The Dry Pea and Lentil Program from the beginning to 1984[1]

by F. J. Muehlbauer[2]

The farmers of the States of Washington and Idaho have long recognized the importance of peas and lentils in their crop rotational schemes. In those schemes, roughly 300,000 and 100,000 acres of dry peas and lentils, respectively, are grown annually. In addition, over the years there have been sizeable areas sown to peas for processing (approximately 75,000 acreas annually) and to peas for the seed industry (aproximately 25,000 acres annually). These crops have been economically important to the region and it is surprising that so little effort has been devoted to these crops and that effort has often been sporadic (but at times very productive). It was not until 1963 that a continuous program devoted to improving these crops (the Dry Pea and Lentil Program) was established at WSU by the U.S. Department of Agriculture. Personnel additions, personnel changes, and changes in research direction of that Program have taken place since 1963 to the present. The USDA program has been strongly tied to the Department of Agronomy and Soils from the beginning. Some detail of the persons involved in the program and some of their accomplishments are as follows:

Details on early workers in the Pea and Lentil Program of the department are sketchy and for the most part quite incomplete. The field pea improvement project was first started in 1943 by S. P. Swenson to develop and maintain supplies of seed peas for use in eastern Washington and to improve production practices. Up until this time, there had been no seed program for dry peas or lentils and presumably seed stocks were in need of purification as to type and

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quality. The success of that initial effort to improve the crop was described in the 1951-52 issue of "Agonomy and Men". Improved seed stocks were turned over to the two industry organizations that initially made the project possible through their financial support. Mr. John Unrau worked on peas, lentils and alternate crops in the late 1940's or early 1950's, but the exact dates of his involvement still need to be determined. The work, of the project started by Swenson, was presumably subsequently carried on by John Unrau, Shirley Kellenbarger (mid 1950's) and Bob Miravalle (late 1950's), but details are sketchy, although all had the reputation for hard work and were in fact graduate students. Vern Youngman appeared on the pea and lentil scene in the late 1950's and carried out work on those crops as well as several other crops including safflower, crambe, and rape. Vern Youngman summarized his experiences and research results in an often cited paper, "Lentils - A pulse of the Palouse" that appeared in Economic Botany in 1968 (p. 135-139). The paper chronicled the introduction of lentils into the Palouse in the 1920's and its slow but sure development into an important commercial crop. Indeed, the Plant Introduction accession used later by Dr. Van Wilson to develop the first lentil cultivar 'Tekoa' was included in those studies.

Growers in the Palouse realized the importance of legumes in their rotational schemes and also their importance as an export crop. For that reason they organized into what is now known as the Washington Dry Pea and Lentil Association. A counterpart organization (known now as the Idaho Dry Pea and Lentil Association) was also formed in Idaho. These organizations were formed under the guidance of Felix Entenmann, then a county agent located at Colfax, Washington. These organizations were formed in the early 1960's and were instrumental in obtaining a commitment from USDA-ARS in 1963 to establish a federally supported program in the Agronomy Department at WSU.

Key figures in the decision made to establish that program were Dr. Bill Zaumeyer of the former Bean and Pea Investigations of USDA and Dr. Rod Bertramson, then chairman of the Agronomy Department, WSU. Dr. Van Wilson, Research Plant Pathologist, USDA-ARS, was than transferred from Twin Falls, Idaho, where he had been a dry bean breeder, to assume the leadership of the newly established Dry Pea and Lentil Program. Dr. Wilson's program thrived from his own diligence and from advice and cooperation from various departmental individuals including Al Law, Ivan Teare, Bob Warner, Orville Vogel, and others. However, USDA support was limited and it was obvious much work needed to be done on legume crops and that additional funds and personnel were needed.

The Washington and Idaho Dry Pea and Lentil Associations, realizing the need for additional resources, were instrumental in forming the Dry Pea and Lentil Commissions in the two states for the purpose of collecting funds from growers based on crop volume. These funds were then used for various "commission" programs, including domestic and foreign marketing and, most importantly, research. Concurrently with the Commissions' efforts, the Associations began an effort in 1967 to obtain additional federal funds to expand the expand the USDA_ARS Dry Pea and Lentil Program. This effort was successful and an additional scientist (F. J. Muehlbauer) and support funds were provided. Part of the additional funds were used to expand the pea and lentil greenhouse and to build the pea and lentil sheaf building at Spillman Farm. At about the same time, the industry groups and WSU collaborated to build the pea and lentil headhouse-laboratory facility adjacent to the greenhouse.

Dr. Fred Muehlbauer appeared on the scene in 1969 as a geneticist with USDA-ARS. After a transition period, Dr. Muehlbauer assumed responsibility

for dry peas and Dr. Wilson had responsibility for lentils. This division of responsibility prevailed until July, 1979 when Van Wilson was seriously injured in a crosswalk near the old livestock Pavillion near Ag Phase II. As a result of the seriousness of his injuries, Dr. Wilson went on a disability leave and subsequently retired in the fall of 1980.

In the void left by Dr. Wilson's retirement, the Pea and Lentil Program engaged the services of Dr. Rodney J. Summerfield of the University of Readin, England. Dr. Summerfield was with the Department on Sabbatical leave from September, 1980 - August, 1981 working primarily on physiological aspects of grain legumes. Following Summerfield's departure in 1981, the USDA began recruitment efforts to fill the position left vacant by Dr. Wilson's retirement. Hiring freezes and other complications delayed filling of the position until June, 1983 when Dr. Steve Spaeth was hired and assumed responsibility for physiological investigations within the Pea and Lentil Program.

Extremely important to the success and daily operations of the Pea and Lentil Program have been the technicians and secretaries associated with the Project from its inception. To name most of them at the risk of excluding one or more, they were: Mrs. Loretta Matthews, Helen Van Neis, Joan Bolick, Lucy Morrow, Bob Cromarty, Mike McMackin, Howard Bird, Rich Nilles, Jerry Coker, and Rick Short. Of these, Jerry Coker and Rick Short have the longest tenure and are still vitally involved with the program. Several secretaries have been associated with the project, foremost of which is Mrs. Edith Waldher who has been with the project since 1978.

Graduate students that have been associated with the project and received degrees include Wayne Riehle (MS), Imru Assefa (MS), Nasri Hadded (Ph.D.), Dogan Sakar (Ph.D.), and Mohammad Jallaluddin (MS). Others currently working

toward degrees include Dave Hoffman, John Hall, Mohamed Kamel, Hatice Aydin, and Dave Buss.

Foremost among the accomplishments of the Dry Pea and Lentil Program have been the cultivar releases that began in 1969. These releases have been as follows (in chronological order):

Tekoa: A large yellow-seeded lentil cultivar with uniform size, shape and color. Developed by Van Wilson and released in 1969.

Latah: A large yellow-seeded dry pea cultivar selected for uniformity and high yield. Developed by Van Wilson and released in 1969.

Garfield: A large green-seeded dry pea cultivar with uniform shape and color. Also has resistance to pea root rot. Developed by F. J. Muehlbauer and released in 1975.

Tracer: A smooth-siever green pea cultivar selected for uniformity and high yield. Also resistant to pea root rot and Fusarium wilt. Developed by F. J. Muehlbauer and released in 1975.

Alaska 81: A large-seeded green pea selected for virus resistance, resistance to seed bleaching, and high yield. Developed by F. J. Muehlbauer an released in 1984.

Brewer: A large-seeded Chilean type cultivar with early maturity and high yields. Developed by F. J. Muehlbauer and released in 1984.

Disease problems with dry peas are considered the most critical of problems faced by the industry. For that reason, major emphasis has been placed on identifying sources of disease resistance and incorporating that resistance into adapted cultivars. This effort led to releases of Garfield, Tracer, Alaska 81, and several germplasm releases. Breeding material with multiple resistance to major pests is being developed for possible future releases.

Several efforts instigated by the Pea and Lentil Program over the years are worth mentioning. The work on Fusarium wilt became necessary in 1971 with the reoccurrence of that problem in the Palouse after nearly a forty year absence. The reoccurrence of the problem resulted from the use of susceptible cultivars. The fact that the disease had not been a problem since the early 1930's gave growers and researchers a false sense of security. With identification of the problem and the use of suitable screening methods, growers ar again assured of the availability of resistant cutivars.

The "chalky spot" problem in the late 1970's was extremely critical to lentil growers because of the downgrading and loss of crop value that resulted. The Pea nd Lentil Program wa instrumental in isolating the problem and showing that Lygus bugs were the culprits. Timely spraying in the early podding stages not only reduced the percentage of lentil seeds affected but evidence also suggested that yields were also improved through a decrease in flower, pod or ovule abortion.

Many of the problems with dry peas can be attributed to their weak vine habit and the tendency to lodge early in the flowering stage and often before flowering. This lodging leads to stem, pod, and seed rotting and, needless to say, reduced yields and quality. Most important among these stem rotting diseases is Sclerotinia white mold that thrives in fallen vines and cool damp weather. Because no true resistance to Sclerotinia white mold is available, the Pea and Lentil Program has taken a different "tact" in controlling this disease. Upright plant types with no leaflets and increased tendril number have been bred. The increased tendril number is responsible for the intertwined nature of these types and the mutual support the intertwining provides. The upright canopy, besides reducing foliar disease, also improves seed quality, improves uniformity of motivation, and will likely improve

yields. Thus, dry peas of the future will be leafless types with better standing ability and improved yields and quality.

Other work on peas includes resistance to the pea seed weevil and multiple disease resistance that include several viruses, powdery mildew, root rot and Fusarium wilt.

The work on lentils has been directed toward early uniform maturity, large seed size with the absence of seed coat mottling, resistance to viruses, and high yield. In recent years pea enation mosaci virus has become a severe problem in lentil fields throughout the area. However, good sources of resistance have been identified and are being incorporated into commercial types.

To broaden the germplasm base of lentils and to make living material of the wild Lens species available not only here but worldwide, Fed Muehlbauer, in cooperation with G. Ladizinsky of Israel, made collections of wild Lens species in southern Europe, the Middle East, and in Turkey. This was the first organized collection made of wild Lens species. All known species were collected, and their relationship to the cultivated species was determine.

One of the goals of the project from its inception has been the development of improved cultivars from the region. This has remained a goal, but here has been a transition toward more basic research on the genetics an physiology of these legumes. Future emphasis will be on the study of genetic systems and how they can be utilized in crop improvement programs.