

Robert Burns Musgrave

April 15, 1913 — July 20, 1989

Robert Burns Musgrave had an extraordinary and lasting impact on Northeastern agriculture. His analyses and innovations are firmly embedded in concepts and practices used at every stage in the production and preservation of grains and forages destined to be consumed by the public in the form of dairy products. His was an uncanny knack for looking behind clichés to expose fundamental questions—and their answers—about the ways in which soils, fertilizers, crops, farm machinery, farm structures, and not least, a farmer's time and energy could most effectively be used for the benefit of all. Those questions were addressed by an inventive mind with unfailing dedication to the disciplines of science and an unparalleled mastery of the art of farming.

Bob's professional career began in the days when technological and scientific breakthroughs were beginning to check—and then to reverse—the seemingly inexorable decline in productivity of American farmlands. Farmers in the Northeast shared in this turnaround, but only the most attentive had any idea that one man had such a large role in developing so many of the specific practices that are taken for granted today.

Early in his career at Cornell, Bob demonstrated the advantages of early seeding of winter wheat, a contradiction of conventions of that day. His rationales for his basic recommendations for planting dates and fertilization of both wheat and oats have never been improved upon. His perception of the potential for greatly increased yields through judicious nitrogen fertilization—if lodging of overgrown stems could be controlled—helped stimulate the development of modern stiff-strawed varieties of small grains.

In the 1940s, Bob was a central figure in a major college program to improve the nutritive value, preservation and storage of forage crops. He and J.K. Loosli (Animal Nutrition) showed that stage-of-growth was the most important factor influencing the nutritive value of forages at the moment of harvesting, a finding that led to the introduction of methods of preservation compatible with timely harvesting, including ensiling of hay. They also showed that, given timely harvesting, the nutritive values of grasses and legumes were much the same, which made yields, production and storage costs decisive. One result was a dramatic increase in the production of alfalfa and birdsfoot trefoil in the Northeast even as the total acreage devoted to hay declined. Bob Musgrave and Jeffrey Dawson (a soil scientist) established the fact that in the absence of direct sunlight, most of the energy responsible for evaporation of water from moist forage comes from respiration by the plant tissue itself, and from

the respiration of microorganisms—both consuming the most readily-digestible components. Modern methods of forage preservation are based on this finding, which effectively ended installations of costly and inevitably inefficient barn-drying systems in the Northeast.

Bob questioned the prevailing view that New York's dairy farmers should grow only forage, purchasing the concentrated feed supplements that they required. Accordingly, he established long-term experiments involving intensively managed crop rotations to produce both forages and grains, and developed the cropping systems that characterize efficient dairy farming of the present era. He did this at a time when cost-analysts were busy "proving" that corn-for-grain was uneconomical for New York. But Bob was quietly proving that corn-for-silage and corn-for-grain both had great potential, producing far greater feeding value per acre—more economically—than any other crop, even for the problem soils and cool environment of the Allegheny Plateau. He showed that, in rotations, the major return to inputs of lime and phosphate for forage legumes was realized from corn following those legumes. His innovative work on row spacings and population densities for corn is reflected in planting and harvesting machinery that farmers use today. By the time that Bob retired, corn acreage in New York had increased by half, and both total production and per-acre yields of corn-for-grain had doubled.

Bob was particularly conscious of the role of commercial fertilizers and farm manure in the production of animal feeds. His evaluations of lime, phosphorus, potassium and nitrogen (including anhydrous ammonia) ranged over the entire state. His conclusion that very high levels of nitrogen fertilization were unwarranted in grain and forage production did not make him popular with those who promoted the opposite view. He insisted that the cost of "disposing" of manure by spreading it on fields to be planted to corn should not be counted as a cost of producing the corn (thereby making it appear more economical to purchase imported corn), but should be charged to the cost of maintaining the dairy herd that produced the manure. His attention to essentials led him to invent a system for plowing land and planting corn with a single pass of the tractor, starting the trend toward "no-till" systems in use today.

About 1960, Bob began a series of direct studies of physiological and environmental influences on the photosynthetic and respiratory activity of corn plants (and later, sugar cane) growing under field conditions. He expected to be able to identify superior genotypes as materials for plant breeders. His field facility, and its ingenious systems of control and measurement, became the prototype that many have copied. His findings suggested, however, that genetic expressions were far more sensitive to microvariables than had been suspected, compromising the routine evaluations of genotypes that he had hoped for, but raising questions that continue to preoccupy his successors.

Bob found time to test his hypotheses under tropical conditions. In 1957-58, he was a visiting professor at the College of Agriculture at Los Baños, in the Philippines. He returned there in 1964-65 to develop a graduate program in crop ecology and physiology, and again in 1970 to work with graduate students and faculty in that program.

Bob Musgrave was born and raised on a farm near Hutsonville, Illinois. After graduating from high school, he farmed with his father for a year before entering the University of Illinois, where he earned a B.S. degree in 1936, an M.S. degree in 1938, and a Ph.D. degree in 1940. He had majored in crop production and plant physiology and joined the faculty of Cornell's Department of Agronomy as an assistant professor of field crops, specializing in crop ecology. In 1978, after 38 years of service, he retired as professor emeritus, and at that time received the prestigious New York Farmer's Award for outstanding contributions to the agriculture of the Northeast. In 1988, an anonymous donor honored him by creating the Robert B. Musgrave Award, to be awarded annually to a student for excellence in agronomy.

In death, he was survived by his wife, Mildred; a son, R. Bruce Musgrave; three daughters, Martha Fellows, Margaret Bennett and Mary Blasiak; and nine grandchildren.

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