THE ORIGINS OF AGRISCIENCE: OR WHERE DID ALL THAT SCIENTIFIC AGRICULTURE COME FROM?

John Hillison, Professor
Virginia Tech

Abstract

The Hatch Act was passed as part of the scientific revolution that occurred in agriculture during the late 1800s. What started as a need to have more accurate fertilizer analyses ended with a revolutionary federal act that started experiment stations. The preamble to the Act used the words agricultural science. Following passage o the Act agricultural education was defined as being primarily academic and having a strong scientific base. Higher education institutions emphasized a strong science content in teacher training curriculum. Secondary Congressional District agricultural schools also emphasized a great deal of science in their curricula. Federal leadership came from the United States Department of Agriculture with, among other things, scientific agricultural bulletins being regularly made available to agricultural education department. However, with passage of the Smith-Hughes Act in 1917 agricultural education joined with other areas and became vocational in nature. National leadership shifted to the Federal Board for Vocational Education. Currently the agricultural education profession is debating how much science should be included in its curriculum. The profession's history has a great deal to say about the subject and should be examined closely.

A scientific revolution occurred in American agriculture during the late 1800s. That revolution was fed by many forces. Among the forces were farmers who clamored for scientific research that resulted in passage of the Hatch Act of 1887. These farmers started as a group who wanted accurate analyses stated for the fertilizer or "artificial manure" they purchased (Marcus, 1985). The Hatch Act in turn provided funds for the type of scientific research that brought about an agricultural revolution which still provides the world's greatest supply of food that is also the most inexpensive and of the very best quality.

The Hatch Act gave American agriculture true experimentation and scientific research. There is a direct cause and effect line that can be drawn from Hatch Act funded research findings and the establishment of the cooperative extension service that helped distribute such findings to the practitioner farmer. Can Hatch Act influence be found as directly with the early agricultural education movement? Was early agricultural education more scientifically based than the contemporary version?

One of the significant national issues in agricultural education today is the role agriscience should play in middle school and high school curricula (Understanding Agriculture, 1988). In fact, a fundamental question is whether the entire program should become one of agriscience. "All students need an understanding of basic science concepts. Teaching science through agriculture would incorporate more agriculture into curricula, while more effectively teaching science" (Understanding Agriculture, 1988, p. 11). Just where did this idea of agriscience come from? What has been the evolutionary development of the program? Does it fit into a basically vocational program? Is agriscience really more academic than vocational? How have the United States Department of Agriculture (USDA) and the United States Department of Education (USDE) influenced the academic and vocational nature of the agricultural education program?

Purposes and Objectives

The purpose of this study was to determine the source of historical influence for agriscience in the agricultural education program. Specific objectives accomplished were:

1. Determine the influence of the Hatch Act on agriscience.

2. Contrast the difference between USDA and USDE for encouraging scientific-based academic instruction in agricultural education

3. Examine an early definition of agricultural education and contrast it with the Smith-Hughes Act definition.

4. Examine agricultural science in higher education during the developmental years of agricultural education.

5. Document the presence of science in early agricultural education programs.

Methods and Procedures

Historical research methods were utilized to accomplish the objectives of the study. Both primary and secondary sources were utilized to obtain the information needed. Primary sources included Congressional records, texts of both state and federal legislation, and first-hand accounts. Secondary sources included books and mass media publications. Information was collected at numerous sites including the Library of Congress, United States Department of Education Library, National Agriculture Library, and various land-grant university libraries. All references were subjected to both internal and external criticism.

Results and/or Findings

Influence of the Hatch Act

The thesis of this paper is that the Hatch Act provided the impetus for the first agriscience programs in the United States. From the time of the passage of the 1887 Act until passage of the Smith-Hughes Act in 1917, a close working relationship existed between agricultural education and the United States Department of Agriculture, which administered the Hatch Act. While the Federal Board for Vocational Education had federal oversight authority for agricultural education as mandated by the Smith-Hughes Act of 1917, USDA provided assistance until 1929. USDA provided a great deal of assistance to agricultural education during its early development. For example, USDA (a) developed sample courses of study which could be used in teaching agriculture (Wheeler, 1948), (b) prepared bulletins and instructional materials for teachers (Ekstrom, 1969), and © prepared lantern slides, film strips, photographs, charts, and motion pictures for teachers (Lane, 1942). Perhaps the biggest contribution was from the Hatch Act and the influence of its research upon agricultural education as it existed at the time.

The preamble to the Hatch Act perhaps best stated its influence on agricultural science: *Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in order to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science, there shall be established, under direction of the college or colleges or agricultural department of colleges in each State or Territory a department known and designated as an "experiment station"* (Hatch Act, 1887, p. 1)

With the use of the term agricultural science in the basic act, emphasis was given to what was to become a popular term for several decades. John (1923) wrote a concise description of the tie

between the Hatch Act and pre Smith-Hughes agricultural education.

But agriculture not only has succeeded in establishing well-organized curricula, but it has enriched systematically the quality of its work and has extended the scope of its field of endeavor through the continual research of the experiment stations. And through the agency of the agricultural extension service the practical application of scientific agricultural knowledge has developed criteria of great value for education. (p. 5)

Early Definitions and Ties to Science

Two years after passage of the Hatch Act, Chambers's Encyclopedia had a definition of agricultural education that showed thinking similar to the Act. The definition used for the field was: *Agricultural education, as at present understood, is a comprehensive term, including instruction in chemistry, geology, botany, zoology, mechanics - embracing, in short the science as well as the practice of agriculture. However important branching off of education into this special track, it is only of late years that adequate attention has been paid to it* (Chambers's Encyclopedia, 1889, p. 61).

By contrast the Smith-Hughes Act of 1917, some 28 years later, defined agricultural education as. . . *any State shall provide in its plan for agricultural education that such education shall be that which is under public supervision or control; that the controlling purposes of such education shall be to fit for useful employment; that such education shall be of less than college grade and be designed to meet the needs of persons over fourteen years of age who have entered upon or who are preparing to enter upon the work of the farm or of the farm home* (Smith-Hughes Act).

Obviously the Smith-Hughes Act shifted the definition of agricultural education from being science-based and academic-oriented to a strictly vocational definition. With passage of the Smith-Hughes Act national influence shifted from the United States Department of Agriculture to the Federal Board for Vocational Education. After several changes the national influence was located in the United States Department of Education, which continued the vocational flavor of the program (Moore & Hillison, 1993).

Agricultural Science in Higher Education

While making the transition from the direct influence of the Hatch Act to secondary programs, an intermediary step of teacher training had to be taken. Future agricultural education teachers had to be prepared to teach a science-based curriculum. Liberty Hyde Bailey (1908) requested that high school agricultural education teachers have a strong scientific background. He wanted such teachers to be well grounded in the science and practice of agriculture, as well grounded as the teacher of chemistry, botany, or physics. He went on to state, in referring to agricultural teachers, "He should, in fact, have a deeper and broader training, since he must use physics, chemistry, botany, and the like, in his special agricultural work" (Bailey, 1908, p. 19).

Faculty at Hampton Institute recognized at an early time that science and agriculture were closely related. A new instructor in agriculture was hired with a partial position description as " . . . teaching the scientific meanings of the daily farm tasks" (John, 1923, p. 42). Hampton Institute also taught an agricultural chemistry course that had an emphasis on the chemical analyses of soils, fertilizers, and feeds. The school offered secondary and post graduate courses in agriculture. Science was emphasized in both courses (John, 1923).

Agricultural Science in Early Agricultural Education Programs

When Alabama established experiment stations, it also established and attached

Congressional district agricultural schools to the experiment stations (Acts of the General Assembly of Alabama, 1889). The schools were intended to be established in the middle of each of the state's Congressional districts and had the primary purpose of providing secondary instruction in agriculture and home economics. A major emphasis was placed on practical instruction which included school farms and science laboratories. The branch experiment stations added to both practical and scientific application (Thompson, 1965). The enabling legislation emphasized the scientific research that would be done at the Congressional district school experiment stations.

T. J. Carnes, as a student, described a first hand account of experiment station experiences at the Seventh District Agricultural school in Albertville, Alabama: *The farm and experiment station was a very important part of the school, and most of the school's emphasis centered around it. It was a teaching laboratory for the students, and they were required to do a certain amount of practical work on the farm every day* (Carnes, 1991, p. 187).

In 1913 Hummel suggested combining agriculture and science courses to form an agricultural general-science course. He suggested that such a course could be taught the first year in high school and would solve the problems of agriculture and science (Agricultural Instruction, 1913). In the same publication Soule advocated tying the experiment stations and the secondary agriculture curriculum together: *To this end it would be well for every secondary school to endeavor to carry on a variety of experimental demonstrations. These may properly fall with four classes: (a) Such simple experiments as are calculated to illustrate the principles of the various courses of instruction, (b) Demonstrations of educational value to the community should be inaugurated, © Every school should attempt to bring new facts to the attention of its student body and its home community, and (d) Cooperative experimental work with the State experiment station may be carried on in some instances to advantage* (Agricultural Instruction, 1913, pp. 21-22).

Hearst (1928) completed an early master's thesis on the topic of the sciences as related to vocational agriculture. He surveyed 166 teachers in 13 states. The sample was purposefully selected, as state supervisors were asked to identify the best teachers in their state. Hearst concluded for vocational agriculture that (a) a knowledge of sciences is necessary, (b) basic principles and fundamentals should be taught, © The science content should be taught by the vocational teacher, (d) Science should be taught in connection with vocational subjects, and (e) Certain instructional methods were agreed upon by the teachers.

The Stimson and Lathrop (1942) book which reported the state by state history of secondary agricultural education noted extensive science influence. Massachusetts reported teaching mineralogy, botany, and physiology. Florida reported teaching the science of the soil. Michigan reported science being included in the agricultural education course of study. Minnesota reported teaching science, botany, geology, anatomy, physiology, physics, and chemistry as part of the total curriculum. New York taught agricultural science that was granted graduation credit. Ohio reported that its first agriculture teacher, in 1890, was a converted science teacher. Texas indicated that academic and agricultural science were taught until vocational agriculture was started.

Conclusions/Recommendations/Implications

Over 100 years ago the Hatch Act used the words agricultural science. With the Act's emphasis on sophisticated research, agriculture became a leader in scientific investigation. The Congressional District Agricultural schools joined this trend and used the physically attached

experiment stations and farms for continued research and investigation. The United States Department of Agriculture assisted agricultural education with science integration in the early 1900s by sharing experiment station results and by printing instructional publications for teachers. With this kind of attention and support from the agricultural community, early agricultural education was considered an academic and scientific course of study. Clearly the professionals in the field agreed as evidenced by the course of study selected and the teaching methods used which utilized science experimentation and practice.

After passage of the Smith-Hughes Act, agricultural education joined other vocational-oriented instruction and de-emphasized academic instruction. However, the basic science base for the field of agriculture has not changed. The complexity and the sophistication for the field have not changed either. Is it now time for the agricultural education profession to go back to what it once was, an academic based content area? Can it use the philosophy of its early leaders and apply the principles of science and research? Can agricultural education work more closely with experiment stations and, for example, use station internships as SAE experiences? Can it become more academic and yet retain a vocational flavor?

The historical background for agricultural education indicates that when the United States Department of Agriculture provided national leadership, the emphasis was on academic development in the form of scientific agriculture. During the time national leadership has been provided by the United States Department of Education vocational development has been emphasized. Are there ways this historical backdrop can help the agricultural education profession make a decision on where its national leadership should be provided?

With the field of agriculture becoming more sophisticated and scientifically based, how can agricultural education graduates be best prepared for that field? Our history indicates that we can and that we should begin a dialogue on how to determine the answers to these and other related questions. If we need help, the historical base is available to help us find such answers and make the right decisions.

References

Acts of the General Assembly of Alabama. (1889). Montgomery, AL: Brown Printing Co.

Agricultural instruction in secondary schools. (1913). United States Bureau of Education Bulletin No. 14, Washington, DC: Government Printing Office.

An educational study of Alabama. (1919). United States Bureau of Education. Bulletin No. 41, Washington, DC: Government Printing Office.

Bailey, L. H. (1908). On the training of persons to teach agriculture in the public schools. U. S. Bureau of Education Bulletin No. 1, Washington, DC: Government Printing Office.

Carnes, T. J. (1991). Out of the sand.

Chambers's encyclopedia. (1889). New York: Collier Publisher, 61.

Ekstrom, G. F. (1969). Historical development of agricultural education in the United States prior to 1917. Final report for the U. S. Office of Education, April 1969.

Hatch Act. (1887). U. S. Statutes at Large, 314, 440.

Hearst, W. F. (1928). The organization and methods of teaching the sciences related to vocational agriculture. Unpublished masters thesis, Kansas State Agricultural College, Manhattan.

John, W. C. (1923). Hampton Normal and Agricultural Institute. U. S. Bureau of Education Bulletin No. 27. Washington, DC: Government Printing Office.

John, W. C. (1924). Land-grant college education 1910 to 1920. U. S. Bureau of Education Bulletin No. 30, Washington, DC: Government Printing Office.

Lane, C. H. (1918). U. S. Bureau of Education Bulletin No. 3. Washington, DC: Government Printing Office.

Lane, C. H. (1942). Contributions of the United States Department of Agriculture to agricultural education of less than college grade, 1904 to 1917. In R. W. Stimson and F. W. Lathrop (Eds.), History of agricultural education of less than college grade in the United States, 570-573. Washington, DC: U. S. Government Printing Office.

Marcus, W. C. (1985). Agricultural science and the quest for legitimacy. Ames, IA: The Iowa State University Press.

Moore, G. & Hillison, J. (1993, April). Who's in charge here? An analysis of the leadership in agricultural education provided by the Federal Board for Vocational Education. Paper presented at the forty-second Annual Southern Region Agricultural Education Research Meeting Gatlinburg, TN.

Smith-Hughes Act (1917). P. L. 347, 64th Congress, Section 18, 39 Stat. 936.

Stimson, R. W. & Lathrop, F. W. (1942). History of agricultural education of less than college grade in the United States. U. S. Office of Education, Washington, DC: Government Printing Office.

Thompson, J. L. (1965). The historical development of the Congressional district secondary agricultural schools in Alabama. Unpublished doctoral dissertation, University of Alabama, University, Alabama.

Understanding Agriculture New Directions for Education. (1988). National Research Council. Washington, DC: National Academy Press.

Wheeler, J. T. (1948). Two hundred years of agricultural education in Georgia. Danville, IL: Interstate Printers and Publishers.