

POTATO RESEARCH IN WASHINGTON

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Since the Washington State Potato Commission is cooperating in several of the research programs on potatoes in the State of Washington, through provision of significant financial support, I thought you would be interested in some of the details of this cooperative effort.

The potato research program in Washington is conducted by scientists of the College of Agriculture of Washington State University and by the Crops Research Division and the Entomology Research Division of the Agricultural Research Service, U. S. Department of Agriculture. While the programs of the U. S. D. A. are regional in nature, the results apply directly to Washington potato growers.

One of the purposes in creating the Washington State Potato Commission was to enhance potato research by allotting grant funds from the Industry for specific research programs. This cooperation has made it possible to carry on a much more extensive and intensive potato research program than would have been possible without these grants. Both applied and basic research work have benefited.

Research grants by the Washington State Potato Commission are allotted by the Board of Directors of the Commission upon the recommendation of the Research Committee of the Board in consultation with University representatives of the research groups.

At the present time the programs of Dr. Robert Kunkel, Dr. Merle Weaver, and Dr. Gene D. Easton of the Washington State University College of Agriculture and Dr. W. G. Hoyman, Crops Research Division, and Mr. B. J. Landis, Entomology Research Division, U. S. D. A, receive support through Washington State Potato Commission grants. These men are all presenting progress reports at this conference.

As you will note from your program, the Washington State University College of Agriculture also is conducting significant research on potatoes that is not supported by grants from the Washington State Potato Commission. None of the potato programs of the College of Agriculture Cooperative Extension Service is supported by the Commission but the Extension workers cooperate closely with the Potato Commission. This is particularly true for Mr. Don Bakes who devotes most of his time to potato problems.

Following is a breakdown of research funds by agencies for the fiscal year, 1965-66:

Washington State Potato Commission \$ 63,073.00

Washington State University	
Salaries & Wages	\$ 48,567.46
Indirect Costs*	45,381.00
Operation	3,200.00
U. S. D. A. Crops Research	12,855.10
U. S. D. A. Entomology Research	<u>26,063.00</u>
Total for potato research	\$199,139.56

*These indirect costs cover administration, office, Laboratory and greenhouse space, utilities, general operations, land, irrigation water and other miscellaneous costs not directly charged to research projects. No indirect costs are paid by the Potato Commission.

The Potato Commission is increasing the grant considerably for 1966-67. Support for present programs will be increased to \$77,101.73 to provide for increased emphasis on wireworm control and the purchase of special equipment and instruments for the work on cultural practices. In addition a \$7,000 increase will be available for a new program by Dr. Gene D. Easton to study the control of soft rot diseases of potatoes.

Much of the field work with potatoes is done at the Othello Research Farm. One of the real limitations in the program has been lack of adequate potato storage and handling facility to store potatoes and evaluate results of the field work. The last State legislature appropriated \$21,000 for such a facility providing this amount was matched. The Washington State Potato Commission has allotted \$21,143.00 for matching this amount. To assure an amount sufficient to build the facility needed, the Director of Research of the College of Agriculture has allotted an additional \$10,500, thus making a total of \$52,643 available for the building. It is hoped that this facility can be available for the handling of the 1966 experimental crop.

Personnel of the Washington State University College of Agriculture and the U. S. D. A. Agricultural Research Service are highly appreciative of the excellent cooperation of the Washington State Potato Commission. Through this united effort, current potato problems are being solved and much new information is being obtained which will help to solve future problems as they arise.

IS VERTICILLIUM WILT TRANSMITTED THROUGH CERTIFIED POTATO SEED?

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Verticillium wilt is an important potato disease in the West, particularly to the old, gravity irrigated part of southeastern Idaho. This disease is without a doubt, the one limiting factor in production in this section. One might even go so far as to say that if Verticillium wilt did not exist in Idaho, and production of high yields were common, that you would not be here today as representatives of the potato industry of Washington. Perhaps this is stretching a point a little but the point is that without this disease in the production area of Idaho, the yield potential would be enormous.

Potato production began some 30 to 40 years ago in southeastern Idaho but did not really expand into a major crop until about the advent of World War II. With the great demand for food by our Government, potato production was forced to accelerate to a level many times greater than the pre-war days. How was this accomplished? In many cases all normal cultural practices were abandoned, in particular the practice of rotation. Year after year potatoes were planted following potatoes. Such intensive cultivation is all that is needed to accentuate many pathological problems and such was the case; Verticillium wilt became one of the major problems. This rapid increase in potato production caught the Certified seed grower short, so more and more use of local seed was employed to attempt to deliver the tonnage required for human consumption. Soon the yield per acre began to drop until now the average number of sacks per acre in southeastern Idaho is much less than that of the newer areas in southwestern Idaho. One thing that should be mentioned is that the quality of the potatoes, and by that I mean the cookability, has never suffered from this disease. In fact a professional colleague of mine once, jokingly said that Idaho potatoes are what they are because of Verticillium, or that this disease was actually a blessing in disguise. I rather doubt that this is true, but in any case wilt does not cause a loss of this kind of quality.

Wilt is not equally distributed in Idaho or at least it is not equally severe. For example, southeastern Idaho's old gravity irrigated land is thoroughly saturated, whereas the newer land brought into production since 1950 and watered with sprinklers is much less influenced by this disease. Southcentral or the Magic Valley now stands at about the stage eastern Idaho was some 20 years ago. Wilt is present but not all fields are completely saturated. Southwestern Idaho is relatively free of wilt or at least the new land brought into production during the last 5 to 10 years is not saturated yet. Here potato yields can go as high as 400 sacks to the acre.

This variation raises some questions as to why this occurs. No

simple answer can be given. For example, in southeastern Idaho wilt is a limiting factor in potential yield on the old gravity land. On the other hand wilt is not this important on the new land surrounding this area. One obvious difference is that because of the irregular terrain the crop is watered by sprinklers. Potato seed obtained from infested land has been used for years to plant the new acreage but the disease is still not a limiting factor. Potato seed from infested land has likewise been used to plant the acreage in the Magic Valley and no doubt in southwestern Idaho as well but wilt has not become equally severe. During the last ten years potato growers in southwestern Idaho have planted certified seed almost entirely not because of wilt but because of potato virus disease problems.

The literature on the subject of tuber-borne inoculum of the wilt organism has been studied by many researchers for many years. I attempted to review this subject and finally limited myself to the last ten years and to those citations in the Potato Journal.

Rieman and Schultz developed a variety called Red Beauty with resistance to wilt. Wheeler and Akeley brought out the variety Onaway with similar resistance and in Idaho the potato variety Menomonee was found to be resistant to wilt. The presence of the pathogen, *Verticillium albo atrum*, in tubers has been established. Darrell reported that tuber necrosis was related to wilt but was too variable, difficult to interpret and did not correlate with the levels of infection for the vines. Eddington stated that both the microsclerotial type and the dark mycelial type invaded the tubers but the former was more important regarding tuber browning. Folsom and Friedman noted that *V. albo atrum* was isolated from tubers exhibiting a pink eye condition in the Katahdin variety. Akeley et al studied tuber transmission in 28 varieties and reported that most of them carried the pathogen but that discoloration did not preclude the presence or absence of this pathogen. Waggoner stated that under conditions in Connecticut the use of certified seed did not control wilt. Robinson reported that wilt originating in seed stocks could be controlled by seed treatment with Semesan Bel or acid mercuric chloride.

From this short review it appears that most agree that wilt is tuber borne; that discoloration of the tuber isn't essential for identification of tuber infection; that resistance varieties are the ultimate answer to wilt control; and that the use of certified seed is beneficial in some potato areas for wilt prevention and not in others.

In 1960, I published a bulletin on *Verticillium* wilt (Res. Bul. 45) which incorporated the results of many research programs at the Aberdeen Branch Exp. Station. The portion on seed transmission consisted of a study of attempted isolation of the fungus *V. albo atrum* from tubers grown in the main certified seed growing areas of Idaho and from two locations of intensive commercial production in Idaho. As you can see in the table projected the presence of this pathogen in

certified seed is either non-existing or so low that we feel that it does not constitute a problem. The two commercial areas, Aberdeen and the Rexburg (actually referred to as the Egin Bench) are both focal points of this disease and are expressed in the amount of this pathogen isolated from tubers.

How valuable is certified seed? From the standpoint of varietal quality and certain tuber transmitted diseases, certified seed is very important. Is *Verticillium* wilt transmitted through certified seed? I believe it is, but I also believe that many factors may determine how efficient this is as a source of field contamination. In an area like Aberdeen if wilt-free certified seed had been used from the beginning of intensive potato culture greater yields of potatoes could have been possible. Once the pathogen is spread throughout the soil the use of certified seed for the purpose of *Verticillium* control is not beneficial. Let me say once again; the value of certified seed in commercial potato areas is still very important and probably essential for high yield production for the control of other diseases such as bacterial ring rot and the various virus problems.

Numbers of Tubers from Idaho Seed and Commercial
Areas in Relation to Infection by *V. albo atrum*

	Total tested 1958-1959	Tubers without <i>V. albo atrum</i>	Tubers with <i>V. albo atrum</i>
Teton Basin	420	420	0
Ashton	373	372	1
Lost River	327	326	1
Grace	452	451	1
McCall	135	135	0
North Idaho	109	106	3
Salmon	59	59	0
Misc.	310	309	1
Total	2,212	2,207	7 = 3%
Aberdeen	326	273	53 = 16%
Rexburg	114	79	35 = 30%

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