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GEORGE FREDRICK SPRAGUE

When the history of corn breeding and genetics for the Twentieth Century is written, the name of GEORGE F. SPRAGUE will play a prominent role in this significant story of science and its contribution to the needs of mankind. Similarly, the records of the U. S. Department of Agriculture will list Dr. SPRAGUE among the most dedicated and productive scientists to have devoted a lifetime of service to this organization.

GEORGE SPRAGUE was born September 3, 1902, in Crete, Nebraska. He obtained his B. S. and M. S. degrees at the University of Nebraska and the Ph.D. degree in 1930 from Cornell University. He was well trained at Cornell University for his career to follow, having majored in genetics under the guidance of R. A. EMERSON with minors in cytology (SHARP) and physiology (KNUDSON).

Forty-two years of continuous service in Cereals Investigations with the U. S. Department of Agriculture were begun by Dr. SPRAGUE in 1922 at Crete, Nebraska, while an undergraduate student. In 1929, he was transferred to Arlington Farms, Virginia, where he was closely associated with F. D. RICHEY and where he initiated many of his important studies on breeding, genetics, and physiology of corn. From 1934 to 1939, he was stationed at Columbia, Missouri, and was in charge of the cooperative USDA-Missouri Corn Improvement Project. In 1939, he began a 19 year assignment at Iowa State University with major contributions to follow in the training of corn breeders and genetics. Since 1958, he has been in charge of the U. S. Corn and Sorghum Investigations with headquarters at Beltsville, Maryland.

The many significant accomplishments during the long and productive career of Dr. SPRAGUE have been in the three main areas of genetics, corn breeding, and graduate training. While he is best known for his important contributions in quantitative genetics and breeding methodology, the more than 130 published works record the results of a variety of studies in

classical genetics where he derived the explanations of various qualitatively inherited traits. These studies included the inheritance of scutellum, glume and blade characteristics, hetero-fertilization, and the

color and quality of the endosperm. He has had a wide range of interests in his studies of inheritance of complex traits in corn. SPRAGUE has probably contributed more to the genetic explanation of characteristics concerning grain quality in maize than any other U. S. scientist. Higher productivity and greater economic returns have been central to his basic genetic investigations as evidenced by his continued emphasis on yield and associated characters in his area of major emphasis; namely, quantitative genetics.

Throughout his career, Dr. SPRAGUE has had, by his own desires, joint responsibilities for basic research and applied breeding. He is probably the most cited example of one who has simultaneously

conducted basic studies and developed improved corn hybrids for the farmer and the corn producing industry. Hybrids containing inbred lines developed by him were extensively grown throughout the Corn Belt area of the United States in the 1940's and 1950's. Two of the best known inbred lines still used extensively in hybrid corn production are his B14 and B37. He has developed many populations that have proved valuable as sources of germ plasm for improved synthetics and hybrids as well as excellent foundation stocks for basic genetic studies.

Most of the research conducted by SPRAGUE has been of a long-range, fundamental nature concerned with types of gene action, mechanism of heterosis, genotype-environmental interactions, recurrent selection and convergent improvement, the improvement of nutritional quality and refinement of breeding techniques. His works have made major contributions toward the widespread adoption of the following principles in corn breeding and genetics:



1. Early generation testing can be effective in the identification and isolation of superior germ plasm.
2. Specific and general combining ability are meaningful characteristics of the genetic variability of populations, can be described with mathematical models, and can provide a basis for choosing testers of populations.
3. Components of genetic variances and their interaction with varying environments can be related to breeding methodology as well as provide information on the fundamental nature of the gene actions in populations.
4. Recurrent selection is an effective breeding procedure with the degree of superiority to conventional procedures dependent upon the nature of gene action in the population.
5. It is possible to change populations of corn in their nutritional value and the chemical composition of such characters as waxy starch and oil and to increase these traits to levels of importance in industrial utilization.
6. Basic genetic information can be derived from properly planned and executed breeding programs and breeding methods, in turn, can be refined in efficiency and effectiveness by the proper applications of basic principles of genetics and statistics.

With all of his research responsibilities and accomplishments, teaching and training of young scientists were his first love. He stated recently, "the one area of my work that has given me more personal satisfaction than any other has been the involvement in graduate teaching and the training of graduate students. . . . The accomplishments of these men are the source of real satisfaction even though one realizes that the major professor deserves little credit for their subsequent achievements." SPRAGUE taught the graduate course in corn breeding throughout his tenure at Iowa State University. His teaching was widely known and well publicized by the students he attracted from animal as well as plant breeding and all areas of biological sciences and statistics. Graduate students from all parts of the world went to Iowa State University to study under Dr. SPRAGUE. He served as major professor for over 50 students who obtained either the M. S. or Ph. D. degree while working with him. Recognition of outstanding performance in this area of work came while he was at Iowa State University where he was given the Gamma Sigma Delta Superior Teaching Award.

When Dr. MERLE T. JENKINS retired from the U.S. Department of Agriculture, SPRAGUE was asked to take the leadership in the USDA Corn and Sorghum Investigations and move to Beltsville, Maryland. I know that this was one of the most difficult decisions GEORGE SPRAGUE has had to make in his 42 years of professional service. He had great love for Iowa State University and all of his colleagues. It meant leaving the classroom and probably the largest University-based basic and applied research program in corn anywhere in the United States. It meant an abrupt change in his life from that of individual project leader to largely one of administrator, advisor, and coordinator of the work of

others. He knew that he was the logical successor to Dr. JENKINS and did make the move to Beltsville in 1958.

He assumed the new assignment with the same degree of dedication and perseverance that he had given to his previous work. The USDA personnel in his division knew that he would expect more attention to be given to basic research and he has fulfilled their expectation. He has provided leadership in attracting the best possible young scientists into the corn breeding and genetics programs of the U.S. Department of Agriculture, and he has been successful in establishing new positions where the emphasis is entirely in basic genetic investigations.

GEORGE SPRAGUE has done more than his share to assist in the solution of food problems in other parts of the world. He has been a consultant to the Rockefeller Foundation for many years and worked closely with Dr. E. J. WELLHAUSEN in the corn breeding, genetics and training program of Latin America. He served on a special mission for the development of hybrid corn in Europe sponsored by ECA (Marshall Plan) and assisted with the USDA advisement on the hybrid corn program in Yugoslavia.

In 1963, the U.S. Department of State, Agency for International Development, made arrangements for the U.S. Department of Agriculture to assume some responsibilities for increasing production of major cereal crops in Africa. GEORGE SPRAGUE was given this additional assignment which has required much of his time in planning programs and arranging for staff to work in Kenya, Nigeria, and other African countries.

SPRAGUE has been widely recognized for his many contributions to genetics and plant breeding and all recognitions have been richly deserved. His honors and awards include Fellow of the American Society for the Advancement of Science, Fellow of the American Society of Agronomy, Crop Science Award from the American Society of Agronomy, Honorary Doctor of Science degree — University of Nebraska, Faculty Citation by the Iowa State University Alumni Association, Superior Service Award by the U.S. Department of Agriculture, Member of team receiving USDA Superior Unit Award, and Corresponding Academician — Academia di Agricoltura di Bologna, Italy. He has served as Treasurer of the American Society of Naturalists, President of the Crops Science Division — American Society of Agronomy, and Vice President and President of the American Society of Agronomy.

The heavy commitments of his professional career did not detract from the devotion of GEORGE SPRAGUE to his family. His hobbies have been few and have suffered from the lack of time that he could devote to personal enjoyments other than his work and his family. He considers himself an amateur at gardening and horticulture but does give some of his limited leisure time to these activities. His work has received his full dedication and commitment, and it would be difficult to identify one who has been a more faithful public servant and contributed so much to the genetic knowledge and improvement of corn.

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