

Black Stem Rust: Status in Washington State, a Case study

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BSR in Washington

Wheat production in WA

History of BSR in WA

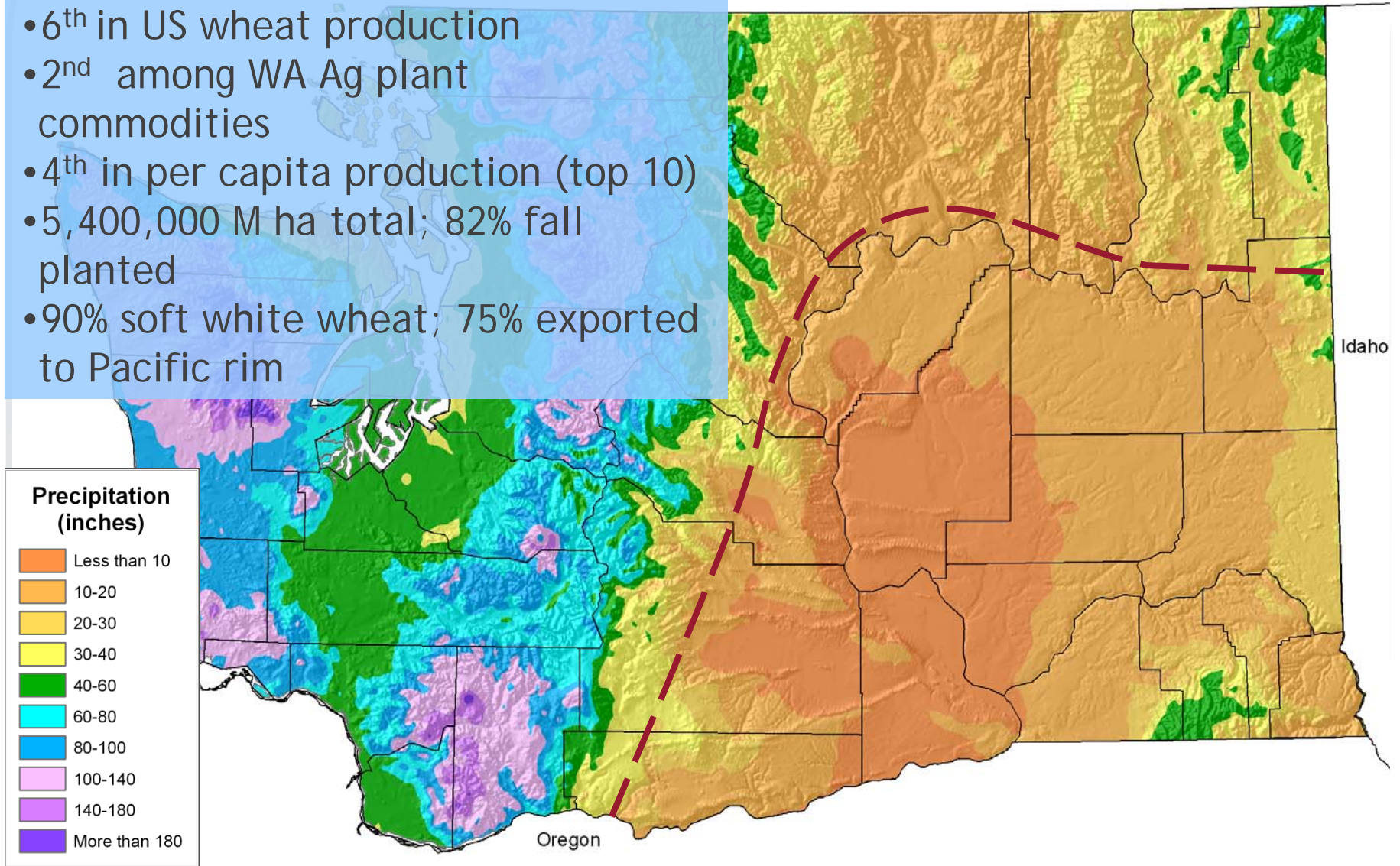
WA Barberry Eradication Program

Current Status of BSR in WA

- Recent collections
- Race situation

WA Wheat Facts

- 6th in US wheat production
- 2nd among WA Ag plant commodities
- 4th in per capita production (top 10)
- 5,400,000 M ha total; 82% fall planted
- 90% soft white wheat; 75% exported to Pacific rim



History of BSR in WA

G.W. Fisher (1944)

- winter temps too severe for survival of uredinia
 - ideal conditions for survival & maturation of telia
 - rainfall/temp for teliospore germination & basidiospore production are near optimal in May to early June
 - avg temps are below optimal for development of uredinia
- ➔ Palouse climate unsuited for regular epidemics

History of BSR in WA

G.W. Fisher (1944)

Non-epidemic yrs: 1917, '18, '22-25, '29, '39

- usually too dry and too cool for uredinial development

Epidemic yrs: 1916, '37, '38, '41-43

- highly variable, but sub-average temps in May and above-average precipitation in June/July
e.g. 36 vs. 19 (E vs. NE) rainy days from April-July over these years

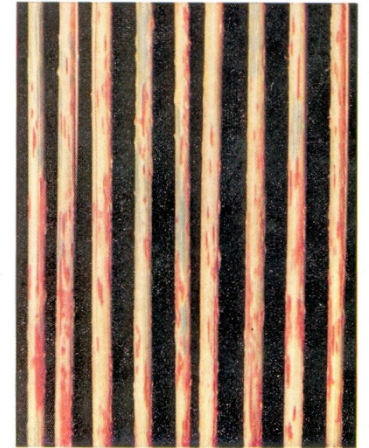
WA Barberry Eradication Program

Washington's program initiated in 1944 (laws against barberry since 1923)

Only eastern Washington, wheat-producing counties (21) included
Stimulated via a familiar pattern of rust epidemic (1941-43) and a concurrent war effort

Program funding was terminated in 1978, although most of the last surveys were completed in 1977

BARBERRY ERADICATION
controls the
STEM RUST
of
WHEAT, OATS, BARLEY, and RYE



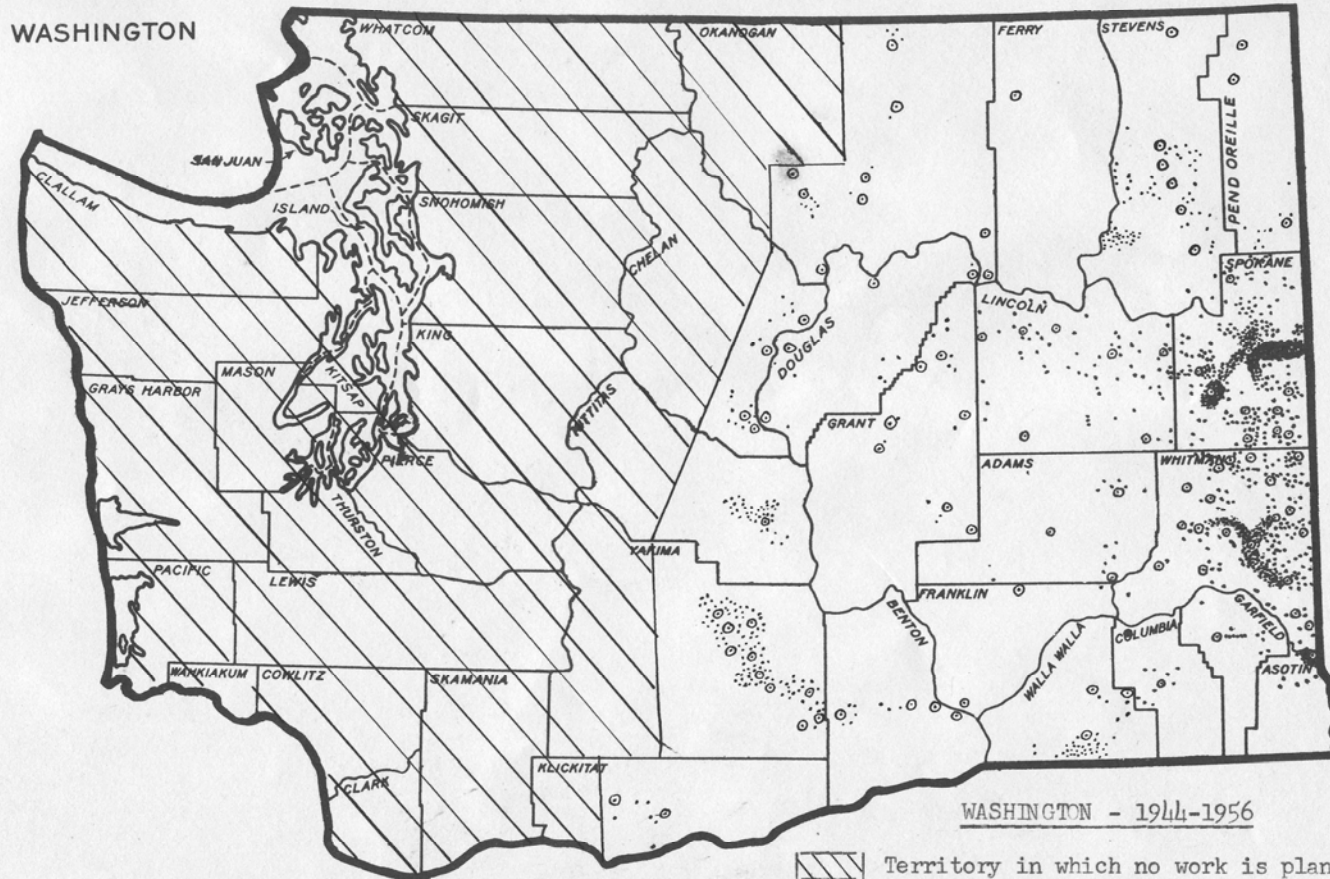
Stem Rust (Red Stage) on Grain Stems

This folder was prepared co-operatively by the Experiment Station and Extension Service of The State College of Washington, the State Department of Agriculture, and the Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, U. S. Department of Agriculture. By H. B. Busdicker, Pathologist, U. S. Department of Agriculture and G. W. Fischer, Plant Pathologist, Washington Agricultural Experiment Stations.

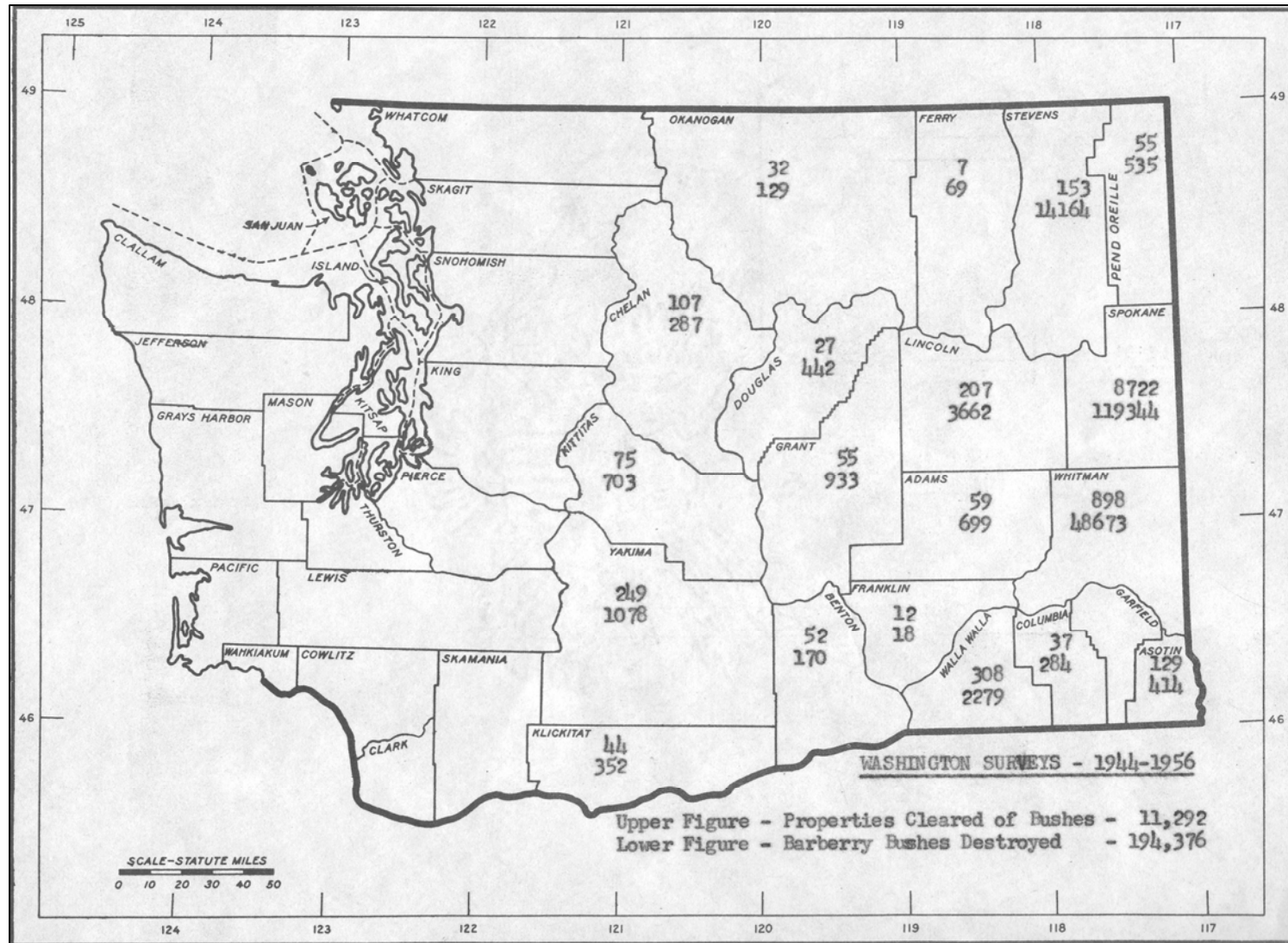
EXTENSION SERVICE
INSTITUTE OF AGRICULTURAL SCIENCES
THE STATE COLLEGE OF WASHINGTON
Pullman, Washington

WA BE Program 1944-1956

BARBERRY ERADICATION FOR STEM RUST CONTROL
LOCATIONS WHERE BUSHES HAVE BEEN DESTROYED



WA BE Program 1944-1956



WA BE Program

RESURVEYS OR SUBSEQUENT SURVEYS

CHANGE OF TENANT OR OTHER INFORMATION

NEW BUSHES		RUST + -	DATE	CHEMICALS, KIND AND AMTS. FURNISHED BY							
DATE	SCOUTS			BUSHES FOUND		BUSHES DESTROYED		KIND	OWNER	STATE	FED. DEP.
		PLANTED	ESCAPED	PLANTED	ESCAPED	HOW*					
7-14-58	W/B	-	-	-	-	4(F) 7.2 #	-	-	-	-	-
6-16-65	E&M	-	-	-	-	1F A 10 #	-	-	-	-	-
10-3-73	W/B	-	-	-	-	1F A 1 #	-	-	-	-	-
6-7-77	E & (Crew)	-	-	-	-	3F A 3/4 #	-	-	-	-	-

* D. Kerosene; S= Salt; Etc.

Form 1 ORIGINAL SURVEY

COUNTY **WHITMAN** CITY **PULLMAN**

OWNER **CITY OF PULLMAN** MAIL ADDRESS **PULLMAN**

RENTER **SAME** ADDRESS PROPERTY **SAME**

LEGAL DESCRIPTION **BETWEEN WEST MAIN AND COLFAX HIGHWAY EAST OF I.O.O.F. CEM.**

NUMBER OF BARBERRIES		KIND	RUST	LEGAL NOTICE SERVED									
SIZE	PLANTED	ESCAPED	G-P	+	-	DUG	TREATED	REMAINING	KIND	OWNER	STATE	FED. DEP.	C.P.G.R.
LARGE		1 F	G										
MEDIUM		4 F	G										
SMALL		53 NF	G										
TOTAL		58					50	NONE	A		5 #		
SEEDLINGS		18				18							

ATTITUDE OF OWNER

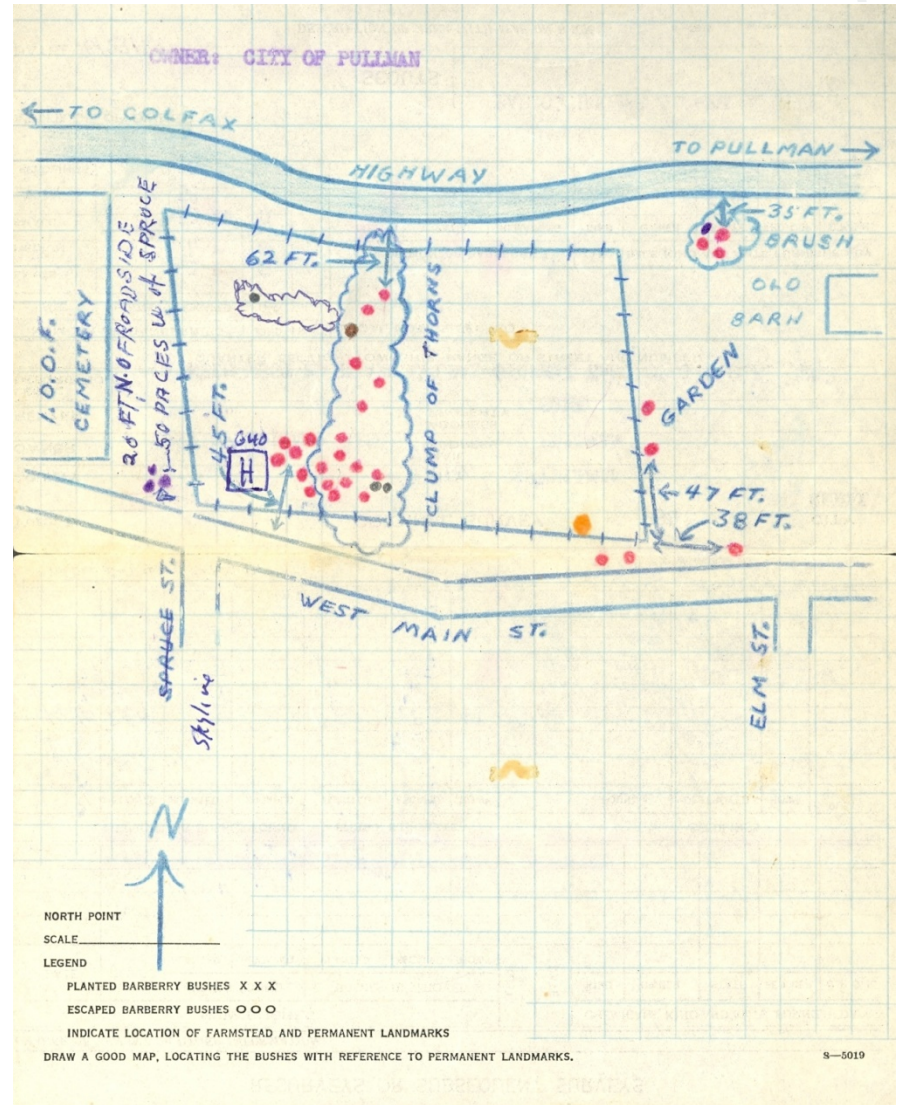
SCOUTS

HAL C. HUGHES & CREW

DATE **6/27/47**

DESCRIPTION OF AREA WITH MAP ON BACK

8-5019 GOVERNMENT PRINTING OFFICE



Barberry Eradication Program

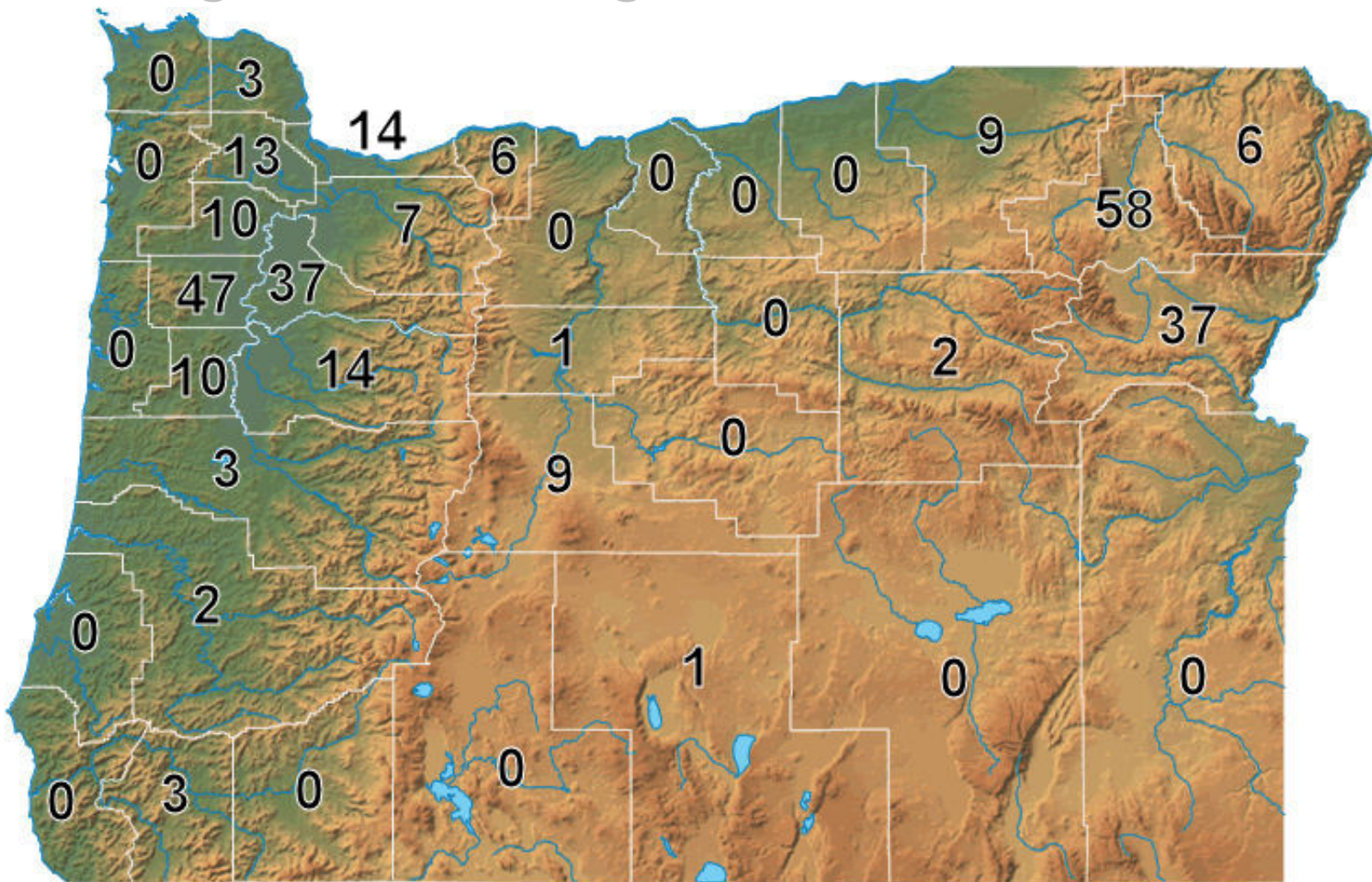


Spokane Co. 1957



Spokane, WA
1948

Oregon BE Program, 1950-1960



Properties surveyed

0 50 KM 50 Miles

© geology.com

Reevaluation of BE Program

Foster, 2002-03: M.S. Botany, WSU

100 properties surveyed in Whitman County
with a total of 5,255 shrubs (1944-1978)

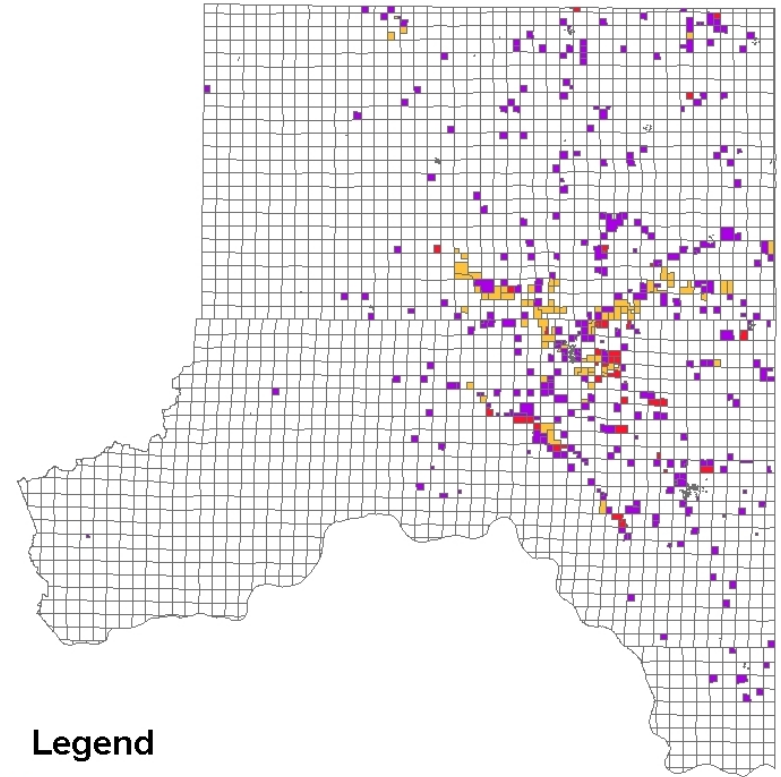
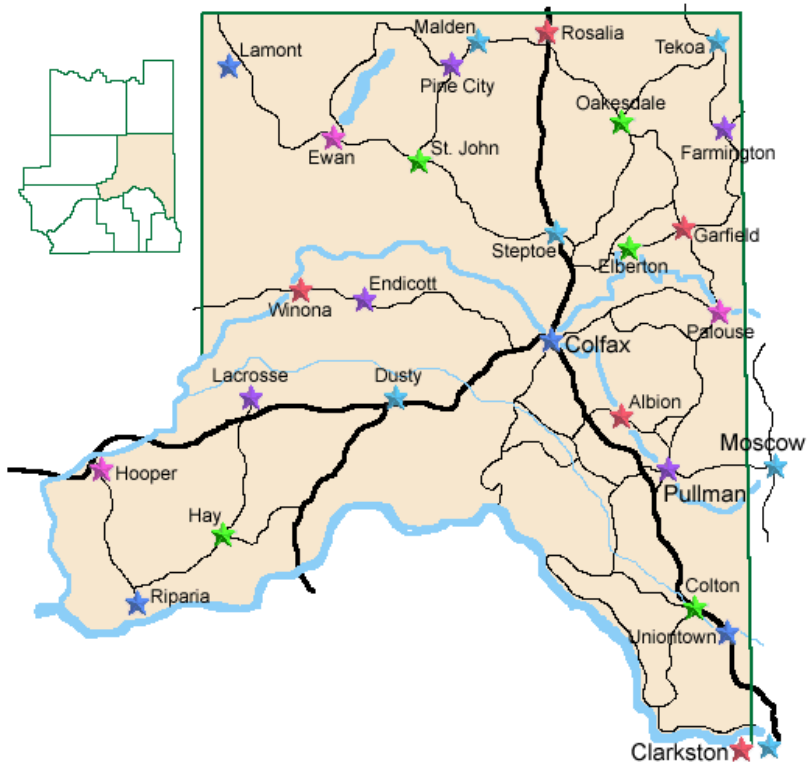
Cross-section of rural and urban properties

Discovered 9 shrubs on 6 properties

5 shrubs producing berries

One property had never been recorded with
barberry previously

Whitman County BE Survey Locations



Legend

-  Inactive Surveys
-  Historical Surveys
-  2002-2003 Surveys



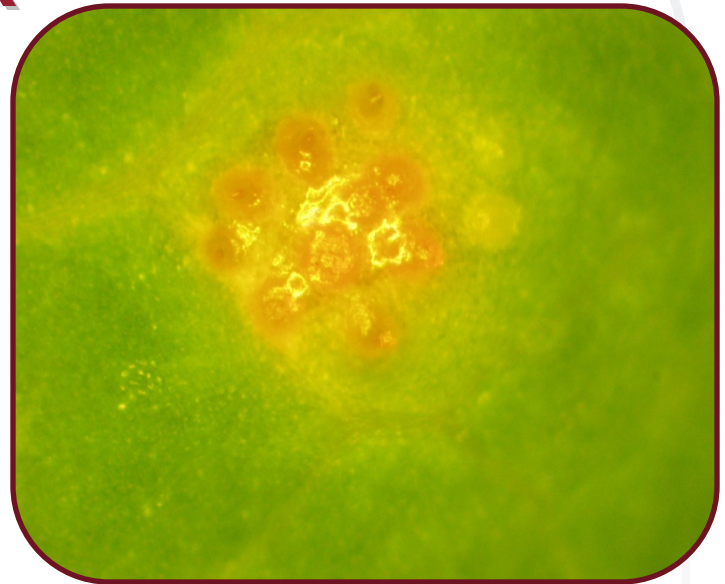
Current Status of BSR



Near Potlatch, ID
14 May 2009



Current Status of BSR



Current Status of BSR in WA

BSR collected from two late-sown spring barley fields in 2007

Oakesdale, Whitman Co.

Baronesse - moderately severe

Arden, Stevens Co.

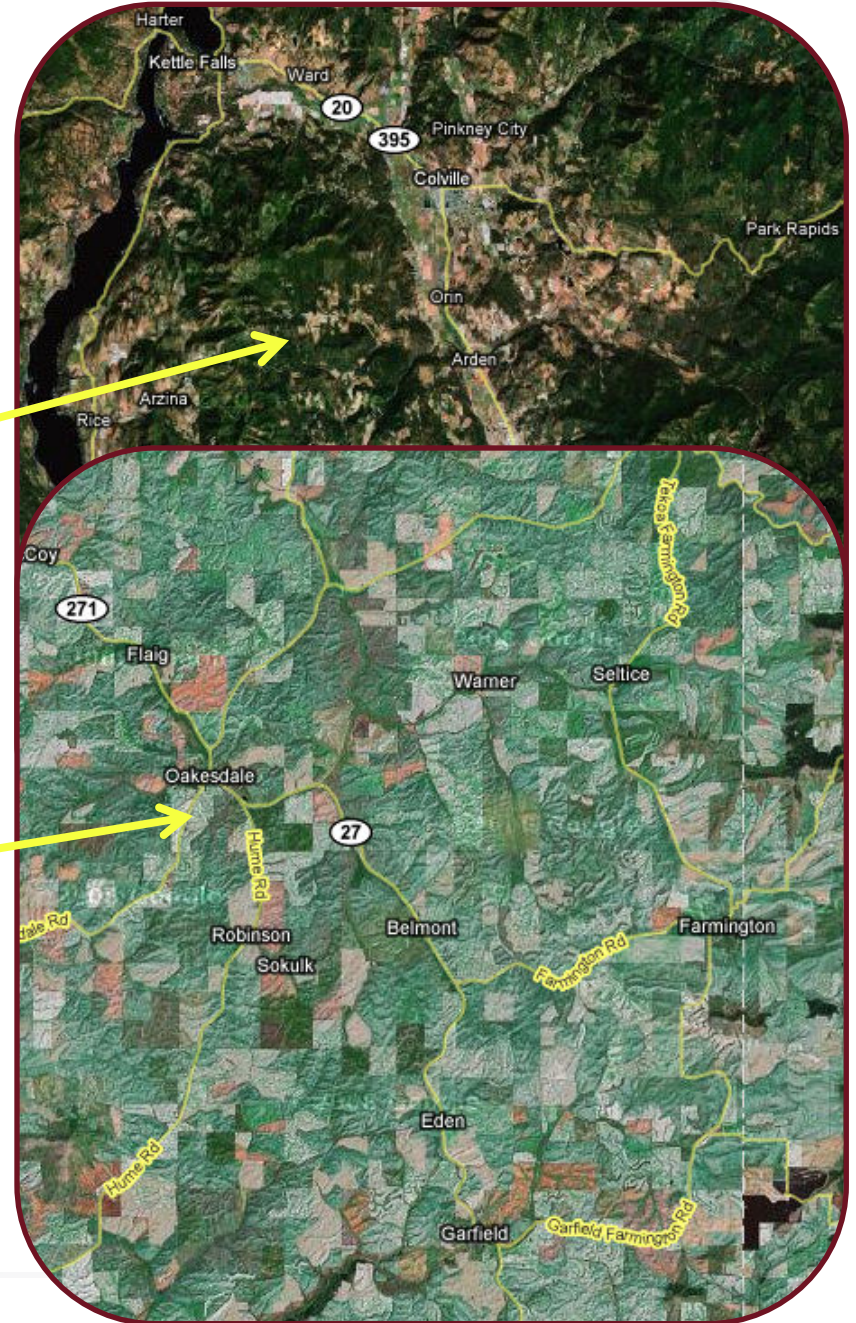
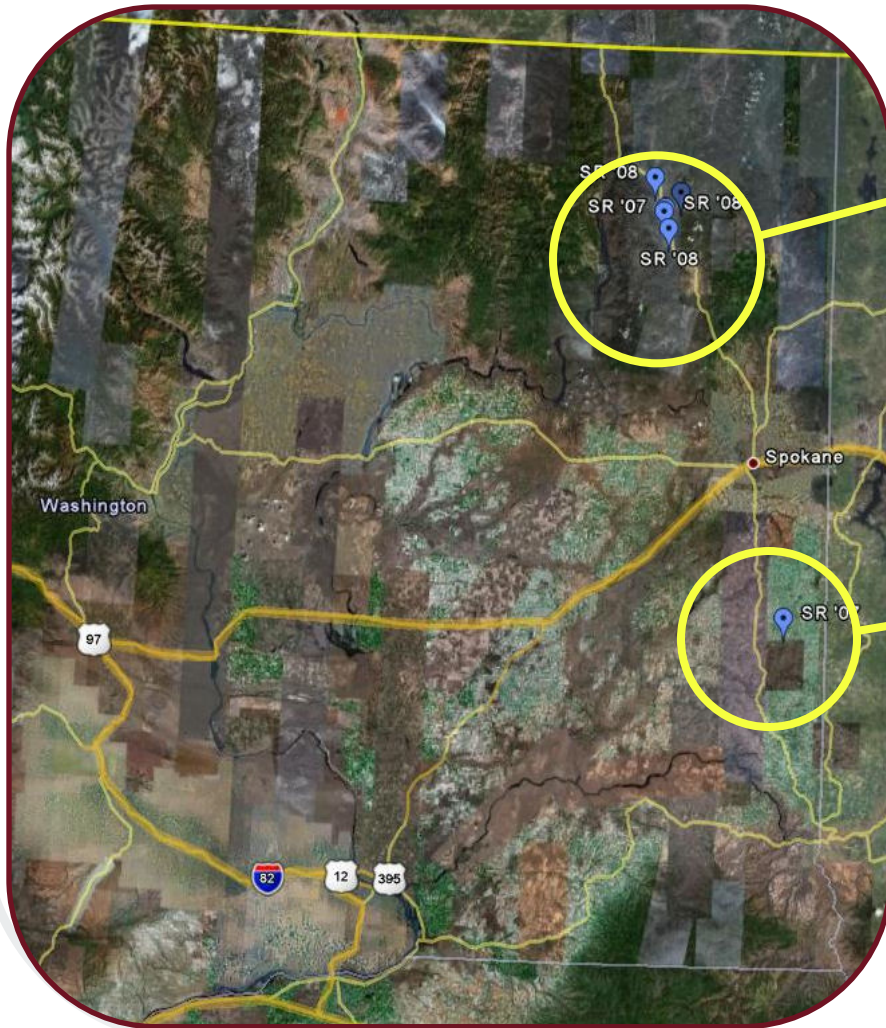
Radiant - severe

Samples sent to CDL for race-typing

Races of *Puccinia graminis* f. sp. *tritici* Identified in Washington in 2007 (CDL data)

No.	Race	Virulence formula on differential Sr genes	Additional virulence	No. of isolates	Location
1	BBBB	-		1	Arden
2	BCBB	9g		1	Arden
3	BLBB	11		1	Arden
4	GCBN	7g, 9a, 10, 21		1	Oakesdale
5	GFCJ	8a, 9d, 9g, 10, 17, 21		1	Oakesdale
6	GKBG	6, 8a, 9d, 9g, 21		1	Oakesdale
7	JMBB	9e, 9g, 11, 21		1	Arden
8	QCCD	5, 9g, 10, 17, 21		1	Oakesdale
9	QCCL	5, 9a, 9g, 17, 21	Sr24	1	Arden
10	QCCN	5, 9a, 10, 9g, 17, 21		1	Oakesdale
11	QCML	5, 9a, 9g, 17, 21, 36		1	Arden
12	QFBS	5, 8a, 9a, 9d, 9g, 10, 21		1	Arden
13	QFCD	5, 8a, 9g, 10, 17, 21		2	Oakesdale
14	QFCJ	5, 8a, 9d, 9g, 10, 17, 21		1	Arden
15	RCCN	5, 7b, 9a, 9g, 10, 17, 21		4	Arden, Oakesdale
16	RFCJ	5, 21, 7b, 8a, 9g, 17, 9d, 10		1	Oakesdale
17	TTTT	5, 6, 7b, 8a, 9a, 9b, 9d, 9e, 9g, 10, 11, 17, 21, 30, 36, TMP		1	Arden
	TTKS (Ug99)	5, 6, 7b, 8a, 9a, 9b, 9d, 9e, 9g, 10, 11, 17, 21, 30	Sr31 (Sr24)		Africa

Current Status of BSR in WA



Current Status of BSR in WA

Diversity of races is typical of a sexually reproducing population

- molecular data indicate this population is even more diverse than is apparent from race diversity
- likely that *formae speciales* in addition to *P. graminis* f.sp. *tritici* are present

Current Status of BSR in WA

Next steps?