change in Terrestrial Ecosystems Initiative, a part of the International Geosphere–Biosphere Programme launched by the International Council of Scientific Unions.

Bernard remained busy as ever in the early years of his 'retirement'. He collaborated with R.H.V. Corley to revise and up-date Hartley's standard reference book on oil palm, and was a member of the Programme Advisory Committee of the Malaysian Palm Oil Board for 12 years. He advised the Indonesian Institute of Applied Agricultural Resources on oil-palm research. He steered the International Society of Soil Science to a new constitution that would be compatible with the demands of what is now the International Science Council and to become the International Union of Soil Sciences.

In 2002 the Union recognized Bernard's drive with honorary membership, only the fifth Briton to be so honoured in its 100 years. Other awards included the Order of the British Empire (OBE) in 2000 for 'services to science', and D.Sc. by the University of Oxford. He was president of the British Society of Soil Science from 1983 to '84 and was made an honorary member of the society in 2020. He became a fellow of the Norwegian Academy of Science in 1987, where he used his knowledge of the language and agriculture to advise the academy on its research programmes. Bernard's later years were dogged by ill health and frailty, and he died of a stroke in the John Radcliffe Hospital in Oxford in January 2021.

Bernard Tinker was serious in his dedication to science with a deep understanding. He worked hard, and he expected others to do the same. He was both critical and encouraging. Our own scientific achievement and careers owe much to his influence.

S.P. McGrath, D.S. Powlson & R. Webster
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