

HISTORY OF SEED TECHNOLOGY, WSU¹James D. Maguire^{2,3}**Introduction**

Seed is basic to any agronomic program; and quality evaluation is an aspect of such programs. The first seed legislation in Washington, related to labeling of seed, was enacted in 1901. A complete seed law was passed in 1919 and the enforcement of these regulations was placed under the direction of the State Commissioner of Agriculture. Numerous revisions followed; dealing with noxious weeds, purity and germination standards and varietal certification. The State College of Washington and now Washington State University has been involved in such activities since its beginning. Initially seeds were the domain of the Botany Department with Dr. Harold St. John conducting extensive surveys of vegetation of eastern Washington, classification of plants and taxonomic studies of seeds as well as plants. An extensive herbarium was developed (Currently the Marion Ownbey Herbarium). In 1916 seed testing work started in the Botany Department with Dr. Hannah Aase in charge. Identifications were made on seeds of weed and crop plants. Dr. Aase also taught seed morphology. Dr. Ira D. Cardiff was Head of Botany from 1913-1917 and assigned H. C. Aase to develop and operate the Seed Testing Laboratory. She continued until 1929 when these responsibilities were transferred to the Agronomy Department, then located in Wilson Hall. Germination facilities were developed and service testing of seed for crop purity, germination and weed content was provided on a fee basis to farmers and seedsmen: Prof. E. G. Schafer was Head of Agronomy at that time.

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The laboratory became affiliated with the Association of Official Seed Analysts and was designated as an official seed laboratory under the Federal Seed Act. The person in charge was appointed as State Seed Analyst. A series of analysts served in this capacity:

H. C. Aase, 1916 - 1929

E. G. Schafer, 1929 - 1937

Dwight Forsyth, 1938 to 1945

Mary Haferkamp, 1947 to 1950

Alvin Overland 1951 to 1957

Xerpha Gaines (Acting 1957) and

James D. Maguire 1957 to date.

In 1957 the Seed Laboratory was temporarily moved to the Agronomy Seed House and then relocated to its present location in Johnson Hall when this building was completed.

The laboratory shared responsibilities of "State Seed Analyst" with the Department of Agriculture in Olympia. A proposal was made by the State Department of Agriculture in the late 40's for the entire function to be located at WSU. Limitation of space, personnel, and funds deterred acceptance of the proposal. Failure to consolidate the function here on Campus was regrettable because it would have provided an ideal situation for training of students with hands-on-experience in the Laboratory and joined continuing expertise in the laboratory with the research functions in this area of the Department of Agronomy. Prof. A. G. Law 1957-58 planned adequate space in Johnson Hall to accommodate this consolidation; but the golden opportunity had passed. The State Department of Agriculture had taken the alternative

solution--moving its seed laboratory, weed control, and certification functions from Olympia to a centralized laboratory in Yakima.

Unique expertise has been maintained in the Laboratory by some especially talented technicians: Xerpha Gaines, widow of Dr. E. F. Gaines, served many years as the plant identification authority at WSU--first--as a Botany Department employee and later in the Agronomy Department. What a shame that her knowledge and experience had to be lost to the Laboratory with her final retirement at an age well beyond that of usual retirement. Fortunately, she had young colleagues who learned from her and thereby have preserved much of her unique expertise. They are Martin Steen and Betty Lee. Their invaluable and unique service continues.

A driving force for the Seed Technology Program since the early 40's was Prof. A. G. Law. He was instrumental in the establishment of the Washington State Crop Improvement Association in 1945 and getting the certification of cereals, peas and lentils assigned to this organization. He served as the Secretary of WSCIA in 1945 and until 1980 when Dr. K. J. Morrison assumed these responsibilities. For a short interim period earlier, Henry Wolfe had served as Secretary. "Certified Seed Is Free" has been the slogan of the WSCIA and the Seed Technology program at WSU. Dr. J. K. Patterson, 1950-1961 was a vigorous proponent of the WSU seed technology program. He visualized greatly expanded research and teaching activities. While his vision has not yet been completely fulfilled, he gave an impetus to this program that is still felt. Billy Gregg, 1956-1966, came to WSU as a part of this program and brought to it expertise and ideas from the strong program at Mississippi State. He, under the fatherly guidance of Al Law, suffered the agonies of Seed-House construction and furnishing. At one time (1962) he had nearly 7000

bushels of Foundation seed bulk-stored in the warehouse portion of the Seed House. The imprint of his ingenuity, resourcefulness, and enthusiasm for the pure seed program still remains. He was very effective with the people of the seed industry: production, processing, and distribution industry. When B. Gregg left, A. G. Law and J. D. Maguire guided the Foundation Seed Program until 1971 when these responsibilities were transferred to Washington State Crop Improvement Association.

The Foundation Seed Program at WSU owes much to Gregg, Law and Maguire. It is one of the best! The 10,000-fold increase of the new and spectacular variety, Gaines 1961-1963, was a high-water mark of their competence and leadership. Of course, such accomplishment required teamwork and cooperation with many people and organizations. The result was a measure of their competence and leadership. In 1971 the WSCIA was delegated by the Experiment Station responsibility for production, conditioning, and distribution of adequate supplies of Foundation seed. Dr. Maguire has continued as WSU Foundation Seed Representative. This program has been handled very ably by Ted Wagner, Foundation Seed Service Manager since 1971. He manages a greatly expanded seed production program. WSCIA now rests on a solid financial base and offers effective transition from variety development to seed distribution to farmers.

The Foundation Seed Program of Washington State Crop Improvement Association has prospered and greatly expanded. So much so, that in 1978 the "Alvin G. Law Seed Storage Annex Building" was erected by the WSCIA near the Rain Tower Building of the Palouse Conservation Field Station, north of Pullman. This accommodated storage needs not met by the Seedhouse on the campus proper. The naming of it recognized the contribution over the years to

this program by Professor A. G. Law. This building can store two and a half million pounds of foundation seed. Ted Wagner has kept it full to capacity with each harvest.

Seed Testing Service and Education

Seed testing depends upon accurate methods, reproducible among laboratories. Referee tests among laboratories using representative samples were conducted to promote uniformity and improved testing. Research on new techniques has been adapted along with improved equipment to reduce testing time and improve results. The tetrazolium test, a chemical indicator of seed viability was developed and is now used extensively to obtain estimates of seed potential in hours instead of days or weeks. Phenol tests based on enzymatic variations in seed coats allow positive identification of wheat varieties, detection of some mixtures and separation of spring and winter types.

Seed testing of service samples had been an important part of the seed program at Washington State University until 1975 when these activities were consolidated at the Washington State Department of Agriculture Seed Laboratory in Yakima and the University Laboratory was designated the, "WSU Seed Technology Laboratory." The Laboratory remains affiliated with AOSA and participates in referee testing and development of new methodology. Research, teaching and supervision of graduate programs has expanded to fill the needs for expertise in seed production and technology in the USA, including developing countries where seed programs are often non-existent. A score of graduate students have received training in seed technology here.

Teaching

Teaching is an important part of the seed technology program. From the initial seed morphology course offered in Botany Department to a course in

seed quality which includes techniques for purity and germination testing and detection of seedborne diseases, the curriculum in seed technology has expanded to seed production, seed conditioning, seed physiology, vegetable seed production and cooperative offerings at University of Idaho in seed pathology. These courses are important components of the undergraduate curriculum and post-graduate student programs.

Short courses on seed analysis for technologists and processors are taught by the seed laboratory personnel. Farm drill box surveys have been conducted by the laboratory staff in cooperation with the Agricultural Extension Service and Washington State Crop Improvement Association. These tests evaluate the quality of seed actually planted in Washington. Demonstration plots of seed from the drill boxes and export wheat samples have been grown on the Agronomy farm. Trueness-to-type varietal tests have been demonstrated at cereal field days and emphasize the value of good quality seed and certification to farmers. Numerous seed and plant identifications are made each year as a service to farmers, agriculturists and other individuals.

In conclusion the Seed Technology Laboratory continues its services to improve seed quality and to conduct research on physiological and biochemical aspects of seed which are vital to Washington agriculture.

Seed Research

Seed research is a specialized area that draws from a number of related disciplines: physiology, genetics, pathology and soil science. Seed quality evaluation, an important element in seed production, has received considerable attention within the confines of the research in this program (1,2,3,4). Related problems also receiving attention are: poor seed set, seed deterioration, seed vigor determination, dormancy, and seedborne diseases (5,6,7,8). The WSU Seed Technology Laboratory has developed a test for

detecting "Blackleg" (Phoma lingam) in crucifer seeds (8). The test is utilized world wide to discriminate on seed quality. Other studies in basic seed physiology have provided insights to metabolic processes involved in seed growth and development (9,10,11,12,13,14,15).

International Activities

The WSU expertise in seed production and technology has benefited many developing countries under auspices of the USAID, FAO and International Programs - WSU. Law, Gregg and Maguire participated in seed programs in India, Brazil, Thailand, Lesotho, Sudan Portugal and People's Republic of China - establishing seed conditioning plants, storage facilities, production schemes, certification and testing rules, testing laboratories and short courses for seed analysis.

Summary

The Seed Technology Laboratory of WSU continues to improve seed quality through identification of the components of that quality and to conduct research on the physiological and biochemical aspects of seed which are vital to Washington agriculture. Close liaison and cooperation with all agencies and segments of the seed industry is maintained to ensure Washington State's strong position in agriculture and, especially, in the seed industry.

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