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Estimated Losses Caused By Rust
In Small Grain Cereals
In The United States – 1918-76

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Estimated Losses Caused by Rust In Small Grain Cereals In the United States—1918-76

A. P. Roelfs¹

Importance of Cereal Rust Losses

The importance of plant diseases is due to the losses they cause; however, few compilations of disease losses are available. The losses caused by stem rust in the small grain cereals in the United States that are contained in this publication constitute the longest, most continuous national record of known plant disease losses.

Disease loss records provide a history of the location and magnitude of the disease problem, as well as reflect the progress made in controlling the disease. Such records also identify those years when a rust disease seriously affected crop yields because changes in pathogen virulence, cultivar resistance, environmental conditions, or cultural practices, or all of these, altered disease development. Loss records are useful for cost-benefit studies needed in a range of decisions from estimates of the potential market for a fungicide to needs for research in breeding disease-resistant varieties.

Losses caused by plant diseases have important financial effects on the farmer and consumer, as well as on the transporting, processing, and marketing industries. Cereal rust diseases cause loss of income, grain quality, and grain quantity. Loss of income is a difficult value to determine, as prices are often related to the supply or the supposed supply of the product. Thus, in years with reduced grain yields caused by disease, the price per unit of grain often increases and vice versa. Under conditions of severe disease, a grower in one area may produce nothing and find higher prices useless,

whereas a grower in another area producing an average crop finds higher prices advantageous.

Losses in grain quality caused by disease are also difficult to measure because a direct correlation does not exist between disease severities and grain quality. An undesirable quality trait, such as a low test weight from shriveled grain caused by disease, may result in a desirable trait, namely a greater percentage of protein, which in turn may be offset by lower extractions in milling. Therefore, comparisons of effects of the cereal rust diseases are made most directly from the resultant losses in crop yield. The Cereal Rust Laboratory personnel have maintained a record of losses of grain quantity because of cereal rusts for many years. These records of wheat stem rust losses were initiated to assess the effect of barberry eradication on the disease.

A correlation exists between disease severity and reduction in yield when cultivar, pathogen biotype, environment, initial infection level, and host growth stage at the time of infection remain constant. Few, if any, of these factors remain unchanged from location to location or from year to year. Thus, precise cereal rust losses are obtainable only from replicated yield loss plots, and then, of course, serve only as "random samples" that can be used to estimate losses over larger areas. Years of experience have shown, however, that cereal rust losses in small plots are an indication of losses over larger areas and that sufficient correlation exists between visually assessed disease severity and the associated decrease in yield to make meaningful estimates of the losses over large areas.

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Data Collection Methods

The annual procedure for collating the loss estimates for cereal rusts by the Cereal Rust Laboratory has followed this general format:

—Laboratory personnel survey major areas of small grain production for rust incidence when the crops are in the last month of maturation.

—Additional data on rust incidence are supplied in field survey reports by field men of the Animal and Plant Health Inspection Service and personnel of the Crop Quality Council.

—Individual reports of rust severity and prevalence are also supplied by State and Federal employees who submit rust collections for race identification or make field survey trips.

—An estimate of the losses caused by rust in each State is made with this data from the loss tables for stem rust² and for leaf rust.³

—State and Federal employees in each State are consulted for their estimates of crop losses caused by rust at the end of the crop season. Some workers use these tables and some base their estimates on replicated plots to determine losses caused by rust. Others base their estimates on observed differences in yield between disease-free and diseased fields or between disease-resistant and susceptible cultivars adjusted for inherent differences in productivity under disease-free conditions. In all of these estimates, acreage of individual varieties is taken into account.

—Estimates for each State are compared, and where differences exist, the estimate is adjusted by consensus among the concerned individuals.

—Finally, the collected data are circulated to all cooperators for comment.

During the past 10 years, research plots for loss data have been planted at many locations.^{4,5} Losses obtained from these plots indicated that the procedure for estimating rust losses by the Cereal Rust Laboratory was generally adequate, although in most years the estimates were conservative, especially in the cases of wheat leaf and oat crown rusts.

Tables 1 through 4 (pp. 3 to 83) list by State and crop the estimated losses of wheat, oats, barley, and rye caused by the various rust diseases. The acreage harvested and total production figures were from the annual estimates made by the U.S. Department of Agriculture. Cereal rust losses were calculated for Winter, Spring, and Durum wheats independently, and the combined data are given in the tables for brevity. Losses in forage and straw yields or other disease-associated losses such as poor winter survival are not included in this tabulation.

Data on disease losses were not obtained in all years from all States. Initially, records were compiled for the original barberry eradication States and other States with major cereal production areas. Some changes have been made in the States included over the years as a result of changes in cropping practices. Generally, States not covered are either historically minor producers of small grain cereals or cereal rusts are not a factor in that area. The impact of local losses is obscured when losses are expressed on a State basis. For example, although only trace losses were reported for 2 million acres in a State, an individual farmer may have suffered a 100 percent loss on his 100 acres, or a region of that State may have suffered light to 5 percent losses on 100,000 acres.

Wheat Stem Rust

Wheat stem rust has historically produced the most serious rust epidemics in the United States. Epidemics prior to 1918 were recorded in the North Central States in 1878, 1904, and 1916. Since 1918,

the States and the number of years in which losses were greater than 5 percent are as follows: North Dakota and South Dakota (15 years); Minnesota (14); Nebraska (12); Iowa and West Virginia (9);

² Kirby, R. S., and Archer, W. A. 1927. Diseases of cereal and forage crops in the United States in 1926. U.S. Department of Agriculture, Plant Disease Reporter Supplement 53:110-208.

³ Chester, K. S. 1946. The nature and prevention of cereal rust as exemplified in the leaf rust of wheat. *Chronica Botanica Co.*, 269 pp.

⁴ Burleigh, J. R., Roelfs, A. P., and Eversmeyer, M. G. 1972. Estimating damage to wheat caused by *Puccinia recondita tritici*. *Phytopathology* 62:944-946.

⁵ Calpouzos, L., Roelfs, A. P., Madson, M. E., and others. 1976. A new model to measure yield losses caused by stem rust in spring wheat. *Agricultural Experiment Station, University of Minnesota Technical Bulletin 307*, 23 pp.

Wisconsin (6); Virginia and Kansas (5); Wyoming (4); Colorado, Michigan, and Montana (3); Illinois, Missouri, and Texas (2); Indiana, Ohio, and Pennsylvania (1).

Thus, epidemics of wheat stem rust have been of the greatest importance in the North Central States. The alternate host, barberry, was common in this area until about 1928. The climate, for example, hot days, cool nights, and frequent dews, is also generally favorable for stem rust. The worst epidemic occurred in 1935 and resulted in the two greatest records of statewide losses, North Dakota 56.5 percent and Minnesota 51.6 percent. This epidemic was caused by race 56 that was virulent on many of the commercial cultivars. Serious epidemics in 1953 and 1954 were caused by a relatively

new race 15B and the predominance of susceptible cultivars.

The most recent epidemic occurred in 1974 when losses of 5 to 20 percent occurred in the Southeastern States. No single race dominated in this epidemic, but a mild winter allowed the pathogen to overwinter over a large area where two highly susceptible cultivars were in widespread use. The reduced frequency of epidemics during the past 25 years resulted from the development and use of resistant cultivars in high hazard areas and the removal of the barberry. The barberry, as an alternate host for stem rust in the Northern States, served as an annual source of inoculum early in the spring and assured variation within the pathogen. After 1928, most epidemics initiated from the pathogen overwintering in the Southern States.

Wheat Leaf Rust

Wheat leaf rust epidemics have been less serious than those of stem rust. However, some loss occurs almost annually in most areas. Since 1918, the States and the number of times they have reported losses greater than 5 percent are as follows: Pennsylvania (25); Illinois (14); Indiana (13); Kansas and Oklahoma (12); Iowa (9); South Dakota (8); Virginia (6); Missouri and Texas (5); Minnesota and West Virginia (4); Colorado, Nebraska, and Wisconsin (3); Michigan, North Dakota, and Ohio (2). Leaf rust is favored by cool temperatures; thus, to find it causing more frequent epidemics on

Winter wheats in the southern half of the country is not surprising.

Leaf rust frequently overwinters on Winter wheat as far north as the 40° N parallel and may do so wherever Winter wheat is grown. Thus, the disease can reinitiate itself as soon as environmental conditions are favorable. The most severe statewide loss was 50 percent in Georgia in 1972, where much of the wheat crop was destroyed before heading. The most serious widespread epidemic nationwide occurred in 1938 when the loss in Iowa and Oklahoma was 28 and 27 percent. In 1938, losses greater

Text continues on page 5.

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
ALABAMA -- WHEAT							
1974	130	23.0	2,990	5.0	160.8	2.0	64.3
1975	135	24.0	3,240	Trace	Trace	5.0	170.5
1976	125	27.0	3,375	Trace	Trace	2.0	68.8
ARKANSAS -- WHEAT							
1971	306	31.5	9,639	0	0	5.0	507.3
1972	296	37.0	10,952	0	0	7.5	888.0
1973	217	28.0	6,076	0	0	8.0	528.3
1974	400	26.0	10,400	0	0	7.0	782.8
1975	520	30.0	15,600	Trace	Trace	2.0	318.3
1976	710	39.0	27,690	0	0	4.0	1,153.8

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
FLORIDA -- WHEAT							
1974	30	20.0	600	20.0	150.0	Trace	Trace
1975	20	26.0	520	Trace	Trace	5.0	27.4
1976	22	30.0	660	0	0	5.0	34.7
GEORGIA -- WHEAT							
1972	140	20.0	2,800	Trace	Trace	50.0	2,800.0
1973	120	27.0	3,240	0	0	6.0	206.8
1974	160	23.0	3,680	8.0	330.7	3.0	124.0
1975	135	27.0	3,645	Trace	Trace	1.0	36.8
1976	115	31.0	3,565	0	0	2.0	72.7
KENTUCKY -- WHEAT							
1966	170	34.0	5,780	0	0	Trace	Trace
1967	231	34.0	7,854	Trace	Trace	Trace	Trace
1968	208	30.0	6,240	Trace	Trace	Trace	Trace
1969	183	34.0	6,222	Trace	Trace	Trace	Trace
1970	170	36.0	6,120	Trace	Trace	Trace	Trace
1971	190	40.0	7,600	0	0	Trace	Trace
1972	216	32.5	7,020	0	0	1.0	70.9
1973	164	33.0	5,412	0	0	5.0	284.8
1974	390	31.5	12,285	Trace	Trace	Trace	Trace
1975	352	34.0	11,968	Trace	Trace	0.5	60.1
1976	330	31.0	10,230	Trace	Trace	2.0	208.7
MISSISSIPPI -- WHEAT							
1974	162	24.0	3,888	1.0	41.4	5.0	206.8
1975	185	24.0	4,440	Trace	Trace	5.0	233.7
1976	180	29.0	5,220	Trace	Trace	3.0	161.4
NORTH CAROLINA -- WHEAT							
1972	225	31.0	6,975	0	0	2.0	142.3
1973	160	35.0	5,660	Trace	Trace	2.5	145.2
1974	290	35.0	10,150	Trace	Trace	5.0	534.2
1975	300	31.0	9,300	Trace	Trace	2.0	189.8
1976	240	29.0	6,690	Trace	Trace	1.5	70.6
SOUTH CAROLINA -- WHEAT							
1972	136	20.0	2,720	0	0	16.0	518.1
1973	101	25.0	2,525	0	0	15.0	445.6
1974	158	25.0	3,950	8.0	395.0	12.0	592.5
1975	155	27.0	4,185	Trace	Trace	2.0	85.4
1976	145	25.0	3,625	Trace	Trace	1.0	36.6
TENNESSEE -- WHEAT							
1971	250	35.0	8,750	Trace	Trace	1.0	88.4
1972	240	32.0	7,680	0	0	1.0	77.6
1973	144	31.0	4,464	0	0	7.5	361.7
1974	325	29.0	9,425	0	0	8.0	819.6
1975	310	31.0	9,610	Trace	Trace	0.5	48.3
1976	335	37.0	12,395	Trace	Trace	3.0	383.4

than 5 percent also occurred in Illinois, Kansas, Minnesota, Missouri, Nebraska, Pennsylvania, Texas, and Virginia. Although many resistant cultivars have been developed, most have been over-

come by changed virulence in the pathogen. The low levels of loss in the North Central and Great Lakes States in the past 7 to 10 years were due to resistant cultivars.

Text continues on page 27.

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield					
				Stem rust		Leaf rust		Stripe rust	
				%	1,000 bu	%	1,000 bu	%	1,000 bu
CALIFORNIA -- WHEAT									
1969	355	34.0	12,080	0.1	1.8	0	0	Trace	Trace
1970	535	41.4	22,175	Trace	0.6	Trace	Trace	Trace	Trace
1971	555	36.0	19,965	Trace	4.0	Trace	Trace	Trace	Trace
1972	487	47.8	23,304	Trace	Trace	Trace	Trace	Trace	Trace
1973	572	54.0	30,880	0	0	Trace	Trace	Trace	Trace
1974	750	52.0	38,994	0	0	Trace	Trace	8.0	3,777.7
1975	1,001	62.2	62,227	0	0	Trace	Trace	Trace	Trace
1976	940	63.5	59,720	0	0	Trace	Trace	Trace	Trace
IDAHO -- WHEAT									
1966	944	38.5	38,278	0	0	Trace	Trace	Trace	36.0
1967	1,285	44.3	56,905	Trace	Trace	Trace	Trace	Trace	42.5
1968	1,236	45.6	56,364	0	0	Trace	Trace	0.5	283.2
1969	1,051	45.6	47,982	0	0	0.5	241.1	Trace	Trace
1970	929	46.0	42,734	0	0	Trace	Trace	Trace	Trace
1971	987	51.3	50,623	0	0	Trace	Trace	Trace	Trace
1972	958	46.2	44,226	0	0	Trace	Trace	Trace	Trace
1973	1,075	45.0	48,395	0	0	Trace	Trace	Trace	Trace
1974	1,440	43.0	61,860	Trace	Trace	3.9	2,538.5	Trace	Trace
1975	1,350	44.5	60,050	Trace	Trace	Trace	Trace	Trace	Trace
1976	1,430	47.8	68,320	Trace	Trace	1.0	742.6	7.0	5,198.3
OREGON -- WHEAT									
1958	821	34.3	28,147	2.2	287.8				
1959	814	35.0	28,464	Trace	Trace	Trace	Trace		
1960	802	33.1	26,542	Trace	Trace				
1961	796	25.9	20,602	Trace	Trace				
1962	687	36.8	25,264	0	0	Trace	Trace		
1963	789	35.5	27,998	0	0	0	0	5.0	1,473.6
1964	791	34.6	27,385						
1965	810	37.4	30,303	Trace	Trace	Trace	Trace		
1966	785	33.8	26,510	Trace	Trace	1.0	268.0		
1967	1,058	30.2	31,988	0	0	0	0	8.0	2,781.6
1968	982	30.7	30,162	0	0	0	0	0.5	151.5
1969	788	38.1	30,030	0	0	0.8	248.0	2.4	728.6
1970	708	42.7	30,216	Trace	Trace	Trace	Trace	6.7	2,175.0
1971	768	44.5	34,200	0	0	Trace	Trace	1.4	487.5
1972	879	41.9	36,848	Trace	Trace	Trace	Trace	Trace	Trace
1973	1,012	34.8	35,276	0	0	Trace	Trace	Trace	Trace
1974	1,230	42.9	52,770	Trace	Trace	0.5	265.2	0.9	480.0
1975	1,215	46.4	56,370	0	0	Trace	Trace	0.9	527.0
1976	1,333	45.2	60,301	0	0	2.0	1,325.3	7.0	4,638.5

Table 1.--Estimated loss of yield caused by wheat rusts by States
and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
COLORADO -- WHEAT							
1918	1,225	17.2	21,025	.5	105.6		
1919	1,529	13.8	18,300	1.0	185.0	0.1	18.5
1920	1,410	15.6	21,967	1.0	221.9	Trace	Trace
1921	1,751	14.5	25,374	Trace	Trace	Trace	Trace
1922	1,878	12.0	22,587	Trace	Trace	Trace	Trace
1923	1,538	11.8	18,136	10.0	2,037.8	1.0	203.8
1924	1,360	13.0	17,264	0	0	0	0
1925	1,487	11.5	17,122	Trace	Trace	0	0
1926	1,685	12.4	20,890	Trace	Trace	Trace	Trace
1927	1,668	13.4	22,299	Trace	Trace	Trace	Trace
1928	1,481	14.0	20,797	Trace	Trace	Trace	Trace
1929	1,539	11.6	17,900	Trace	Trace	Trace	Trace
1930	1,659	13.3	22,034	Trace	Trace		
1931	1,420	11.7	16,613	Trace	Trace	0	0
1932	704	10.2	7,172	Trace	Trace	Trace	Trace
1933	583	10.1	5,881	0	0	0	0
1934	704	8.8	6,192	0	0	0	0
1935	553	12.5	6,940	6.0	442.9	Trace	Trace
1936	853	12.7	10,811	1.0	109.2	Trace	Trace
1937	1,102	13.6	14,990	Trace	Trace	0	0
1938	1,273	15.1	19,166	0.4	78.5	2.0	392.7
1939	1,060	11.4	12,064	Trace	Trace	Trace	Trace
1940	1,028	12.0	12,354	Trace	Trace	Trace	Trace
1941	1,368	18.3	25,036	0.1	34.2	Trace	Trace
1942	1,237	22.2	27,406	0	0	0.9	248.9
1943	1,410	22.4	31,616	Trace	11.2	Trace	Trace
1944	1,256	14.2	17,794	13.0	2,658.9	Trace	Trace
1945	1,560	22.3	34,768	Trace	Trace	Trace	Trace
1946	2,004	18.9	37,776	0	0	0	0
1947	2,523	23.4	59,052	Trace	Trace	Trace	Trace
1948	3,074	21.0	64,605	0	0	0	0
1949	2,838	16.3	46,164		428.1	Trace	Trace
1950	2,314	16.0	36,909	Trace	Trace	0	0
1951	2,659	14.0	37,334	Trace	Trace	Trace	Trace
1952	3,305	17.6	58,162	0	0	Trace	Trace
1953	2,813	15.6	43,875	.6	264.4	Trace	Trace
1954	1,740	10.7	18,608	Trace	Trace	0	0
1955	1,299	13.6	17,712	Trace	Trace	0	0
1956	1,578	11.2	17,652	0	0	0	0
1957	1,488	24.5	36,522	0.5	183.5	Trace	Trace
1958	2,648	25.4	67,205	0	0	0	0
1959	2,475	22.0	54,562	0	0	Trace	Trace
1960	2,452	27.0	66,121	Trace	Trace	1.0	667.9
1961	2,459	23.0	56,557	1.5	870.1	1.0	580.1
1962	1,899	19.1	36,207	1.0	367.6	0.5	183.8
1963	1,697	13.1	22,261	Trace	Trace	Trace	Trace
1964	1,777	15.6	27,664	Trace	Trace	Trace	Trace
1965	1,329	15.7	20,809	Trace	Trace	Trace	Trace
1966	2,371	18.1	42,808	0	0	8.0	3,722.4
1967	1,945	19.5	38,029	1.0	388.0	1.0	388.0
1968	1,933	20.0	38,745	0.5	205.6	5.0	2,050.0
1969	2,145	21.0	45,045	0.5	234.8	4.9	2,347.8
1970	2,420	28.5	68,944	Trace	Trace	1.0	696.4
1971	2,541	27.9	70,920	Trace	Trace	2.0	1,447.3
1972	2,146	24.0	51,519	0.5	272.0	4.8	2,611.3
1973	2,432	24.5	59,568	Trace	Trace	4.9	3,094.7
1974	2,654	25.5	67,809	Trace	Trace	5.0	3,529.7
1975	2,260	22.5	50,950	Trace	Trace	2.0	1,028.6
1976	2,223	21.6	47,990	Trace	Trace	Trace	Trace

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Losses in yield					
		Crop production		Stem rust		Leaf rust	
		bu/A	1,000 bu	%	1,000 bu	%	1,000 bu
ILLINOIS -- WHEAT							
1918	2,900	20.0	58,050	Trace	Trace		
1919	4,103	17.2	70,476	1.0	719.3	1.0	719.3
1920	2,990	15.4	45,907	0.5	231.9	0.5	231.9
1921	2,909	16.2	47,180	0.5	238.0	0.4	190.4
1922	3,196	17.4	55,764	0.5	311.5	10.0	6,230.6
1923	3,429	18.0	61,808	1.5	970.8	3.0	1,941.6
1924	2,363	16.1	37,968	0.75	294.0	2.4	940.8
1925	2,284	16.1	36,814	Trace	Trace	1.5	560.6
1926	2,263	19.0	43,047	1.0	439.2	1.0	439.2
1927	2,458	13.9	34,091	0.8	282.0	2.5	881.3
1928	1,462	15.9	23,264	Trace	Trace	0.8	187.6
1929	2,093	14.7	30,831	0.5	155.7	0.5	155.7
1930	2,025	18.2	36,891	Trace	Trace	1.5	561.8
1931	1,420	11.7	16,613	Trace	Trace	0	0
1932	1,669	15.6	25,983	Trace	Trace	10.0	2,887.0
1933	1,874	16.4	30,746	0	0	5.0	1,618.2
1934	2,080	17.6	36,522	0	0	2.0	745.3
1935	2,074	14.5	30,060	1.0	347.5	12.5	4,343.9
1936	2,080	17.5	36,400	Trace	Trace	0.5	182.9
1937	2,575	17.4	44,922	11.0	5,882.6	5.0	2,673.9
1938	2,212	18.5	40,908	1.7	830.9	15.0	7,331.2
1939	1,948	20.4	39,804	Trace	Trace	10.0	4,422.6
1940	1,745	22.5	39,285	5.0	2,310.9	10.0	4,621.7
1941	1,716	20.0	34,320	2.0	703.2	4.0	1,406.4
1942	981	13.1	12,818	Trace	Trace		
1943	1,028	16.5	16,986	1.0	171.6		
1944	1,247	19.5	24,320	1.5	370.3		
1945	1,339	18.5	24,817	1.0	288.6	13.0	3,751.4
1946	1,207	16.0	19,361	0.2	46.76	17.0	3,974.9
1947	1,347	21.0	28,311	Trace	Trace	9.9	3,110.8
1948	1,710	22.5	38,497	4.0	1,949.2	17.0	8,284.2
1949	1,913	23.0	43,995	Trace	Trace	10.0	5,499.3
1950	1,417	19.5	27,632	1.5	479.16	12.0	5,749.9
1951	1,757	19.0	33,383	Trace	Trace		
1952	1,845	23.0	42,435	0.5	231.2	8.0	3,710.2
1953	2,122	28.0	59,416	0.3	178.8		
1954	1,592	30.0	47,760	0.04	19.1		
1955	1,576	33.0	52,008	0.8	524.3		
1956	1,623	37.5	60,862	1.0	614.8		
1957	1,737	21.0	36,477	Trace	Trace		
1958	1,694	31.5	53,361	Trace	Trace	0	0
1959	1,660	26.0	43,160	0.4	173.3		
1960	1,627	29.0	47,183	Trace	Trace	0.5	232.3
1961	1,703	36.0	61,308	1.5	957.9	2.5	1,596.5
1962	1,522	32.5	49,465	3.0	1,595.6	4.0	2,127.5
1963	1,737	40.0	69,480	Trace	Trace	1.0	695.8
1964	1,806	36.0	66,822	0.6	409.5	1.5	1,023.8
1965	1,603	35.5	56,906	Trace	Trace	Trace	Trace
1966	1,424	41.0	58,384	0	0	Trace	Trace
1967	1,964	39.0	76,596	0	0	0	0
1968	1,476	36.0	53,136	0	0	Trace	0
1969	1,301	37.0	48,137	Trace	Trace	Trace	Trace
1970	993	36.0	35,748	0	0	Trace	Trace
1971	983	44.0	43,252	0.5	219.5	1.0	439.1
1972	1,200	45.0	54,000	Trace	Trace	0	0
1973	1,260	30.0	37,800	Trace	Trace	Trace	Trace
1974	1,790	30.0	53,700	Trace	Trace	Trace	Trace
1975	1,730	39.0	67,470	Trace	Trace	Trace	Trace
1976	1,850	39.0	72,150	Trace	Trace	1.0	228.8

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
INDIANA -- WHEAT							
1918	2,350	22.0	51,707	Trace	Trace	Trace	Trace
1919	2,799	16.1	45,122	1.0	460.4	1.0	460.4
1920	2,108	12.0	25,326	0.1	25.4	0.1	25.4
1921	2,123	12.0	25,488	1.0	277.0	7.0	1,939.3
1922	1,996	14.5	28,944	0.7	226.9	10.0	3,241.2
1923	2,435	17.0	36,307	Trace	Trace	2.0	740.9
1924	1,730	16.5	28,543	Trace	Trace	Trace	Trace
1925	1,816	14.5	26,344	Trace	Trace	Trace	Trace
1926	1,764	20.5	36,147	0.5	191.2	5.0	1,912.5
1927	1,872	15.5	29,020	Trace	Trace	13.0	4,336.3
1928	961	10.5	10,129	Trace	Trace	1.0	102.3
1929	1,568	16.5	25,916	0.5	135.7	4.0	1,085.4
1930	1,587	18.0	28,584	Trace	Trace	Trace	Trace
1931	1,729	25.9	44,802	0.5	256.0	12.0	6,144.3
1932	1,470	16.5	24,231	Trace	Trace	10.0	2,692.3
1933	1,577	15.0	23,641	0	0	5.0	1,244.2
1934	1,845	17.3	13,891	0	0	0	0
1935	1,906	15.5	29,534	Trace	Trace	15.0	5,211.9
1936	1,775	17.5	31,042	Trace	Trace	0	0
1937	2,129	16.0	34,046	12.0	5,237.8	10.0	4,364.8
1938	1,769	16.0	28,286	Trace	Trace	3.0	874.8
1939	1,512	17.5	26,445	Trace	Trace	5.0	1,391.8
1940	1,433	19.5	27,934	5.0	1,470.2		
1941	1,476	23.5	34,665	Trace	Trace		
1942	1,123	12.5	14,052	Trace	Trace	7.0	1,057.6
1943	955	16.0	15,274	Trace	Trace		
1944	1,266	20.2	25,568	Trace	Trace	1.0	
1945	1,555	22.5	34,980	Trace	Trace	12.0	4,770.0
1946	1,366	21.5	29,369	Trace	Trace		
1947	1,571	23.0	36,133	Trace	Trace	Trace	Trace
1948	1,775	21.5	38,162	3.0	1,192.6	1.0	397.5
1949	1,722	22.0	37,884	Trace	Trace		
1950	1,533	21.0	32,193	Trace	Trace		
1951	1,426	16.5	23,529	0	0		
1952	1,540	24.0	36,960	0.5	189.5	2.0	758.2
1953	1,648	28.0	46,144	1.0	466.1	Trace	Trace
1954	1,318	30.5	40,199	0.5	212.7	5.0	2,126.9
1955	1,186	29.0	34,394	0.5	178.2	3.0	1,069.2
1956	1,186	30.5	36,173	0.5	181.8		
1957	1,281	25.5	32,666	Trace	Trace	3.0	1,013.3
1958	1,281	32.0	40,992	Trace	Trace		
1959	1,217	26.0	31,642	Trace	Trace	Trace	Trace
1960	1,280	33.0	42,240	Trace	Trace	Trace	Trace
1961	1,290	35.0	45,150	Trace	Trace	0	0
1962	1,096	35.5	38,908	Trace	Trace	Trace	Trace
1963	1,330	41.0	54,530	0	0	0	0
1964	1,410	36.5	51,465	1.0	519.8	Trace	Trace
1965	1,156	34.0	39,304	Trace	Trace	Trace	Trace
1966	958	44.0	42,152	0	0	Trace	Trace
1967	1,308	37.0	48,396	0	0	0	0
1968	1,014	35.0	35,490	0	0	5.0	1,867.8
1969	899	39.0	35,061	0	0	3.0	1,084.4
1970	744	38.5	29,799	Trace	Trace	1.0	301.0
1971	735	45.0	33,075	1.0	337.5	1.0	337.5
1972	826	48.0	39,648	0	0	0.5	199.2
1973	703	35.0	24,605	Trace	Trace	Trace	Trace
1974	1,390	36.0	50,040	0	0	Trace	Trace
1975	1,500	43.0	64,500	Trace	Trace	Trace	Trace
1976	1,600	36.0	57,600	Trace	Trace	Trace	Trace

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
IOWA -- WHEAT							
1918	1,060	19.0	20,142	Trace	Trace		
1919	1,438	14.3	20,501	8.0	1,812.2	1.5	339.8
1920	613	17.4	10,684	7.0	812.9	1.0	116.1
1921	563	17.9	10,053	10.0	1,117.0		
1922	739	22.5	16,612	1.0	167.8	Trace	Trace
1923	737	18.6	13,689	1.0	140.4	1.5	210.6
1924	455	21.9	9,983	Trace	Trace	Trace	Trace
1925	396	16.3	6,441	0.1	6.8	5.0	339.4
1926	387	21.2	8,222	1.0	88.4	6.0	530.4
1927	432	18.1	8,180	0.6	58.1	15.0	1,453.6
1928	463	18.8	8,709	0	0	3.0	269.3
1929	426	18.8	8,000	0.3	26.2	8.0	697.8
1930	435	20.5	8,919	0	0		
1931	357	20.5	7,321	Trace	Trace	Trace	Trace
1932	273	15.9	4,350	Trace	Trace	0.2	8.7
1933	251	17.1	4,303	0	0	Trace	Trace
1934	298	12.2	3,632	0	0		
1935	401	15.8	6,318	6.5	491.8	10.0	756.6
1936	407	20.7	8,407	0.5	42.7	1.0	85.4
1937	817	17.9	14,649	19.0	3,711.1	6.0	1,171.9
1938	583	15.9	9,284	1.0	130.8	28.0	3,661.3
1939	392	17.7	6,930	Trace	Trace	3.0	214.3
1940	312	24.8	7,733	2.0	157.8		
1941	181	12.9	2,341	1.0	23.6	Trace	Trace
1942	178	23.6	4,192	Trace	Trace	Trace	Trace
1943	129	19.3	2,494	3.0	77.1		
1944	120	15.9	1,912	3.0	59.1	Trace	Trace
1945	140	19.0	2,660	Trace	Trace	Trace	Trace
1946	185	23.4	4,355	0	0		
1947	201	17.9	3,607	Trace	Trace	Trace	Trace
1948	318	23.3	7,393	Trace	Trace	1.0	74.7
1949	384	18.8	7,212	Trace	Trace	4.0	300.5
1950	250	21.8	5,454	0.5	28.0	2.0	111.9
1951	145	10.3	1,489	Trace	Trace	Trace	Trace
1952	155	21.5	3,329	0.5	16.7	Trace	Trace
1953	137	20.4	2,791	6.0	178.1	1.0	29.7
1954	110	19.4	2,135	15.0	376.6		
1955	115	33.2	3,822	Trace	Trace		
1956	131	19.8	2,592	Trace	Trace		
1957	156	27.6	4,312	Trace	Trace	5.0	226.9
1958	167	31.7	5,288	Trace	Trace	Trace	Trace
1959	165	20.1	3,317	1.0	34.6	3.0	103.6
1960	121	24.7	2,985	Trace	Trace	Trace	Trace
1961	115	26.2	3,008	5.0	170.9	7.0	239.3
1962	88	25.3	2,223	17.0	503.9	8.0	237.1
1963	105	27.6	2,928	Trace	Trace	3.0	90.8
1964	94	27.8	2,612	3.0	83.4	3.0	83.4
1965	41	19.0	779	Trace	Trace	Trace	Trace
1966	52	33.0	1,716	Trace	Trace	Trace	Trace
1967	65	26.0	1,690	0.5	8.49	Trace	Trace
1968	49	38.0	1,862	0	0	1.0	18.8
1969	43	32.0	1,376	0	0	Trace	Trace
1970	40	35.0	1,400	0	0	1.0	14.1
1971	36	37.0	1,332	0	0	Trace	Trace
1972	33	37.5	1,238	0	0	Trace	Trace
1973	27	31.0	837	0	0	Trace	Trace
1974	41	30.0	1,230	0	0	2.0	25.1
1975	75	34.0	2,550	Trace	Trace	1.0	25.8
1976	85	35.0	2,975	Trace	Trace	Trace	Trace

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
KANSAS -- WHEAT							
1918	7,250	13.5	97,710	Trace	Trace	Trace	Trace
1919	11,624	13.2	153,311	10.0	17,323.3	1.5	2,598.5
1920	9,294	15.6	144,933	Trace	Trace	Trace	Trace
1921	10,554	12.7	133,964	Trace	Trace	1.0	1,353.2
1922	9,756	12.8	124,809	0.03	37.8	1.0	1,261.1
1923	8,299	10.1	83,804	1.0	855.1	1.0	855.1
1924	9,817	16.0	157,022	Trace	Trace	Trace	Trace
1925	8,755	9.2	80,539	Trace	Trace	0	0
1926	10,409	14.8	153,991	Trace	Trace	Trace	Trace
1927	10,202	11.2	114,216	0.05	62.1	8.0	9,937.2
1928	10,639	16.3	173,185	Trace	Trace	4.0	7,216.0
1929	12,550	12.4	155,563	1.0	1,620.4	3.0	4,861.3
1930	13,132	14.2	186,277	1.5	2,925.8	3.0	5,851.6
1931	13,623	18.5	251,885	0.8	2,073.1	2.0	5,182.8
1932	10,365	11.6	120,178	0.5	613.2	1.5	1,839.4
1933	7,361	9.1	66,931	Trace	Trace	Trace	Trace
1934	8,610	9.8	84,323	Trace	Trace	Trace	Trace
1935	6,888	9.3	64,055	12.0	9,260.9	5.0	3,858.7
1936	10,458	11.5	120,234	0.5	605.4	0.2	242.2
1937	13,172	12.0	158,052	6.6	11,216.5	0.4	679.8
1938	14,494	10.5	152,163	3.0	5,370.4	12.0	21,481.8
1939	9,574	12.0	114,858	0.2	233.7	1.5	1,752.7
1940	8,739	14.5	126,533	7.0	9,525.5		
1941	11,799	14.7	173,332	Trace	Trace	5.0	9,122.7
1942	10,374	19.3	202,101	Trace	Trace	Trace	Trace
1943	10,159	14.2	144,241	Trace	Trace	Trace	Trace
1944	11,377	16.5	187,700	4.0	8,730.2	Trace	Trace
1945	13,416	15.5	207,939	Trace	Trace	8.0	18,081.6
1946	13,147	16.2	212,977	0	0	2.0	4,346.5
1947	14,855	19.3	286,702	Trace	Trace	Trace	Trace
1948	13,221	17.5	231,368	Trace	Trace	0	0
1949	14,279	11.0	157,069	Trace	Trace	10.0	17,452.1
1950	12,280	14.5	178,060	Trace	Trace	Trace	Trace
1951	9,701	13.0	126,113	Trace	Trace	2.0	2,573.7
1952	14,649	21.0	307,629	Trace	Trace	1.0	3,107.4
1953	11,573	12.5	144,662	1.5	2,203.0	Trace	Trace
1954	10,069	17.5	176,208	3.0	5,593.9	2.5	4,661.6
1955	8,559	15.0	128,385	1.0	1,330.4	2.5	3,326.9
1956	9,244	15.5	143,282	Trace	Trace	Trace	Trace
1957	5,269	19.0	100,111	3.0	3,452.1	10.0	11,507.2
1958	10,433	23.5	297,340	0	0	0.5	1,494.2
1959	10,329	20.5	211,744	Trace	Trace	10.0	23,527.1
1960	10,380	28.0	290,640	2.0	5,992.6	1.0	2,996.3
1961	10,329	26.5	273,718	7.0	20,826.3	1.0	2,975.2
1962	8,986	23.5	211,171	4.0	8,798.8	Trace	Trace
1963	8,627	21.5	185,480	Trace	Trace		
1964	9,576	22.5	215,460	Trace	Trace	0.6	1,200.0
1965	10,151	24.0	243,624	2.0	4,972.0	2.0	4,972.0
1966	10,260	19.5	200,070	Trace	Trace	Trace	Trace
1967	11,081	20.0	221,620	0	0	Trace	Trace
1968	9,751	25.0	243,775	0	0	8.0	21,197.8
1969	9,849	31.0	305,319	0	0	Trace	Trace
1970	9,061	33.0	299,013	0	0	1.0	3,020.3
1971	9,061	34.5	312,605	Trace	Trace	2.0	6,379.7
1972	9,400	33.5	314,900	Trace	31.8	1.0	3,181.1
1973	10,400	37.0	384,800	Trace	Trace	8.0	33,460.9
1974	11,600	27.5	319,000	0.5	1,887.6	15.0	56,627.2
1975	12,100	29.0	350,900	Trace	Trace	8.0	30,513.0
1976	11,300	30.0	339,000	Trace	Trace	Trace	Trace

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Losses in yield					
		Crop production		Stem rust		Leaf rust	
		bu/A	1,000 bu	%	1,000 bu	%	1,000 bu
MICHIGAN -- WHEAT							
1918	760	14.2	10,815	0.5	54.3	Trace	Trace
1919	1,056	19.3	20,401	8.0	1,793.5	1.0	224.2
1920	1,055	15.3	16,140	8.0	1,403.5	Trace	Trace
1921	925	15.9	14,680	5.0	772.6		
1922	1,023	15.0	15,354	2.0	319.9	2.0	319.9
1923	910	17.5	15,917	2.0	324.8	Trace	Trace
1924	793	23.8	18,856	Trace	Trace	0.5	94.8
1925	801	17.0	13,627	0.5	68.5	0	0
1926	898	18.5	16,598	3.5	614.7	2.0	351.3
1927	801	21.5	17,201	1.0	175.5	1.0	175.5
1928	785	16.5	12,959	Trace	Trace	1.5	197.3
1929	790	17.4	13,760	Trace	Trace	1.0	139.0
1930	724	22.0	16,575	1.0	167.4	Trace	Trace
1931	734	25.8	18,965	Trace	Trace	0.1	19.0
1932	734	23.8	17,484	0.3	52.9	0.5	88.1
1933	885	16.4	14,528	Trace	Trace	Trace	Trace
1934	855	14.2	12,126	0	0	Trace	Trace
1935	874	21.9	19,108	0.5	96.0	Trace	Trace
1936	821	20.3	16,705	Trace	Trace	0.1	16.7
1937	1,009	18.5	18,647	2.5	504.0	5.0	1,007.9
1938	910	21.4	19,488	1.0	197.0	0.1	19.7
1939	747	21.5	16,036	Trace	Trace	0.1	16.0
1940	779	23.5	18,290	1.0	184.7		
1941	741	22.0	16,286	0.3	49.0		
1942	681	22.5	15,322	Trace	Trace	Trace	Trace
1943	673	17.0	11,417	1.0	118.9	3.0	356.8
1944	987	24.0	23,670	Trace	Trace	Trace	Trace
1945	1,026	27.0	27,688	0.5	139.1		
1946	864	26.5	22,896	Trace	Trace		
1947	1,192	25.0	29,800	Trace	Trace	Trace	Trace
1948	1,395	26.0	36,270	0.5	182.3	Trace	Trace
1949	1,297	26.5	34,370	Trace	Trace	Trace	Trace
1950	1,141	26.0	29,666	0.3	89.3	Trace	Trace
1951	1,232	25.0	30,800	Trace	Trace	Trace	Trace
1952	1,429	25.5	36,440	Trace	Trace	Trace	Trace
1953	1,515	29.0	43,935	Trace	Trace	Trace	Trace
1954	1,030	29.0	29,870	Trace	Trace	Trace	Trace
1955	948	29.5	27,966	Trace	Trace	Trace	Trace
1956	1,043	30.0	31,290	0.5	157.2	0	0
1957	991	29.0	28,739	Trace	Trace	Trace	Trace
1958	1,090	38.0	41,420	Trace	Trace	0	0
1959	1,112	32.0	35,584	1.0	359.4	Trace	Trace
1960	1,144	31.0	35,464	Trace	Trace	0.5	170.5
1961	1,111	36.0	39,996	0.3	120.4	Trace	Trace
1962	922	32.5	29,965	0.5	150.6	Trace	Trace
1963	1,060	38.0	40,280	Trace	Trace	Trace	Trace
1964	1,007	39.0	39,273	Trace	Trace	Trace	Trace
1965	836	33.0	27,588	Trace	Trace	Trace	Trace
1966	762	40.0	30,480	Trace	Trace	Trace	Trace
1967	1,120	36.0	40,320	Trace	Trace	Trace	Trace
1968	885	36.0	31,860	0	0	Trace	Trace
1969	628	40.0	25,120	Trace	Trace	Trace	Trace
1970	565	39.0	22,035	Trace	Trace	Trace	Trace
1971	570	36.0	20,520	Trace	Trace	Trace	Trace
1972	535	40.0	21,400	Trace	Trace	Trace	Trace
1973	568	35.0	19,880	Trace	Trace	5.0	1,046.3
1974	940	40.0	37,600	Trace	Trace	2.0	767.3
1975	1,020	38.0	38,760	Trace	Trace	Trace	Trace
1976	990	38.0	37,620	Trace	Trace	Trace	Trace

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
MINNESOTA -- WHEAT							
1918	3,450	20.0	68,860	0.1	68.9		
1919	3,878	9.5	36,790	20.0	9,313.8	1.0	465.7
1920	2,630	9.9	26,120	30.0	11,194.2	Trace	Trace
1921	2,348	9.9	23,225	7.0	1,748.1		
1922	2,101	13.0	27,330	5.0	1,446.0	0.5	144.6
1923	1,871	12.8	23,864	15.0	4,211.2	Trace	Trace
1924	1,710	21.9	37,375	1.0	377.5	Trace	Trace
1925	2,232	13.4	29,798	11.0	3,682.8	Trace	Trace
1926	1,872	12.6	23,589	5.0	1,241.5	Trace	Trace
1927	1,786	11.7	20,976	30.0	9,392.1	3.0	939.2
1928	1,544	14.0	21,634	2.0	443.8	0.5	110.9
1929	1,434	14.9	21,406	15.0	3,799.8	0.5	126.7
1930	1,368	17.1	23,456	3.7	901.2	Trace	Trace
1931	1,207	14.7	17,776	1.0	179.6	Trace	Trace
1932	1,441	14.3	20,558	1.5	316.3	1.0	210.8
1933	1,588	10.2	16,266	Trace	Trace	Trace	Trace
1934	1,224	10.7	13,104	5.0	689.6	Trace	Trace
1935	1,774	10.6	18,716	51.6	22,258.2	5.0	2,156.5
1936	1,760	9.9	17,348	Trace	Trace	Trace	Trace
1937	2,115	16.6	35,066	10.0	3,940.0	1.0	394.0
1938	2,554	14.9	38,017	Trace	Trace	8.0	3,305.8
1939	1,548	13.6	21,016	Trace	Trace	2.0	428.9
1940	1,588	19.8	31,406	Trace	Trace	Trace	Trace
1941	1,471	13.7	20,104	Trace	Trace	2.0	410.3
1942	1,112	20.8	23,170	Trace	Trace	Trace	Trace
1943	1,102	16.2	17,896	Trace	Trace	Trace	Trace
1944	1,214	16.5	20,090	Trace	Trace	Trace	Trace
1945	1,100	19.3	21,246	Trace	Trace	Trace	Trace
1946	1,391	19.5	27,080	Trace	Trace	Trace	Trace
1947	1,169	17.7	20,633	Trace	Trace	4.0	859.7
1948	1,051	17.5	18,352	Trace	Trace	Trace	Trace
1949	1,285	15.1	19,380	Trace	Trace	2.0	395.5
1950	927	16.7	15,512	Trace	Trace	Trace	Trace
1951	1,076	18.6	20,022	Trace	Trace	Trace	Trace
1952	1,155	14.7	16,998	2.3	394.3	Trace	Trace
1953	997	16.2	16,171	13.4	2,495.0	Trace	Trace
1954	726	14.3	10,399	18.0	2,285.2	Trace	Trace
1955	634	19.2	12,186	2.4	290.6	Trace	Trace
1956	727	23.7	17,218	Trace	Trace	Trace	Trace
1957	699	22.6	15,780	Trace	Trace	0.9	146.3
1958	806	31.4	25,345	Trace	Trace	Trace	Trace
1959	970	22.9	22,252	Trace	Trace	1.0	230.1
1960	967	27.4	26,543	Trace	Trace		
1961	1,022	24.0	24,560	Trace	Trace		
1962	731	24.6	17,982	0.02	5.0	6.7	1,200.3
1963	877	24.7	21,697	Trace	Trace		
1964	925	23.0	21,280	Trace	Trace	1.8	384.3
1965	797	27.8	22,124	Trace	Trace	9.0	2,200.0
1966	799	22.9	18,318	Trace	Trace	1.8	334.0
1967	1,052	32.1	33,795	Trace	Trace	0.3	96.7
1968	1,018	32.9	33,532	Trace	Trace	2.8	964.9
1969	838	29.4	24,607	Trace	Trace	0.2	41.4
1970	830	27.6	22,882	Trace	Trace	1.9	438.3
1971	1,508	37.8	57,014	Trace	Trace	1.0	551.6
1972	1,498	32.9	49,292	Trace	Trace	0.5	238.8
1973	2,010	38.9	78,152	Trace	Trace	Trace	Trace
1974	2,794	28.9	80,862	Trace	Trace	0.5	394.5
1975	2,844	30.9	87,839	Trace	Trace	Trace	69.0
1976	4,056	32.2	130,482	Trace	Trace	Trace	Trace

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Losses in yield					
		Crop production		Stem rust		Leaf rust	
		bu/A	1,000 bu	%	1,000 bu	%	1,000 bu
MISSOURI -- WHEAT							
1918	3,100	17.2	53,268	Trace	Trace		
1919	4,577	14.3	65,346	4.0	2,780.7	2.0	1,390.3
1920	3,065	13.0	39,845	0.5	202.3	1.0	404.5
1921	3,249	10.8	35,096	Trace	Trace		
1922	3,021	12.5	37,770	0	0		
1923	2,810	13.3	37,371			1.0	377.5
1924	1,688	13.3	22,449				
1925	2,711	12.1	32,693	Trace	Trace	Trace	Trace
1926	1,408	16.0	22,528	Trace	Trace		
1927	1,562	10.0	15,628	Trace	Trace	Trace	Trace
1928	1,521	13.0	19,745	Trace	Trace	Trace	Trace
1929	1,534	9.9	15,250	Trace	Trace	1.0	154.0
1930	1,336	14.5	19,342	Trace	Trace	0.5	97.2
1931	1,596	20.0	31,913	Trace	Trace	0.2	63.9
1932	1,404	11.5	16,143				
1933	1,362	12.5	17,019	Trace	Trace	0.4	68.3
1934	1,643	15.1	24,776				
1935	2,145	12.5	26,795	4.0	1,177.8	5.0	1,472.2
1936	2,175	15.0	32,619	Trace	Trace	Trace	Trace
1937	3,264	13.3	43,409	30.0	18,603.6		
1938	2,499	13.0	32,487	5.0	2,165.8	20.0	8,663.2
1939	1,918	16.7	32,031	Trace	Trace		
1940	1,713	19.0	32,547	3.0	1,006.6		
1941	1,336	13.5	18,036	1.5	274.6	Trace	Trace
1942	695	13.0	9,035	1.0	91.3	Trace	Trace
1943	931	13.0	12,103	Trace	Trace	Trace	Trace
1944	1,207	16.3	19,674	Trace	Trace	Trace	Trace
1945	1,304	14.0	18,256	Trace	Trace	10.0	2,028.4
1946	1,213	15.0	18,195	Trace	Trace	Trace	Trace
1947	1,321	18.5	24,438	Trace	Trace	Trace	Trace
1948	1,598	21.0	33,558	Trace	Trace	Trace	Trace
1949	1,678	17.5	29,365	Trace	Trace		
1950	1,359	17.5	23,782	Trace	Trace	0.5	119.5
1951	1,315	17.0	22,406	Trace	Trace	Trace	Trace
1952	1,252	22.0	27,544	0.5	138.4		
1953	1,578	26.0	41,028	2.0	837.3		
1954	1,373	30.0	41,190	1.0	416.1		
1955	1,551	32.0	49,632	0	0		
1956	1,660	30.0	49,800	Trace	Trace		
1957	1,643	23.0	37,789	Trace	Trace	10.0	4,198.8
1958	1,446	28.0	40,488	Trace	Trace		
1959	1,518	25.0	37,950	1.5	596.1	3.0	1,192.1
1960	1,321	28.5	37,648	1.5	573.3	Trace	Trace
1961	1,413	30.5	43,096	0.5	216.6	0	0
1962	976	27.0	26,352	Trace	Trace	0	0
1963	1,191	33.0	39,303	Trace	Trace	3.0	1,215.6
1964	1,429	32.5	46,442	0.5	251.0	7.0	3,514.5
1965	1,186	27.5	32,615	Trace	Trace		
1966	1,210	34.0	41,140	Trace	Trace	Trace	Trace
1967	1,682	32.0	53,824	Trace	0	Trace	0
1968	1,278	33.0	42,174	Trace	0	3.0	1,304.4
1969	1,035	32.0	33,120	0	0	Trace	Trace
1970	932	33.5	31,222	0	0	Trace	Trace
1971	848	40.5	34,344	0	0	Trace	Trace
1972	925	39.0	36,075	0	0	1.0	364.4
1973	850	30.0	25,500	0	0	Trace	Trace
1974	1,310	29.0	37,990	Trace	Trace	1.0	383.7
1975	1,470	33.0	48,510	Trace	Trace	2.0	990.0
1976	1,650	33.0	54,450	Trace	Trace	Trace	Trace

Table 1.--Estimated loss of yield caused by wheat rusts by State and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield					
				Stem rust		Leaf rust		Stripe rust	
				%	1,000 bu	%	1,000 bu	%	1,000 bu
MONTANA -- WHEAT									
1918	2,386	12.6	29,961	0	0				
1919	1,698	5.0	8,493	0	0	0	0		
1920	3,608	12.4	44,768	0	0	0	0		
1921	3,435	12.2	42,034	2.5	1,089.0	1.0	435.6		
1922	3,358	15.6	52,533	0	0	Trace	Trace		
1923	3,274	15.0	49,107	18.0	10,779.5				
1924	3,130	16.1	50,422	Trace	Trace	Trace	Trace		
1925	3,249	10.8	34,998	Trace	Trace	0	0		
1926	3,590	12.5	44,773	0.1	44.8	Trace	Trace		
1927	4,020	20.3	81,713	0.1	81.8	Trace	Trace		
1928	4,395	18.0	79,146	0.1	80.0	1.0	800.3		
1929	4,419	9.3	41,290	Trace	Trace	Trace	Trace		
1930	4,217	8.4	35,313	Trace	Trace	0.1	35.3		
1931	2,182	6.6	14,478	0	0	Trace	Trace		
1932	4,021	13.6	54,593	Trace	Trace	0.1	54.6		
1933	3,512	7.6	26,810	0	0	Trace	Trace		
1934	2,481	11.1	27,624	0	0	Trace	Trace		
1935	3,434	9.9	34,157	0.6	206.2	Trace	Trace		
1936	2,239	5.3	11,866	Trace	Trace	Trace	Trace		
1937	2,624	7.8	20,401	0	0	Trace	Trace		
1938	4,249	15.3	64,837	5.0	3,412.4	Trace	Trace		
1939	3,401	13.6	46,112	0	0	0	0		
1940	3,917	13.2	51,676	2.5	1,325.0				
1941	3,703	18.4	68,239	0	0				
1942	3,267	21.4	69,836	Trace	Trace				
1943	3,626	22.1	80,028	Trace	Trace				
1944	4,019	18.8	75,497	Trace	Trace				
1945	3,777	15.1	57,145	Trace	Trace				
1946	4,133	15.2	62,888	0	0				
1947	4,427	14.8	65,346	0	0				
1948	4,875	19.2	93,718	0	0				
1949	5,316	11.5	61,189	0	0				
1950	4,953	18.5	91,434	Trace	Trace				
1951	5,910	16.1	95,033	0	0				
1952	5,772	14.6	84,133	0	0				
1953	5,969	19.1	114,232	3.0	3,532.9				
1954	4,713	17.6	82,865	2.0	1,691.1				
1955	4,628	23.6	109,350	Trace	Trace	Trace	Trace		
1956	4,780	18.2	86,983	Trace	Trace	0	0		
1957	4,235	19.8	83,815	Trace	Trace				
1958	4,360	23.4	101,882	Trace	Trace				
1959	3,966	19.7	77,974	0	0				
1960	4,118	19.3	79,517	0	0				
1961	3,679	14.7	54,048	0	0				
1962	3,465	22.6	78,297	5.0	4,120.9	Trace	Trace		
1963	3,817	23.5	89,869	0.5	451.6	Trace	Trace		
1964	3,724	24.4	90,821	Trace	Trace	Trace	Trace		
1965	3,998	25.6	102,475	4.9	5,279.9	Trace	Trace		
1966	3,802	26.6	101,212	0	0	0.3	304.5		
1967	4,734	25.2	119,136	0.3	359.2	0.2	239.5	1.8	219,186
1968	4,550	27.7	125,869	Trace	Trace	Trace	Trace	0	0
1969	3,645	26.6	96,794	Trace	Trace	Trace	Trace	Trace	Trace
1970	3,383	25.2	85,167	Trace	Trace	Trace	Trace		
1971	4,314	26.0	112,011	Trace	Trace	Trace	Trace	Trace	Trace
1972	3,704	26.7	98,831	Trace	Trace	0.2	198.0	Trace	Trace
1973	4,052	23.9	96,714	Trace	Trace	0.1	96.8	Trace	Trace
1974	4,857	24.7	120,108	Trace	Trace	Trace	Trace	2.3	2,860.2
1975	4,975	31.3	155,925	Trace	Trace	1.0	1,060.6	Trace	Trace
1976	5,415	30.9	167,295	Trace	Trace	Trace	Trace	Trace	Trace

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
NEBRASKA -- WHEAT							
1918	3,826	11.3	43,198	Trace	Trace		
1919	4,427	13.2	58,304	10.0	6,588.0	1.5	988.2
1920	3,593	16.8	60,480	12.0	8,342.0	1.0	695.2
1921	3,967	15.1	59,814	Trace	Trace		
1922	4,177	13.8	57,773	0.5	290.3		
1923	3,252	9.9	32,168	4.0	1,354.4	1.0	338.6
1924	3,033	18.4	55,686	0	0	Trace	Trace
1925	2,711	12.1	32,693	Trace	Trace	Trace	Trace
1926	3,146	13.1	41,290	Trace	Trace	Trace	Trace
1927	3,733	19.3	72,188	0.1	73.7	2.0	1,474.7
1928	3,757	18.0	67,446	Trace	Trace	Trace	Trace
1929	3,700	15.0	55,403	Trace	Trace	Trace	Trace
1930	3,974	18.8	74,848	1.0	759.9	0.5	379.9
1931	3,420	16.6	56,943	Trace	Trace		
1932	2,265	12.3	27,838	0.8	224.5		
1933	2,388	12.1	28,814	Trace	Trace	Trace	Trace
1934	2,251	7.8	17,543	Trace	Trace		
1935	3,045	12.6	38,512	15.0	6,796.2		
1936	3,325	14.2	47,281	Trace	Trace	Trace	Trace
1937	3,567	13.2	47,031	6.0	3,001.9		
1938	4,691	11.8	55,570	5.0	3,704.7	20.0	14,818.6
1939	3,186	11.1	35,242	Trace	Trace	Trace	Trace
1940	2,643	13.1	34,725	1.3	457.4		
1941	2,354	15.4	36,155	Trace	Trace	Trace	Trace
1942	2,947	23.7	69,908	Trace	Trace	Trace	Trace
1943	2,948	20.8	61,244	Trace	Trace		
1944	2,675	12.6	33,762	20.0	8,440.5	Trace	Trace
1945	3,596	22.9	82,358	Trace	Trace	Trace	Trace
1946	3,954	22.9	90,677	Trace	Trace		
1947	4,434	20.9	92,757	2.5	2,378.4	Trace	Trace
1948	4,275	20.4	87,111	Trace	Trace	Trace	Trace
1949	4,165	14.0	58,213	Trace	Trace	Trace	Trace
1950	4,051	21.8	88,482	Trace	Trace		
1951	4,005	14.5	58,073	Trace	Trace		
1952	4,390	22.4	98,367	Trace	Trace	Trace	Trace
1953	3,856	22.3	85,980	2.0	1,786.1		
1954	3,060	19.5	59,670	5.0	3,140.5		
1955	3,121	25.0	78,025	Trace	Trace	2.5	
1956	3,531	19.5	64,506	Trace	Trace	0	0
1957	2,911	27.0	78,597	2.0	1,604.0	Trace	Trace
1958	3,435	33.0	113,355	Trace	Trace	Trace	Trace
1959	3,092	22.0	68,024	5.4	3,967.0	2.0	1,469.3
1960	3,011	28.5	85,712	5.0	4,535.0	0.5	453.5
1961	3,220	24.5	78,807	15.0	13,907.1		
1962	2,760	19.5	53,820	30.0	23,065.5	Trace	Trace
1963	2,953	21.5	63,490	Trace	Trace		
1964	2,953	25.0	73,825	0.5	371.0	Trace	Trace
1965	2,805	20.0	56,100	15.0	10,518.7	5.0	3,506.2
1966	2,945	35.0	103,075	Trace	Trace	Trace	Trace
1967	3,325	26.5	88,112	0	0	Trace	Trace
1968	3,159	32.0	101,088	0	0	2.0	2,063.0
1969	2,717	31.5	85,586	0	0	1.0	864.5
1970	2,558	38.0	97,204	0	0	2.0	1,983.7
1971	2,558	42.0	107,436	Trace	Trace	3.0	3,322.7
1972	2,556	37.0	94,572	0.5	480.1	1.0	960.1
1973	2,680	35.0	93,800	Trace	Trace	3.0	2,901.0
1974	4,900	34.0	98,600	.05	52.7	6.0	6,327.3
1975	3,070	32.0	98,240	Trace	Trace	3.5	3,563.1
1976	2,950	32.0	94,400	Trace	Trace	Trace	Trace

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
NORTH DAKOTA -- WHEAT							
1918	7,770	13.6	105,672	0.5	531.0		
1919	9,098	6.7	61,256	20.0	15,507.8	1.0	775.4
1920	9,793	8.8	86,214	20.0	21,965.2	1.5	1,647.4
1921	10,734	8.2	87,733	10.0	10,084.2	3.0	3,025.3
1922	9,414	13.8	130,339	10.0	14,644.8	1.0	1,464.5
1923	8,411	8.2	68,655	12.0	9,469.6	1.0	789.1
1924	8,674	15.3	132,715	3.0	4,104.6	Trace	Trace
1925	9,204	12.3	113,531	5.0	5,975.3	Trace	Trace
1926	9,083	8.6	77,733	1.75	1,384.5		
1927	10,336	12.9	133,537	10.0	15,174.6	2.0	3,024.9
1928	10,832	14.4	155,482	0.5	781.3	Trace	Trace
1929	10,440	9.6	99,950	1.0	1,009.6	Trace	Trace
1930	9,896	10.8	107,328	1.5	1,634.4	Trace	Trace
1931	6,295	6.5	41,042	Trace	Trace	Trace	Trace
1932	10,639	10.4	110,396	2.0	2,253.0	Trace	Trace
1933	10,098	7.1	71,314	0	0	Trace	Trace
1934	3,340	6.1	20,908	2.0	426.7	Trace	Trace
1935	7,823	7.0	54,714	56.5	71,117.0	Trace	Trace
1936	3,699	5.2	19,235	Trace	Trace	Trace	Trace
1937	6,725	8.2	54,984	25.0	19,637.0	5.0	3,927.4
1938	8,082	9.0	72,719	6.0	4,737.2	2.0	1,580.7
1939	7,236	10.5	75,753	Trace	Trace	Trace	Trace
1940	8,025	11.6	92,745	Trace	Trace		
1941	8,155	17.3	140,722	Trace	Trace		
1942	7,321	19.6	143,616	Trace	Trace		
1943	8,326	18.2	151,387	Trace	Trace		
1944	9,856	15.9	156,321	Trace	Trace		
1945	9,855	15.7	154,568	Trace	Trace		
1946	10,192	13.7	139,824	0	0		
1947	10,263	14.3	146,383	Trace	Trace	Trace	Trace
1948	9,771	14.4	140,234	Trace	Trace	Trace	Trace
1949	10,552	10.6	112,357	0	0	Trace	Trace
1950	8,942	13.9	123,986	8.2	11,017.9	Trace	Trace
1951	10,485	13.9	145,732	Trace	Trace		
1952	9,854	10.2	100,359	5.6	5,953.5		
1953	9,843	9.9	97,304	37.7	58,882.2	Trace	Trace
1954	7,702	9.0	69,155	42.9	51,957.1	Trace	Trace
1955	7,212	15.0	109,336	8.0	9,507.5	Trace	Trace
1956	6,889	17.2	118,824	0.3	357.5	Trace	Trace
1957	6,353	18.8	119,227	Trace	Trace	Trace	Trace
1958	6,374	23.1	147,372	Trace	Trace	Trace	Trace
1959	6,503	15.0	97,636	Trace	Trace	Trace	Trace
1960	6,440	19.8	127,500	0	0		
1961	5,756	11.9	68,438	0	0	0	0
1962	5,519	28.7	158,395	0.7	1,215.9	3.2	5,206.2
1963	5,644	22.3	125,608	2.6	3,459.5	3.0	3,991.8
1964	6,241	24.2	150,842	Trace	Trace	1.9	2,340.5
1965	6,786	26.5	179,706	0.1	193.0	6.8	13,125.7
1966	6,737	23.4	157,586	0	0	2.6	4,206.6
1967	7,962	22.2	176,855	0	0	1.5	2,643.2
1968	7,903	27.1	213,867	0	0	1.8	4,052.3
1969	6,782	30.0	203,561	0	0	0.01	24.8
1970	6,486	23.6	152,826	0	0	0.7	1,101.3
1971	8,982	31.8	285,231	Trace	Trace	0.9	2,582.6
1972	7,507	28.9	216,818	0	0	0.7	1,528.5
1973	8,913	28.3	252,476	0	0	0.4	974.8
1974	10,036	20.4	205,062	Trace	Trace	0.8	1,757.3
1975	10,213	25.9	264,392	Trace	Trace	0.8	2,170.2
1976	11,655	24.7	287,830	Trace	Trace	Trace	Trace

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
OHIO -- WHEAT							
1918	2,550	18.5	47,213	0.1	47.3	Trace	Trace
1919	2,992	19.9	58,135	1.0	593.2	1.0	593.2
1920	2,393	13.0	31,216	Trace	Trace	Trace	Trace
1921	2,127	12.5	26,606	6.0	1,773.7	4.0	1,182.5
1922	2,106	15.0	31,602	2.0	679.6	5.0	1,699.0
1923	2,062	19.0	39,188	2.0	833.8	4.0	1,667.6
1924	1,857	18.5	34,372	1.0	347.2		
1925	1,599	15.0	24,025	0.1	24.1	0.1	24.1
1926	1,730	22.5	38,937	0.5	195.7	Trace	Trace
1927	1,579	18.0	28,422	Trace	Trace	0.5	142.8
1928	856	11.7	9,984	0.25	25.1	0.5	50.3
1929	1,564	19.5	30,503	1.5	466.9	0.5	155.6
1930	1,661	17.5	29,095	0.5	146.9	0.5	146.9
1931	1,861	28.9	53,825	2.0	1,115.5	1.5	836.6
1932	1,748	20.0	34,911	Trace	Trace	0.5	175.4
1933	2,089	18.0	37,586	Trace	Trace	0.5	188.9
1934	3,543	10.5	37,202	Trace	Trace	0.5	186.9
1935	2,131	22.0	46,872	1.5	724.8	1.5	724.8
1936	2,175	18.5	40,240	Trace	Trace	0.1	40.3
1937	2,430	19.0	46,116	2.0	991.7	5.0	2,479.4
1938	2,379	19.5	46,384	Trace	Trace	2.5	1,189.3
1939	1,904	20.0	38,080	Trace	Trace	0.5	191.4
1940	1,921	22.0	42,262	1.0	431.2	1.0	431.2
1941	1,902	25.0	47,553	Trace	Trace	Trace	Trace
1942	1,655	21.0	34,756	Trace	Trace	1.0	351.1
1943	1,523	16.5	25,129	2.0	518.1	1.0	259.1
1944	1,918	22.7	43,539	Trace	Trace	Trace	Trace
1945	2,129	27.0	57,483	1.0	586.6	1.0	586.6
1946	1,831	26.5	48,522	Trace	Trace	0	0
1947	2,179	22.5	49,028	Trace	Trace	Trace	Trace
1948	2,353	24.5	57,648	0.5	289.7	1.0	
1949	2,353	25.0	58,825	Trace	Trace	2.0	1,200.5
1950	2,118	22.0	46,596	Trace	Trace	0	0
1951	1,906	18.0	34,308	Trace	Trace	Trace	Trace
1952	2,249	24.5	55,100	Trace	Trace	Trace	Trace
1953	2,384	28.5	67,944	1.0	686.3	Trace	Trace
1954	1,740	27.0	46,980	2.0	958.8	0	0
1955	1,496	29.0	43,384	1.0	447.2	2.0	894.5
1956	1,496	26.0	38,896	1.0	400.9	2.0	802.0
1957	1,436	22.0	31,592	1.0	325.7	2.0	651.4
1958	1,436	31.0	44,516	Trace	Trace	1.0	446.2
1959	1,264	24.5	30,968	0.5	757.2	1.0	314.4
1960	1,500	35.0	52,500	0	0	Trace	Trace
1961	1,457	31.0	45,167	0.7	320.0	0.5	228.6
1962	1,207	32.0	38,688	0	0		
1963	1,415	38.0	53,770	0	0	Trace	Trace
1964	1,373	33.0	45,309	Trace	Trace	Trace	Trace
1965	1,195	32.0	38,240	0	0	Trace	Trace
1966	1,183	39.0	46,137	0	0	Trace	Trace
1967	1,514	34.0	51,476	Trace	0	Trace	0
1968	1,226	37.0	45,362	Trace	0	Trace	0
1969	1,067	37.0	39,479	Trace	Trace	Trace	Trace
1970	971	37.0	35,927	Trace	Trace	Trace	Trace
1971	981	43.5	42,674	0	0	Trace	Trace
1972	1,029	45.0	46,305	Trace	Trace	Trace	Trace
1973	720	32.0	23,040	0	0	Trace	Trace
1974	1,540	42.0	64,680	Trace	Trace	Trace	Trace
1975	1,770	42.0	74,340	Trace	Trace	Trace	Trace
1976	1,650	40.0	66,000	0	0	Trace	Trace

Table 1.--Estimated loss of yield caused by wheat rusts by States
and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
OKLAHOMA -- WHEAT							
1918	3,200	11.5	36,800			Trace	Trace
1919	4,718	14.0	66,052	4.0	2,871.8	4.0	2,871.8
1920	3,727	15.0	55,905	Trace	Trace	2.0	1,140.9
1921	4,100	13.0	53,300	Trace	Trace	10.0	5,922.2
1922	3,772	8.5	32,062			5.0	1,687.4
1923	3,847	11.0	42,317				
1924	3,684	15.5	57,102	3.0	1,766.0	0	0
1925	2,711	12.1	32,693	Trace	Trace	Trace	Trace
1926	4,332	17.0	73,644	0.75	556.5		
1927	3,812	9.2	35,070				
1928	4,612	14.0	64,582				
1929	4,576	11.2	51,251				
1930	3,935	9.5	37,382				
1931	4,407	17.0	74,919			5.0	3,943.1
1932	3,966	12.0	47,592			2.0	971.3
1933	3,093	10.2	31,549				
1934	3,543	10.5	37,202				
1935	3,366	10.0	33,660	Trace	Trace		
1936	3,534	8.0	28,272	Trace	Trace	1.5	430.5
1937	4,736	14.2	67,251	1.0	686.2	1.0	686.2
1938	5,607	11.2	61,677	Trace	Trace	27.0	22,812.0
1939	4,277	14.1	60,306	Trace	Trace	5.0	3,174.0
1940	4,020	14.5	58,290	2.9	1,740.9		
1941	4,502	10.7	48,171	1.0	486.6	Trace	Trace
1942	3,737	16.0	59,792	Trace	Trace	Trace	Trace
1943	3,588	9.5	34,086	Trace	Trace		
1944	5,095	16.7	85,086	2.0	1,736.4		
1945	5,910	12.5	73,875	Trace	Trace	15.0	13,036.6
1946	6,087	14.5	88,262	Trace	Trace	Trace	Trace
1947	6,696	15.5	103,788	Trace	Trace	Trace	Trace
1948	6,696	14.5	97,092	0.5	487.9	Trace	Trace
1949	6,629	12.8	84,851	1.0	857.1	Trace	Trace
1950	4,707	9.0	46,363	Trace	Trace	Trace	Trace
1951	4,905	9.5	38,902	0	0	0	0
1952	5,840	18.5	108,040	Trace	Trace	10.0	12,004.4
1953	5,898	12.0	70,776	1.0	714.9	Trace	Trace
1954	4,718	15.0	70,770	2.0	1,444.3	Trace	Trace
1955	3,020	8.0	24,160	Trace	Trace	4.0	1,006.4
1956	4,198	16.5	69,267	0	0	0	0
1957	3,442	12.5	43,025	1.0	434.6	Trace	Trace
1958	4,440	26.0	115,440	0	0	6.0	7,368.5
1959	4,529	20.0	90,580	Trace	Trace	10.0	1,006.4
1960	4,756	25.5	121,278	Trace	Trace	1.0	1,225.0
1961	4,618	24.0	110,832	2.0	2,358.1	4.0	4,716.2
1962	3,787	19.0	71,953	0	0	Trace	Trace
1963	3,591	21.0	75,411	0	0	1.5	1,148.4
1964	4,201	23.0	96,623	2.0	1,992.2	1.0	996.1
1965	4,747	28.0	132,916	Trace	Trace	1.0	1,343.0
1966	4,700	21.0	98,700	0	0	1.0	997.0
1967	5,217	17.0	88,689	Trace	Trace	3.0	2,743.0
1968	5,321	23.0	122,383	Trace	Trace	2.5	3,138.0
1969	4,150	28.5	118,275	Trace	Trace	1.5	1,801.1
1970	3,777	26.0	98,202	Trace	Trace	3.0	3,037.2
1971	3,475	20.0	69,500	Trace	Trace	0.5	349.2
1972	3,900	23.0	89,700	Trace	Trace	3.0	2,774.2
1973	5,260	30.0	157,800	0.1	175.5	10.0	17,552.8
1974	6,400	21.0	134,400	Trace	Trace	10.0	14,933.3
1975	6,700	24.0	160,800	Trace	Trace	10.0	17,866.7
1976	6,300	24.0	151,200	Trace	Trace	2.0	3,085.7

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
PENNSYLVANIA -- WHEAT							
1918	1,340	16.0	21,426	0.3	64.5	Trace	Trace
1919	1,425	16.5	23,448	Trace	Trace	1.0	236.8
1920	1,323	16.0	21,148	Trace	Trace	Trace	Trace
1921	1,250	17.0	21,238	Trace	Trace	Trace	Trace
1922	1,274	18.0	22,917	Trace	Trace	4.0	954.8
1923	1,210	18.0	21,768	Trace	Trace	1.5	331.5
1924	1,139	16.0	18,224	0.2	36.9	1.0	184.4
1925	1,106	19.5	21,563	0.2	43.3	0.3	65.0
1926	1,131	19.5	22,048	0.1	22.2	0.5	110.9
1927	1,023	17.5	17,886	0.5	95.6	6.0	1,147.7
1928	1,002	14.5	14,524	Trace	Trace	4.5	684.4
1929	987	17.7	17,473	0.5	103.4	15.0	3,101.7
1930	997	22.0	21,923	Trace	Trace	0	0
1931	930	22.0	20,447	Trace	Trace	20.0	5,111.6
1932	929	15.0	13,929	Trace	Trace	25.0	4,643.0
1933	937	18.0	16,833	Trace	Trace	9.0	1,664.7
1934	946	16.4	15,499	Trace	Trace	10.0	1,722.1
1935	1,004	21.0	21,045	Trace	Trace	12.0	2,869.7
1936	1,033	19.0	19,615	1.5	344.1	13.0	2,982.2
1937	1,063	22.0	23,353	3.0	824.2	12.0	3,296.9
1938	1,019	21.0	21,381	2.5	610.9	10.0	2,443.5
1939	893	20.5	18,292	Trace	Trace	10.0	2,032.4
1940	884	20.0	17,675	Trace	Trace	Trace	Trace
1941	866	19.5	16,878	Trace	Trace	Trace	Trace
1942	803	19.0	15,248	Trace	Trace	Trace	Trace
1943	784	17.0	13,329	Trace	Trace	Trace	Trace
1944	914	21.4	19,560	Trace	Trace	Trace	Trace
1945	932	21.5	20,038	0.8	195.0	17.0	4,144.1
1946	885	22.5	19,912	3.5	805.7	10.0	2,302.0
1947	929	24.0	22,296	0.33	80.3	8.0	1,945.8
1948	966	19.0	18,354	7.0	1,381.4	Trace	Trace
1949	908	23.0	20,884	Trace	Trace	12.0	2,847.7
1950	863	22.0	18,986	Trace	Trace	12.0	2,589.0
1951	837	22.5	18,832	Trace	Trace	5.0	991.2
1952	845	22.5	19,012	0.5	95.5	Trace	Trace
1953	862	24.0	20,688	0.2	43.6	5.0	1,091.1
1954	690	28.0	19,320	0.2	39.1	1.0	195.5
1955	614	27.0	16,578	Trace	Trace	8.0	1,441.6
1956	577	27.5	15,868	Trace	Trace	7.0	1,194.4
1957	548	27.0	14,796	Trace	Trace	5.0	778.7
1958	564	30.0	16,920	Trace	Trace	7.0	1,273.5
1959	530	26.5	14,045	Trace	Trace	6.0	896.5
1960	535	29.5	15,782	Trace	Trace	6.0	1,024.5
1961	524	30.0	15,720	0.25	41.5	5.0	829.6
1962	451	28.0	12,628	Trace	Trace	2.5	323.8
1963	487	30.5	14,854	Trace	Trace	2.0	303.1
1964	477	31.0	14,787	Trace	Trace	2.0	301.8
1965	420	34.0	14,280	Trace	Trace	Trace	Trace
1966	400	36.0	14,400	0	0	0	0
1967	480	36.0	17,280	0	0	0	0
1968	394	32.0	12,608	0	0	0	0
1969	327	35.5	11,608	0	0	0	0
1970	298	33.0	9,834	0	0	0	0
1971	286	36.0	10,296	0	0	Trace	Trace
1972	269	32.0	8,608	0	0	Trace	Trace
1973	264	28.0	7,392	0	0	Trace	Trace
1974	350	36.0	12,600	0.2	25.3	0.25	31.6
1975	345	33.0	11,385	Trace	Trace	1.0	115.0
1976	315	30.0	9,450	Trace	Trace	1.5	143.9

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
SOUTH DAKOTA -- WHEAT							
1918	3,280	17.8	58,500	0.7	412.4		
1919	3,896	8.1	31,473	10.0	3,516.5	0.5	175.8
1920	2,938	9.2	27,098	20.0	6,860.2	1.0	343.0
1921	2,870	9.1	26,194	10.0	3,081.6	5.0	1,540.8
1922	3,022	13.7	41,330	3.0	1,278.2	Trace	Trace
1923	2,883	9.5	27,329	10.0	3,070.6	1.0	307.1
1924	2,405	14.7	35,235	1.0	355.9	0	0
1925	2,701	11.8	31,918	7.5	2,587.9	0	0
1926	2,306	6.0	13,894	1.2	168.7	Trace	Trace
1927	3,189	14.9	47,589	10.2	5,470.0	3.0	1,641.0
1928	3,648	10.4	37,895	Trace	Trace	Trace	Trace
1929	3,583	9.7	34,799	3.0	1,076.2		
1930	3,682	11.6	42,871	3.0	1,325.9	Trace	Trace
1931	2,943	6.0	17,610	Trace	Trace	Trace	Trace
1932	3,854	13.5	51,839	Trace	Trace		
1933	1,150	4.3	4,904	0	0		
1934	158	4.6	732	Trace	Trace		
1935	3,153	8.1	25,540	29.0	11,221.8	5.0	1,934.8
1936	826	5.1	4,177	Trace	Trace	Trace	Trace
1937	2,747	5.6	15,498	12.0	2,162.4	2.0	360.4
1938	3,095	9.1	28,227	3.4	982.8		
1939	2,170	8.4	18,158	Trace	Trace		
1940	2,693	9.8	26,261	Trace	Trace		
1941	2,864	12.3	35,358	1.0	357.2	Trace	Trace
1942	2,630	16.4	43,174	Trace	Trace	Trace	Trace
1943	2,889	10.5	30,366	Trace	Trace		
1944	3,070	12.1	37,278	8.0	3,241.6		
1945	3,201	15.5	49,656	Trace	Trace	Trace	Trace
1946	3,588	14.8	53,197	Trace	Trace	Trace	Trace
1947	3,703	14.5	53,268	1.0	541.7	Trace	Trace
1948	3,843	13.1	50,342	Trace	Trace		
1949	4,079	8.0	32,653	Trace	Trace	Trace	Trace
1950	3,359	10.0	33,488	1.0	336.7		
1951	3,893	14.9	58,044	Trace	Trace	Trace	Trace
1952	3,898	8.2	32,049	5.3	1,790.5		
1953	3,561	9.2	32,717	35.2	17,781.9	Trace	Trace
1954	2,705	10.0	27,105	21.0	7,002.3	Trace	Trace
1955	2,400	11.4	27,360	5.2	1,500.8	Trace	Trace
1956	1,711	9.7	16,537	Trace	Trace	Trace	Trace
1957	1,978	20.2	40,037	1.0	404.4		
1958	2,332	23.9	55,722	Trace	Trace	Trace	Trace
1959	1,972	9.2	18,204	Trace	Trace	Trace	Trace
1960	2,373	19.5	46,156	0.4	185.4		
1961	2,260	14.4	32,545	1.6	540.2	2.0	675.2
1962	1,721	17.3	29,773	26.3	11,827.2	7.6	3,406.1
1963	2,013	14.6	29,368	0.3	96.1	8.0	2,562.1
1964	2,139	17.6	37,563	2.7	1,109.0	6.0	2,394.1
1965	2,034	18.0	36,624	14.4	7,314.6	13.5	6,857.5
1966	2,153	18.2	39,296	0	0	1.3	517.6
1967	2,637	28.0	73,892	0	0	3.1	2,433.3
1968	2,418	27.2	65,729	Trace	Trace	7.2	5,099.7
1969	1,963	21.9	42,915	0	0	0.7	302.5
1970	1,811	21.7	39,282	Trace	Trace	2.4	965.9
1971	2,288	30.1	68,768	Trace	Trace	1.6	1,118.2
1972	1,878	28.6	53,619	0	0	7.7	4,473.1
1973	2,268	25.7	58,270	0	0	Trace	Trace
1974	3,145	18.4	57,770	Trace	Trace	Trace	Trace
1975	3,003	21.1	63,294	Trace	Trace	0.3	180.9
1976	2,990	13.2	39,520	Trace	Trace	Trace	Trace

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
TEXAS -- WHEAT							
1918	1,000	7.5	7,500	Trace	Trace	Trace	Trace
1919	2,415	15.5	37,432	3.0	1,207.5	4.0	1,610.0
1920	1,570	13.0	20,410	1.0	208.3	1.0	208.3
1921	2,072	10.0	20,720	Trace	Trace	Trace	Trace
1922	1,243	8.0	9,994	10.0	1,117.3	1.0	111.7
1923	1,554	10.5	16,317	2.0	336.4	1.0	168.2
1924	1,355	16.0	21,680	1.0	221.2	1.0	221.2
1925	962	6.5	6,253	1.0	63.5	0.5	31.7
1926	2,117	18.2	38,529	0.75	294.1	1.0	392.2
1927	2,180	9.7	21,146	0.5	109.6	3.0	657.4
1928	2,393	10.8	25,844	1.0	262.4	0.5	131.2
1929	3,042	14.8	45,022	0.5	227.4	0.5	227.4
1930	3,457	11.1	38,373	1.0	388.0	0.1	38.8
1931	4,386	15.5	67,983	2.0	1,401.7	1.0	700.8
1932	3,509	8.5	29,826	2.0	615.0	1.0	307.5
1933	2,105	7.1	14,146	2.0	311.4	2.0	311.4
1934	3,094	8.5	26,299	1.0	279.8	5.0	1,398.8
1935	1,639	7.0	11,473	10.0	1,303.7	2.0	260.7
1936	2,458	7.7	18,927	Trace	Trace	2.0	386.3
1937	3,933	10.6	41,690	Trace	Trace	1.0	421.1
1938	3,894	9.0	35,046	0.6	222.8	5.0	1,856.2
1939	2,819	10.3	29,036	Trace	Trace	1.0	293.3
1940	3,157	10.3	32,517	1.7	562.3		
1941	2,936	10.4	30,534	2.0	623.1		
1942	3,230	16.5	53,295	Trace	Trace		
1943	3,746	11.0	41,206	Trace	Trace		
1944	4,458	18.5	82,473	1.0	833.1		
1945	5,350	9.0	48,150	Trace	Trace		
1946	5,992	10.5	62,916	Trace	Trace		
1947	7,310	17.0	124,270	Trace	Trace		
1948	5,629	10.5	59,104	Trace	Trace		
1949	6,415	14.0	89,838	4.8	5,127.4	11.1	11,857.2
1950	2,374	8.0	18,992	Trace	Trace	Trace	
1951	1,994	9.0	17,946	0	0		
1952	3,011	12.0	36,132	Trace	Trace		
1953	2,710	9.0	24,390	Trace	Trace	Trace	Trace
1954	3,279	10.0	32,790	Trace	Trace	4.0	1,366.2
1955	1,508	9.5	14,326	Trace	Trace		
1956	2,111	12.5	26,388	Trace	Trace	0	0
1957	2,322	14.5	33,669	1.0	354.0	3.9	1,380.7
1958	3,228	21.5	69,402	Trace	Trace	2.7	1,925.8
1959	3,228	17.0	54,876	Trace	Trace	Trace	Trace
1960	3,899	22.5	87,728	Trace	Trace	Trace	Trace
1961	3,690	23.0	84,870	0	0	0.25	212.7
1962	2,731	16.0	43,696	Trace	Trace	2.0	891.7
1963	2,321	18.5	42,938	Trace	Trace	0	0
1964	3,017	20.5	61,848	Trace	Trace	Trace	Trace
1965	3,228	22.5	72,630	Trace	Trace	4.0	3,028.0
1966	3,229	22.5	72,652	0.01	8.9	1.5	1,336.1
1967	3,326	16.0	53,216	0.07	37.9	1.5	812.6
1968	3,825	22.0	84,150	2.0	1,449.0	5.0	4,045.0
1969	2,869	24.0	68,856	Trace	0.2	0.5	346.0
1970	2,267	24.0	54,408	Trace	Trace	0.5	273.4
1971	1,496	21.0	31,416	0	0	0	0
1972	2,000	22.0	44,000	Trace	Trace	1.0	444.4
1973	3,400	29.0	98,600	0	0	1.0	996.0
1974	3,300	16.0	52,800	Trace	Trace	10.0	5,866.7
1975	5,700	23.0	131,100	Trace	Trace	3.0	4,054.6
1976	4,700	22.0	103,400	Trace	Trace	1.0	1,044.4

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
VIRGINIA -- WHEAT							
1918	1,020	12.0	12,240	Trace	Trace	Trace	Trace
1919	991	11.8	11,694	Trace	Trace	3.0	361.6
1920	820	13.0	10,660	Trace	Trace	2.0	217.5
1921	773	10.5	8,116	1.0	86.3	5.0	431.7
1922	716	13.0	9,308	Trace	Trace	5.0	489.8
1923	682	14.0	9,548	0.2	19.3	1.0	96.6
1924	599	13.4	8,027	0.3	24.4	1.0	81.3
1925	569	14.2	8,080	0.3	24.3	Trace	Trace
1926	620	16.5	10,230	0.1	102.4	Trace	Trace
1927	620	13.0	8,060	0.1	8.2	1.5	122.9
1928	608	14.5	8,816	0.5	45.7	3.0	274.0
1929	657	13.1	8,607	0.5	44.6	3.0	267.5
1930	591	15.5	9,160	0.5	47.0	2.0	187.9
1931	609	22.0	13,398	1.0	142.5	5.0	712.6
1932	585	10.8	6,318	1.0	66.5	4.0	266.0
1933	567	13.5	7,654	1.0	81.0	4.5	364.4
1934	605	13.1	7,926	0			
1935	629	13.5	8,492	3.0	272.5	3.5	317.9
1936	629	12.5	7,862	2.0	164.6	2.5	205.8
1937	648	15.0	9,720	2.0	199.4	0.5	49.8
1938	590	14.0	8,260	5.0	458.8	5.0	458.8
1939	513	14.7	7,541	2.0	157.1	2.0	157.1
1940	527	15.5	8,168	3.5	296.2		
1941	511	15.0	7,665	0.75	57.9		
1942	460	16.0	7,360	10.0	826.9	1.0	82.7
1943	437	13.0	5,681	10.0	631.2	Trace	Trace
1944	516	19.2	9,907	2.5	264.9	4.0	423.8
1945	485	15.5	7,518	5.0	432.1	8.0	691.3
1946	432	18.5	7,992	5.0	420.6	Trace	Trace
1947	458	17.5	8,015	3.0	247.9		
1948	449	18.5	8,306	2.0	180.6	6.0	541.7
1949	400	18.5	7,400	2.0	157.4	4.0	314.9
1950	376	18.0	6,768	2.0	138.1	Trace	Trace
1951	368	21.0	7,728	1.0	78.1	Trace	Trace
1952	383	21.5	8,234	3.0	254.6	Trace	Trace
1953	368	21.0	7,728	2.0	157.7	Trace	Trace
1954	283	25.0	7,075	3.0	218.8	Trace	Trace
1955	255	25.5	6,502	1.0	65.7	Trace	Trace
1956	268	27.0	7,236	2.5	185.5	Trace	Trace
1957	249	19.0	4,731	1.0	47.8	Trace	Trace
1958	237	26.0	6,162	1.0	62.9	1.0	62.9
1959	270	23.5	6,345	1.0	64.7	1.0	68.7
1960	256	26.0	6,656	1.0	67.2		
1961	248	27.5	6,820	1.0	68.9		
1962	179	23.0	4,117	1.0	41.6		
1963	179	22.5	4,028	Trace	Trace		
1964	215	29.0	6,235	Trace	Trace		
1965	183	30.0	5,490	Trace	Trace		
1966	145	31.0	4,495	Trace	Trace		
1967	194	35.0	6,790	Trace	Trace		
1968	169	34.0	5,746	Trace	Trace		
1969	157	43.0	6,751	0	0	0	0
1970	165	44.0	7,260	Trace	Trace	Trace	Trace
1971	190	44.0	8,360	0.3	25.2	Trace	Trace
1972	218	37.0	8,066	Trace	Trace	Trace	Trace
1973	175	37.0	6,475	0	0	0	0
1974	275	37.0	10,175	Trace	Trace	1.0	102.8
1975	292	31.0	9,052	Trace	Trace	1.0	91.4
1976	240	32.0	7,680	0	0	Trace	Trace

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production bu/A 1,000 bu		Losses in yield					
				Stem rust		Leaf rust		Stripe rust	
				%	1,000 bu	%	1,000 bu	%	1,000 bu
WASHINGTON -- WHEAT									
1918	2,315	12.5	28,975						
1919	2,495	16.8	41,888	Trace	Trace	0	0		
1920	2,325	17.2	40,070	Trace	Trace	Trace	Trace		
1921	2,152	23.2	49,979	Trace	Trace	Trace	Trace		
1922	2,058	13.6	27,974	0	0	0	0		
1923	1,998	25.3	50,479	Trace	Trace	Trace	Trace		
1924	1,765	14.1	24,935	Trace	Trace	Trace	Trace		
1925	1,957	17.5	34,310	Trace	Trace	0	0		
1926	1,988	19.1	38,035	Trace	Trace	Trace	Trace		
1927	2,137	24.6	52,660	Trace	Trace	Trace	Trace		
1928	2,223	21.4	47,674	Trace	Trace	Trace	Trace		
1929	2,375	18.6	44,199	Trace	Trace	Trace	Trace		
1930	2,338	16.1	37,548						
1931	2,315	18.0	41,699						
1932	2,308	18.6	42,868	Trace	Trace	Trace	Trace		
1933	2,163	20.2	43,638	Trace	Trace	Trace	Trace		
1934	1,934	19.2	37,158	Trace	Trace	Trace	Trace		
1935	2,006	22.5	45,194						
1936	2,180	21.5	46,968						
1937	2,344	21.2	49,698						
1938	2,257	24.0	54,118	0.3	163.0	0.1	54.3		
1939	1,993	22.4	44,731	Trace	Trace	Trace	Trace		
1940	2,136	20.7	44,180						
1941	2,098	29.1	61,142						
1942	1,777	31.0	55,148						
1943	1,970	26.2	51,652						
1944	2,338	26.8	62,673	Trace	Trace				
1945	2,524	24.4	61,512	Trace	Trace				
1946	2,642	29.5	77,965	Trace	Trace				
1947	2,719	23.8	64,750	Trace	Trace	Trace	Trace		
1948	2,766	28.7	77,268	Trace	Trace	1.0	780.5		
1949	2,758	21.8	60,146	0	0				
1950	2,621	26.6	69,692	0	0	Trace	Trace		
1951	2,774	27.5	76,224	0	0				
1952	2,889	27.9	80,541	Trace	Trace				
1953	2,939	28.6	84,150	Trace	Trace				
1954	2,234	32.2	72,011	Trace	Trace				
1955	1,998	27.9	55,832	Trace	Trace				
1956	2,028	29.5	58,826	Trace	Trace				
1957	1,897	37.4	71,016	Trace	Trace	Trace	Trace		
1958	2,005	34.9	69,975	0.3	219.4			4.0	2,924.8
1959	2,000	38.4	76,807	Trace	Trace	Trace	Trace	10.0	8,534.1
1960	1,949	33.4	65,102	Trace	Trace			25.0	21,700.7
1961	1,974	28.0	55,272	Trace	Trace			30.0	23,688.0
1962	1,697	39.4	66,862	0	0	0	0	Trace	Trace
1963	1,903	37.4	71,234	0	0	0	0	4.0	2,968.1
1964	2,019	40.7	82,206	Trace	Trace	Trace	Trace	Trace	Trace
1965	2,268	40.0	90,796	Trace	Trace	Trace	Trace	Trace	Trace
1966	2,266	39.8	90,243	Trace	Trace	1.0	911.5	Trace	Trace
1967	2,922	40.5	118,464	0	0	Trace	Trace	8.0	10,301.0
1968	2,766	39.4	108,975	0	0	Trace	Trace	1.0	1,100.7
1969	2,462	38.7	95,242	0	0	0.8	768.1	Trace	Trace
1970	2,258	44.6	100,731	Trace	Trace	Trace	Trace	Trace	Trace
1971	2,489	47.8	118,921	0	0	Trace	Trace	Trace	Trace
1972	2,602	46.9	122,083	Trace	Trace	Trace	Trace	Trace	Trace
1973	2,720	32.8	89,200	0	0	Trace	Trace	Trace	Trace
1974	3,130	34.0	122,200	Trace	Trace	2.0	3,001.0	2.0	3,001.0
1975	3,060	47.4	145,140	Trace	Trace	1.4	2,107.8	3.0	4,516.8
1976	3,200	45.0	144,050	Trace	Trace	2.0	3,165.9	7.0	11,080.8

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
WEST VIRGINIA -- WHEAT							
1918	275	12.0	3,300	Trace	Trace	Trace	Trace
1919	298	13.0	3,874	12.0	546.8	3.0	136.7
1920	212	12.5	2,650	3.0	81.9	Trace	Trace
1921	211	12.0	2,532	Trace	Trace	Trace	Trace
1922	179	12.6	2,250	Trace	Trace	Trace	Trace
1923	148	12.5	1,850	Trace	Trace	1.0	18.7
1924	144	12.4	1,784	0.5	9.0	Trace	Trace
1925	109	13.5	1,472	Trace	Trace	Trace	Trace
1926	235	15.0	3,522	Trace	Trace	Trace	Trace
1927	112	13.0	1,456	1.0	14.8	1.0	14.8
1928	101	13.5	1,346	0	0	Trace	Trace
1929	104	13.1	1,362	Trace	Trace		
1930	121	17.5	2,118	Trace	Trace		
1931	131	19.0	2,489	0	0	5.0	131.0
1932	122	11.5	1,403	10.0	155.8	Trace	Trace
1933	131	14.5	1,900	0	0	5.0	100.0
1934	145	12.8	1,856	0	0	5.0	97.6
1935	154	16.5	2,541	Trace	Trace	0.5	12.8
1936	157	13.5	2,120	1.0	21.5	0.5	10.8
1937	155	16.0	2,480	2.0	50.6		
1938	135	15.0	2,025	1.0	20.4		
1939	124	14.5	1,798	1.0	18.2	Trace	Trace
1940	118	15.0	1,770	1.0	17.9		
1941	105	16.0	1,680	1.0	17.0		
1942	94	16.0	1,504	5.0	79.2		
1943	78	13.5	1,053	12.0	156.0	7.0	91.0
1944	87	18.6	1,618	3.0	50.0	4.0	69.6
1945	87	18.5	1,610	5.0	84.7	1.0	17.1
1946	77	19.0	1,463	5.0	74.9	Trace	Trace
1947	82	19.5	1,599	3.0	49.4		
1948	82	18.5	1,517	3.0	46.9	Trace	Trace
1949	68	19.0	1,292	2.0	26.4		
1950	66	18.5	1,221	2.0	24.9		
1951	58	18.5	1,073	1.0	10.8	Trace	Trace
1952	56	21.0	1,176	2.0	24.0		
1953	59	21.5	1,268	2.0	25.9	Trace	Trace
1954	46	25.0	1,150	2.5	29.5		
1955	40	23.0	920	1.0	9.3		
1956	37	24.0	888	1.5	13.5		
1957	29	21.0	609	1.0	6.2	Trace	Trace
1958	27	26.0	702	1.0	7.2	1.0	7.2
1959	25	23.0	575	1.0	5.9	1.0	5.9
1960	27	28.0	756	1.0	7.6		
1961	25	24.0	600	1.0	6.1		
1962	18	24.0	432	1.0	4.4		
1963	19	26.0	494	Trace	Trace		
1964	20	27.0	540	Trace	Trace	Trace	Trace
1965	19	29.0	551	Trace	Trace		
1966	17	28.5	484	Trace	Trace		
1967	20	33.0	660	Trace	Trace		
1968	16	28.5	456	Trace	0	Trace	0
1969	14	30.0	420	Trace	Trace	0	0
1970	14	33.0	462	2.0	9.4	Trace	Trace
1971	13	33.0	429	2.0	8.7	0	0
1972	14	35.0	490	4.0	20.6	1.0	5.2
1973	12	31.0	372	5.0	19.6	0	0
1974	17	33.0	561	5.0	29.5	Trace	Trace
1975	17	32.0	544	5.0	28.9	1.0	5.8
1976	14	32.0	448	Trace	Trace	0	0

Table 1.--Estimated loss of yield caused by wheat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Losses in yield					
		Crop production		Stem rust		Leaf rust	
		bu/A	1,000 bu	%	1,000 bu	%	1,000 bu
WISCONSIN -- WHEAT							
1918	424	22.3	9,465	0.5	47.6		
1919	530	13.9	7,385	15.0	1,318.6	1.0	87.9
1920	351	15.4	3,395	30.0	2,312.1	Trace	Trace
1921	225	13.7	3,075	10.0	341.6		
1922	186	15.7	2,924	5.1	158.8	1.0	31.1
1923	133	16.7	2,221	1.0	22.4	Trace	Trace
1924	116	24.0	2,786	3.0	87.1	1.0	29.0
1925	113	18.4	2,074	3.5	76.0	1.0	21.7
1926	122	18.5	2,259	3.0	70.6	1.0	23.5
1927	134	20.1	2,696	1.5	41.0	Trace	Trace
1928	97	18.6	1,800	0.5	9.0	Trace	Trace
1929	96	19.4	1,866	4.5	89.3	1.5	29.8
1930	99	20.8	2,063	0.7	14.6	0.1	2.1
1931	88	17.4	1,532	Trace	Trace	0.1	1.5
1932	110	19.2	2,109	0	0	0.1	2.1
1933	104	15.5	1,616	0	0	Trace	Trace
1934	104	14.2	1,475	0	0	Trace	Trace
1935	139	16.2	2,254	1.5	36.2	15.0	361.6
1936	106	13.9	1,469	Trace	Trace	5.0	77.3
1937	131	15.6	2,043	19.8	517.2	2.0	52.2
1938	120	16.7	2,007	7.8	170.2	Trace	Trace
1939	88	14.0	1,232	Trace	Trace	1.9	23.9
1940	83	19.3	1,599	0.5	7.5	Trace	Trace
1941	79	16.8	1,324	0.5	6.8	3.0	41.2
1942	78	21.0	1,638	Trace	Trace	0.5	8.2
1943	69	18.8	1,296	1.5	20.8	5.0	69.3
1944	67	19.5	1,308	1.0	13.2	1.0	13.3
1945	60	26.3	1,576	Trace	Trace	2.0	394.2
1946	93	25.2	2,340	Trace	Trace	Trace	Trace
1947	114	25.7	2,926	Trace	Trace	Trace	Trace
1948	123	23.6	2,906	Trace	Trace	Trace	Trace
1949	112	22.5	2,520	Trace	Trace	Trace	Trace
1950	88	24.2	2,132	Trace	Trace	Trace	Trace
1951	81	23.4	1,895	0	0	Trace	Trace
1952	78	24.7	1,929	1.0	19.5	Trace	Trace
1953	74	23.1	1,712	2.9	50.9	Trace	Trace
1954	64	25.3	1,617	1.2	19.9	Trace	Trace
1955	51	25.5	1,298	0.5	6.7	Trace	Trace
1956	54	26.7	1,440	Trace	Trace	Trace	Trace
1957	51	25.5	1,300	Trace	Trace	1.1	14.4
1958	58	35.7	2,071	0	0	Trace	Trace
1959	62	30.8	1,907	Trace	Trace	Trace	Trace
1960	55	30.0	1,650	Trace	Trace	Trace	Trace
1961	58	34.5	2,018	0.6	12.2	Trace	Trace
1962	48	35.2	1,690	0.2	35.5	Trace	Trace
1963	56	37.1	2,076	0.3	4.7	Trace	Trace
1964	58	34.7	2,013	0	0	Trace	0.9
1965	38	32.4	1,230	0.2	3.0	0.5	7.0
1966	44	35.7	1,570	0.1	1.6	0.6	9.0
1967	63	37.4	2,358	0.1	1.8	0.2	5.6
1968	60	35.7	2,144	Trace	Trace	0.2	5.1
1969	44	34.4	1,514	Trace	Trace	0.2	3.2
1970	40	35.6	1,422	Trace	Trace	0.09	1.3
1971	45	37.4	1,685	Trace	Trace	0.08	1.5
1972	29	31.1	901	0.06	0.6	0.15	1.4
1973	27	33.0	890	0.06	0.6	0.4	3.9
1974	78	36.0	2,853	Trace	2.2	0.1	5.7
1975	93	30.3	2,820	Trace	Trace	0.1	2.8
1976	93	34.8	3,238	Trace	Trace	0.2	5.7

Table 1.--Estimated loss of yield caused by wheat rusts by State and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
WYOMING -- WHEAT							
1918	198	18.8	3,732	Trace	Trace		
1919	184	8.0	1,479				
1920	201	16.5	3,318	Trace	Trace		
1921	195	13.5	2,624				
1922	179	12.6	2,250	0	0	Trace	Trace
1923	173	11.8	2,038	Trace	Trace		
1924	144	12.4	1,784	0.5	9.0	0	0
1925	178	13.4	2,392	Trace	Trace	0	0
1926	235	15.0	3,522	Trace	Trace		
1927	285	15.9	4,530	Trace	Trace		
1928	342	14.8	5,063	2.0	103.3		
1929	341	12.9	4,394	Trace	Trace		
1930	326	11.7	3,808	Trace	Trace		
1931	217	9.4	2,032	Trace	Trace		
1932	255	11.2	2,862	0	0		
1933	219	9.3	2,046	0	0		
1934	106	9.9	1,050	0	0	Trace	Trace
1935	186	10.8	2,017	10.0	224.1	Trace	Trace
1936	128	10.0	1,277	Trace	Trace	Trace	Trace
1937	202	11.5	2,324	Trace	Trace	Trace	Trace
1938	257	13.3	3,428	Trace	Trace	0.5	17.2
1939	195	11.1	2,159	Trace	Trace	Trace	Trace
1940	214	12.0	2,568	Trace	Trace		
1941	236	20.7	4,894	0.5	23.0		
1942	226	20.1	4,544	0	0		
1943	242	19.3	4,662	1.0	6.8	Trace	Trace
1944	215	13.1	2,811	12.0	341.0	Trace	Trace
1945	244	18.2	4,431	0.3	44.4		
1946	281	24.3	6,832	0	0	0	0
1947	326	20.2	6,592	0.5	33.1	Trace	Trace
1948	342	19.4	6,650	0	0		
1949	369	18.7	6,885	Trace	Trace		
1950	348	18.3	6,378	Trace	Trace	0	0
1951	375	18.0	6,750	Trace	Trace		
1952	405	16.3	6,602	Trace	Trace		
1953	413	16.5	6,823	3.2	225.5		
1954	252	11.7	2,946	Trace	Trace	0	0
1955	277	18.8	5,200	Trace	Trace	0	0
1956	283	18.2	5,145	0	0	0	0
1957	288	22.1	6,376	Trace	Trace		
1958	300	27.1	8,120	Trace	Trace	Trace	Trace
1959	261	21.1	5,517	Trace	Trace		
1960	246	22.5	5,541	Trace	Trace	Trace	Trace
1961	229	20.5	4,705	1.0	47.8	0.5	23.9
1962	213	21.4	4,558	6.0	303.9	4.0	202.6
1963	241	21.1	5,091	Trace	Trace	Trace	Trace
1964	224	23.7	5,304	Trace	Trace	Trace	Trace
1965	208	12.8	2,664	8.0	236.0	2.0	59.2
1966	239	19.8	4,744	0	0	Trace	Trace
1967	310	25.2	8,564	2.0	174.8	Trace	0
1968	290	29.2	8,466	Trace	0	2.0	172.8
1969	242	20.2	4,884	0	0	Trace	Trace
1970	221	28.3	6,259	Trace	Trace	Trace	Trace
1971	230	32.1	7,382	0	0	Trace	Trace
1972	232	34.7	8,060	0	0	0	0
1973	240	23.1	5,542	0	0	Trace	Trace
1974	263	24.7	6,502	Trace	Trace	Trace	7.7
1975	273	24.9	6,802	Trace	Trace	Trace	63.1
1976	275	25.0	6,875	Trace	Trace	Trace	Trace

Oat Stem Rust

Fewer epidemics of oat stem rust occurred in which losses exceeded 5 percent than epidemics of wheat stem rust. In the central Great Plains, there are fewer acres of oats than of wheat, which may reduce the probability of epidemics. The number of epidemics per State that resulted in 5 percent or greater loss are Minnesota and North Dakota (7); South Dakota (6); Texas (5); Iowa and Michigan (4); Illinois, Kansas, and Nebraska (3 each); Wisconsin (2); and Oklahoma and Pennsylvania (1). Oat stem rust, like wheat stem rust, has most frequently been epidemic in the North Central

States. The greatest statewide loss was 25 percent in Minnesota in 1953. The greatest nationwide loss was in 1953, when losses in the major oat-producing States were Minnesota 25 percent, Iowa 10 percent, Wisconsin 7 percent, North Dakota 5 percent, and South Dakota 4 percent. The most recent 5 percent loss occurred in Texas in 1975 when an unusually large amount of stem rust overwintered on winter oats. Currently, race 31, the most common race since 1965, is virulent on nearly all commercial oat cultivars.

Oat Crown Rust

Oat crown rust is the most serious rust disease of oats, and probably caused the greatest loss of any of the cereal rusts since 1970. The number of epidemics per State that caused greater than 5 percent loss was as follows: Texas (16), Arkansas (14), Iowa (12), Florida (10), Minnesota and North Dakota (8), Kansas and Wisconsin (7), Indiana and South Dakota (5), Illinois and Pennsylvania (4), Missouri and Virginia (3), West Virginia and Michigan (2), and Oklahoma (1). Many of these losses exceeded 20 percent. States and years are as follows: Florida 1925, 1928, 1929, 1930, 1932, 1933, 1974, 1975, and

1976; Arkansas 1935 and 1938; Indiana 1935 and 1957; Iowa 1935, 1938, 1941, and 1951; Texas 1921 and 1934; Kansas 1929; Pennsylvania 1943, Wisconsin 1938 and 1941. Although Florida is not an important oat production area, the greatest percent loss on a statewide basis, 70 percent, occurred there in 1974. A loss of 50 percent occurred in Arkansas in 1935. The greatest nationwide epidemic probably occurred in 1938. Although rust-resistant cultivars have been developed, effectiveness seems to last only a few years.

Text continues on page 50.

Table 2.--Estimated loss of yield caused by oat rust by States and years reported

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Crown rust	
				%	1,000 bu	%	1,000 bu
ARKANSAS -- OATS							
1919	280	22.0	6,160	0	0	2.0	126.8
1920	290	25.0	7,250	0	0	5.0	381.6
1921	300	22.0	6,600	Trace	Trace	10.0	733.3
1922	264	25.0	6,600	Trace	Trace	8.0	573.8
1923	269	23.0	6,187	2.0	149.1	15.0	1,118.1
1924	275	18.0	4,950	Trace	Trace	Trace	Trace
1925	261	16.0	4,176	Trace	Trace	Trace	Trace
1926	243	22.0	5,346	Trace	Trace	Trace	Trace
1927	207	20.0	4,140				
1928	155	22.0	3,410			Trace	Trace
1929	186	26.0	4,836			Trace	Trace
1930	195	25.0	4,875	Trace	Trace	Trace	Trace
1931	160	26.0	4,160	Trace	Trace	10.0	462.2
1932	114	14.0	1,596	Trace	Trace	10.0	177.3
1933	103	16.0	1,648	Trace	Trace	10.0	183.1
1934	132	15.5	2,046	Trace	Trace	5.0	107.6
1935	132	17.0	2,244	0.8	36.5	50.0	2,280.0
1936	150	20.5	3,075	Trace	Trace	Trace	Trace
1937	150	22.0	3,300				
1938	135	19.0	2,565	Trace	Trace	20.0	641.2
1939	132	22.0	2,904	Trace	Trace	5.0	152.8
1971	59	54.0	3,186	0	0	5.0	167.6
1972	100	78.0	7,800	0	0	3.5	282.9
1973	67	55.0	3,685	0	0	2.0	74.6
1974	74	51.0	3,774	0	0	5.0	198.6
1975	60	50.0	3,000	Trace	Trace	8.0	97.5
1976	60	50.0	3,000	Trace	Trace	3.0	92.7
FLORIDA -- OATS							
1924	11	13.4	148	0	0	0	0
1925	13	14.0	182	0	0	26.0	63.7
1926	14	16.7	234	0	0	0	0
1927	11	11.0	121	0	0	15.0	21.3
1928	11	17.4	191	0	0	20.0	47.6
1929	12	14.0	168	0	0	40.0	112.0
1930	12	15.0	180	0	0	30.0	77.1
1931	9	18.0	162	2.0	3.9	15.0	29.2
1932	7	11.4	80	0	0	20.0	20.0
1933	7	11.4	80	0	0	30.0	34.2
1934	8	13.0	104	0	0	0	0
1935	8	14.0	112	0	0	0	0
1936	8	16.0	128	0	0	Trace	Trace
1974	12	35.0	420	Trace	Trace	70.0	980.0
1975	12	41.0	492	Trace	Trace	25.0	164.0
1976	12	50.0	600	0	0	10.0	66.7

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Crown rust	
				bu/A	1,000 bu	%	1,000 bu
COLORADO -- OATS							
1919	249	26.2	6,524	Trace	Trace	Trace	Trace
1920	204	31.5	6,426	Trace	Trace		
1921	217	31.0	6,727	0	0		
1922	185	25.0	4,625	Trace	Trace		
1923	226	32.0	7,232	2.0	147.6	0	0
1924	232	25.0	5,800	0	0	0	0
1925	214	27.0	5,778	0	0	0	0
1926	195	24.0	4,680	Trace	Trace	0	0
1927	189	29.0	5,481	Trace	Trace	0	0
1928	193	31.0	5,983	Trace	Trace		
1929	212	31.0	6,572	Trace	Trace	0	0
1930	195	31.0	6,045	0	0		
1931	142	24.0	3,408	Trace	Trace		
1932	141	26.5	3,736	Trace	Trace	0	0
1933	162	25.5	4,131	0	0	0	0
1934	97	23.5	2,280	0	0	Trace	Trace
1935	160	28.0	4,480	Trace	Trace		
1936	152	28.0	4,256	Trace	Trace	Trace	Trace
1937	143	31.0	4,433	0	0	0	0
1938	9	15.5	140	0	0		
1939	145	29.0	4,205	0	0		
1940	151	27.6	4,168	0	0		
1941	177	33.1	5,859	0	0		
1942	181	31.2	5,647	0	0	0	0
1943	188	31.0	5,828	0.5	29.3	0	0
1944	224	27.8	6,227	Trace	Trace	0	0
1945	220	33.0	7,260	Trace	Trace		
1946	187	30.0	5,610	Trace	Trace	0	0
1947	200	32.5	6,500	Trace	Trace	0	0
1948	194	30.0	5,820	0	0	0	0
1949	217	33.5	7,270	0	0	0	0
1950	169	27.5	4,648	0	0	0	0
1951	155	30.5	4,728	0	0		
1952	175	31.5	5,512	0	0		
1953	159	31.5	5,008	Trace	Trace		
1954	126	26.0	3,276	Trace	Trace	0	0
1955	126	31.0	3,906	0	0	0	0
1956	111	31.5	3,496	0	0	0	0
1957	176	36.0	6,336	Trace	Trace	0	0
1958	148	34.5	5,106	0	0	0	0
1959	115	36.0	4,140				
1960	129	38.0	4,902	0	0	Trace	Trace
1961	112	37.5	4,200	Trace	Trace	Trace	Trace
1962	122	41.0	5,002	Trace	Trace	Trace	Trace
1963	81	36.0	2,916	0	0	0	0
1964	78	40.0	3,120	0	0	0	0
1965	113	38.0	4,294	0	0	0	0
1966	74	37.5	2,775	0	0	Trace	Trace
1967	229	48.0	10,992	0	0	Trace	0
1968	71	39.5	2,804	Trace	0	0.5	14.6
1969	100	43.0	4,300	0	0	0	0
1970	120	42.0	5,040	0	0	0	0
1971	73	41.0	2,993	0	0	0	0
1972	37	40.0	1,480	0	0	0	0
1973	41	43.0	1,763	0	0	0	0
1974	50	49.0	2,450	0	0	0	0
1975	48	47.0	2,250	0	0	Trace	Trace
1976	50	47.0	2,350	0	0	Trace	Trace

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Crown rust	
				bu/A	1,000 bu	%	1,000 bu
ILLINOIS -- OATS							
1919	4,180	30.0	125,400	0	0	1.0	1,300.3
1920	4,334	39.5	171,193	Trace	Trace	1.0	1,729.2
1921	4,594	26.5	121,741	Trace	Trace	3.0	3,765.2
1922	3,860	28.5	110,010	Trace	Trace	4.0	4,583.7
1923	3,860	35.0	135,100	Trace	Trace	2.5	3,464.1
1924	4,374	39.0	170,586	0.5	861.5	0.5	861.5
1925	4,855	32.5	157,788	Trace	Trace	Trace	Trace
1926	4,661	26.5	123,516	15.0	21,848.2	0.2	291.3
1927	4,008	25.5	102,204	Trace	Trace	0.8	824.2
1928	4,649	37.5	174,338	Trace	Trace	Trace	Trace
1929	4,231	33.5	141,738	Trace	Trace	Trace	Trace
1930	4,267	33.5	142,944	Trace	Trace		
1931	4,352	34.5	150,144	3.0	4,643.6		
1932	4,439	37.5	166,462	Trace	Trace		
1933	4,039	19.5	78,760	Trace	Trace	0.5	395.8
1934	3,029	11.0	33,319	0.5	168.3	0.5	168.3
1935	3,799	28.0	106,372	Trace	Trace	5.0	5,598.5
1936	3,495	28.5	99,608	Trace	Trace	0.5	500.5
1937	3,655	45.5	166,302	0	0	0.5	815.1
1938	3,545	31.5	111,668	10.0	12,762.0	2.5	3,190.5
1939	3,084	30.0	92,520	Trace	Trace	3.0	2,861.4
1940	3,090	48.0	148,320	0.5	745.3	Trace	Trace
1941	3,569	43.0	153,467	2.0	3,230.9	3.0	4,864.3
1942	3,533	40.0	141,320	0.5	728.4	2.5	3,642.3
1943	3,427	33.0	113,091	1.0	1,171.3	2.5	2,929.8
1944	3,169	31.7	100,457	1.0	1,041.0	2.5	2,602.5
1945	3,372	45.0	151,740	0.1	158.9	3.5	5,561.1
1946	3,799	42.0	159,588	0.5	806.0	0.5	806.0
1947	3,311	34.0	112,574	Trace	Trace	1.0	1,137.1
1948	3,853	45.0	173,385	Trace	Trace	0.2	347.5
1949	3,790	41.5	157,285	Trace	Trace	2.0	3,209.8
1950	3,796	41.0	155,636	1.0	1,691.6	7.0	11,842.0
1951	3,359	40.0	134,360	Trace	Trace		
1952	3,309	37.0	122,433	Trace	Trace	10.0	13,603.7
1953	3,110	37.0	115,070	2.0	2,848.4		
1954	3,266	41.0	133,906	5.0	7,047.6	Trace	Trace
1955	3,168	56.0	177,408	1.0	1,792.0	Trace	Trace
1956	3,057	47.0	143,679	1.5	2,188.0	Trace	Trace
1957	2,568	39.0	100,152	Trace	Trace	18.0	21,984.6
1958	2,427	55.0	133,485	Trace	Trace	0	0
1959	2,196	41.0	90,036	Trace	Trace		
1960	1,081	51.0	91,851	Trace	Trace	3.0	2,840.7
1961	1,606	56.0	89,936	0.5	467.0	3.2	2,988.5
1962	1,520	53.0	80,560	Trace	Trace	3.0	2,491.5
1963	1,386	57.0	79,002	0	0	Trace	Trace
1964	1,123	50.0	56,150	Trace	Trace	1.0	567.2
1965	910	57.0	51,870	0	0	0	0
1966	907	60.0	54,420	Trace	Trace	Trace	Trace
1967	771	58.0	44,718	0	0	0	0
1968	756	66.0	49,896	0	0	Trace	0
1969	718	61.0	43,798	Trace	Trace	1.0	442.4
1970	612	56.0	34,272	0	0	Trace	0
1971	600	60.0	36,000	Trace	Trace	0.5	180.9
1972	440	63.0	27,720	Trace	0	1.0	280.0
1973	430	46.0	19,780	Trace	Trace	Trace	Trace
1974	480	51.0	24,480	0	0	Trace	Trace
1975	490	54.0	26,460	Trace	Trace	Trace	Trace
1976	410	58.0	23,780	0	0	Trace	Trace

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Losses in yield					
		Crop production		Stem rust		Crown rust	
		bu/A	1,000 bu	%	1,000 bu	%	1,000 bu
INDIANA -- OATS							
1919	1,750	32.0	56,000	0	0	1.0	565.6
1920	1,875	41.0	76,875	Trace	Trace	Trace	Trace
1921	1,912	24.0	45,888				
1922	1,506	21.0	31,626	Trace	Trace	2.0	645.4
1923	1,739	28.0	48,692			2.0	993.7
1924	1,850	37.0	68,450			Trace	Trace
1925	2,138	28.0	59,864	Trace	Trace	Trace	Trace
1926	2,050	30.0	61,500	1.0	621.2		
1927	1,948	25.0	48,700	0	0	5.0	244.2
1928	2,532	37.0	93,684	Trace	Trace	1.0	946.3
1929	1,895	28.5	54,008	Trace	Trace	1.0	545.5
1930	1,966	29.1	57,211	0	0		
1931	1,946	31.2	60,715	0.5	305.1	Trace	Trace
1932	1,965	30.0	58,950	Trace	Trace		
1933	1,651	17.0	28,067	0	0	3.0	868.0
1934	1,350	13.5	18,225	0	0		
1935	1,485	26.0	38,610	Trace	Trace	20.0	9,652.4
1936	1,426	27.0	35,502	Trace	Trace		
1937	1,483	31.0	45,973	Trace	Trace	Trace	Trace
1938	1,310	26.0	34,060	Trace	Trace	1.0	344.0
1939	1,009	25.0	25,225	1.0	254.8	Trace	Trace
1940	1,110	45.0	49,500	0	0		
1941	1,375	41.0	56,375	3.0	1,743.5		
1942	1,444	37.0	53,428	Trace	Trace	12.0	7,285.6
1943	1,444	23.0	33,212	Trace	Trace		
1944	1,172	25.6	30,003	Trace	Trace		
1945	1,371	42.0	57,582	Trace	Trace	6.0	2,450.3
1946	1,412	30.9	55,068	Trace	Trace		
1947	1,172	30.0	35,160	Trace	Trace		
1948	1,289	41.0	52,849	0	0		
1949	1,353	37.0	50,061	0	0	Trace	Trace
1950	1,272	36.0	45,792	0	0		
1951	1,285	37.0	47,545	0	0		
1952	1,298	35.5	46,079	0	0	Trace	Trace
1953	1,181	36.5	43,106	1.0	439.8	1.0	439.8
1954	1,252	42.5	53,210	1.0	537.5	Trace	Trace
1955	1,302	51.0	66,402	0.5	340.5	2.0	1,362.1
1956	1,250	45.0	56,250	1.0	568.2		
1957	1,025	34.0	34,850	Trace	Trace	20.0	8,712.4
1958	943	51.0	48,093	Trace	Trace		
1959	877	38.5	33,764	Trace	Trace	Trace	Trace
1960	807	59.0	47,613	Trace	Trace	Trace	Trace
1961	605	44.0	26,620	0	0	0	0
1962	605	55.0	33,275	0	0	2.0	679.1
1963	484	62.0	30,008	0	0	0	0
1964	348	44.0	15,312	0	0	0	0
1965	336	52.0	17,472	Trace	Trace	Trace	Trace
1966	360	51.0	18,360	Trace	Trace	Trace	Trace
1967	299	48.0	14,352	0	0	0	0
1968	345	63.0	21,735	0	0	0	0
1969	334	59.0	19,706	0	0	0	0
1970	291	53.0	15,423	0	0	Trace	Trace
1971	280	63.0	17,640	Trace	Trace	Trace	Trace
1972	201	59.0	11,859	0	0	0	0
1973	261	48.0	12,528	Trace	Trace	Trace	Trace
1974	215	50.0	10,750	0	0	Trace	Trace
1975	250	52.0	13,000	Trace	Trace	Trace	Trace
1976	220	48.0	10,560	Trace	Trace	Trace	Trace

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production bu/A 1,000 bu		Losses in yield			
				Stem rust		Crown rust	
				%	1,000 bu	%	1,000 bu
IOWA -- OATS							
1919	5,670	34.6	196,182	1.0	2,001.8	1.0	2,001.8
1920	5,894	39.0	229,866	0.5	1,160.9	0.5	1,160.9
1921	6,340	26.0	164,840			1.5	2,510.2
1922	5,874	37.1	217,925	1.0	2,223.7	1.0	2,223.7
1923	5,639	36.1	203,004	1.0	2,071.5	1.0	2,071.5
1924	5,855	42.0	245,910	Trace	Trace	Trace	Trace
1925	6,221	39.2	243,863	0.7	1,719.1	Trace	Trace
1926	6,218	31.5	195,867	10.0	21,763.0	Trace	Trace
1927	6,001	32.0	192,032	0.8	1,580.5	2.0	3,951.3
1928	6,001	40.0	240,040	0	0	0	0
1929	5,997	36.0	215,892	Trace	Trace	2.0	4,405.9
1930	6,303	37.0	233,211	0.2	2,336.8	Trace	
1931	6,120	31.0	189,720	0.5	953.4	Trace	Trace
1932	6,181	35.5	219,426	1.0	2,239.0	1.0	2,239.0
1933	6,119	22.0	134,618	Trace	Trace	Trace	Trace
1934	4,682	12.5	58,525	Trace	Trace	0	0
1935	6,100	34.5	210,450	1.0	2,663.9	20.0	53,278.5
1936	5,642	28.0	157,976	0.5	793.8	Trace	Trace
1937	5,913	46.0	271,998	0.5	1,380.7	1.0	2,761.4
1938	5,972	35.0	209,020	0.5	1,384.2	24.0	66,443.0
1939	5,076	30.5	154,818	Trace	Trace	3.5	5,615.2
1940	5,178	38.5	199,353	Trace	Trace	0	0
1941	5,437	32.5	176,702	Trace	Trace	30.0	75,792.3
1942	5,165	39.0	201,435	Trace	Trace	10.0	22,381.6
1943	4,907	36.5	179,106	5.0	9,426.6	12.5	25,586.5
1944	4,711	28.7	135,206	0.8	1,124.4	3.0	4,216.4
1945	5,323	38.5	204,936	3.0	6,505.9	1.5	3,252.9
1946	5,642	37.5	211,575	Trace	Trace	Trace	Trace
1947	5,247	31.0	162,657	Trace	Trace	Trace	Trace
1948	6,086	45.0	273,870	Trace	Trace	Trace	Trace
1949	6,269	38.6	241,983	Trace	Trace	12.0	32,997.6
1950	6,520	41.5	270,580	2.0	6,764.5	18.0	60,880.5
1951	5,672	33.5	190,012	Trace	Trace	20.0	47,503.0
1952	6,069	35.0	212,415	Trace	Trace	8.0	18,470.8
1953	5,766	25.5	142,033	10.0	23,672.2	30.0	71,016.5
1954	6,040	37.5	226,500	11.0	31,143.7	9.0	25,481.2
1955	5,798	44.5	258,011	3.0	8,147.7	2.0	5,431.8
1956	4,986	31.0	154,566	0.5	776.7	Trace	Trace
1957	5,185	42.0	217,770	Trace	Trace	7.5	17,657.0
1958	4,822	45.5	219,401	Trace	Trace	1.5	3,341.1
1959	4,316	43.5	187,746	0	0	0.5	943.4
1960	4,057	40.5	164,308	0	0	Trace	Trace
1961	3,321	43.5	144,464	0	0	Trace	Trace
1962	3,012	43.0	129,516	Trace	Trace	1.0	1,308.2
1963	2,800	45.0	126,000	Trace	Trace	3.0	3,896.9
1964	2,352	50.0	117,600	0.5	603.1	2.0	2,412.3
1965	1,999	54.0	107,946	Trace	Trace	1.0	1,084.0
1966	1,919	53.0	101,707	Trace	Trace	Trace	Trace
1967	1,742	54.0	94,068	Trace	Trace	Trace	Trace
1968	1,841	60.0	110,460	0	0	0.5	555.0
1969	1,840	50.0	92,000	0	0	Trace	Trace
1970	1,711	54.0	92,394	0	0	2.0	1,885.6
1971	1,550	59.0	91,450	0	0	Trace	Trace
1972	1,250	56.0	70,000	0	0	0.1	70.1
1973	1,325	48.0	63,600	0	0	0	0
1974	1,600	55.0	88,000	0	0	Trace	Trace
1975	1,540	51.0	78,540	Trace	Trace	Trace	Trace
1976	1,475	59.0	87,025	Trace	Trace	Trace	Trace

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Losses in yield					
		Crop production		Stem rust		Crown rust	
		bu/A	1,000 bu	%	1,000 bu	%	1,000 bu
KANSAS -- OATS							
1919	1,574	28.1	44,229	Trace	Trace	Trace	Trace
1920	2,127	30.7	65,299				
1921	1,894	20.5	38,827	Trace	Trace	1.0	392.2
1922	1,494	18.5	27,639	Trace	Trace	Trace	Trace
1923	1,338	26.1	34,922	Trace	Trace	Trace	Trace
1924	1,369	25.0	34,225	1.0	345.7		
1925	1,712	23.0	39,376	0	0	Trace	Trace
1926	1,626	21.6	35,122	Trace	Trace	0	0
1927	1,301	23.5	30,574	Trace	Trace	5.0	1,609.2
1928	1,301	29.0	37,729	Trace	Trace	1.0	381.1
1929	1,197	23.6	28,249	Trace	Trace	30.0	12,106.5
1930	1,334	27.5	36,685	Trace	Trace	1.0	370.6
1931	1,561	28.0	43,708	Trace	Trace	Trace	Trace
1932	1,608	21.5	34,572	Trace	Trace	Trace	Trace
1933	1,528	17.0	25,976	0	0	Trace	Trace
1934	1,238	13.0	16,094	0	0	0	0
1935	1,540	26.5	40,810	2.0	868.3	4.0	1,736.6
1936	1,694	19.0	32,186	Trace	Trace	Trace	Trace
1937	1,474	24.0	35,376	Trace	Trace	Trace	Trace
1938	1,518	23.5	35,673	3.0	1,305.1	15.0	6,525.4
1939	1,366	15.5	21,173	Trace	Trace	0	0
1940	1,557	30.0	46,710	1.0	471.8		
1941	1,619	24.0	38,856	Trace	Trace	6.0	2,480.2
1942	1,813	25.5	46,232	Trace	Trace		
1943	1,976	24.0	47,424	1.0	479.0	Trace	Trace
1944	1,561	16.2	25,288	10.0	2,809.7	Trace	Trace
1945	968	17.5	16,940	12.0	2,823.3	16.0	3,764.4
1946	1,423	28.5	40,556	0	0	0	0
1947	1,395	29.0	40,455	1.0	408.6	0	0
1948	1,144	22.0	25,168	Trace	Trace	Trace	Trace
1949	858	19.4	16,645	Trace	Trace	15.0	2,937.3
1950	901	21.0	18,921	Trace	Trace	0	0
1951	748	18.0	13,464	0	0	0	0
1952	838	20.5	17,179	Trace	Trace	0	0
1953	989	21.5	21,264	0.2	42.7	0.2	42.7
1954	1,080	33.0	35,640	0	0	Trace	Trace
1955	1,123	27.5	30,882	5.0	1,625.4	Trace	Trace
1956	1,078	21.5	23,177	Trace	Trace	0	0
1957	1,121	30.5	34,190	1.0	363.7	5.0	1,818.6
1958	516	26.0	13,416	0	0	0	0
1959	681	24.0	16,344	0	0	0	0
1960	422	34.0	14,348	0	0	0	0
1961	549	31.0	17,019	Trace	Trace	0	0
1962	351	22.5	7,898	0	0	Trace	Trace
1963	344	30.0	10,320	0	0		
1964	316	29.0	9,164	Trace	Trace	Trace	Trace
1965	205	32.0	6,560	Trace	Trace	Trace	Trace
1966	215	28.0	6,020	0	0	0	0
1967	161	36.0	5,796	0	0	0	0
1968	180	38.0	6,840	0	0	0	0
1969	160	38.0	6,080	0	0	0	0
1970	250	41.0	10,250	0	0	0	0
1971	217	45.0	9,765	0	0	0	0
1972	167	44.0	7,348	Trace	Trace	Trace	Trace
1973	100	40.0	4,000	0	0	Trace	Trace
1974	240	31.0	7,440	0	0	Trace	Trace
1975	150	40.0	6,000	Trace	Trace	1.0	60.6
1976	240	42.0	10,080	Trace	Trace	Trace	Trace

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Losses in yield					
		Crop production		Stem rust		Crown rust	
		bu/A	1,000 bu	%	1,000 bu	%	1,000 bu
MICHIGAN -- OATS							
1919	1,425	25.0	35,625			3.0	1,101.8
1920	1,485	39.6	58,806			1.0	594.0
1921	1,544	18.2	28,101	10.0	3,122.3		
1922	1,498	34.0	50,932	2.0	1,039.4		
1923	1,528	32.0	48,896	5.0	2,600.8	1.0	520.2
1924	1,513	38.3	58,704	1.0	593.0	Trace	Trace
1925	1,619	32.0	51,808	0.5	260.3	Trace	Trace
1926	1,570	33.0	51,810	7.5	4,200.8	Trace	Trace
1927	1,617	33.5	54,170	2.0	1,116.9	1.0	558.4
1928	1,633	35.8	58,461	Trace	Trace	Trace	Trace
1929	1,372	29.8	40,886	1.0	413.0	Trace	Trace
1930	1,354	36.0	48,744	0.5	244.9	Trace	Trace
1931	1,435	30.5	43,768	12.0	5,891.9	0.2	99.7
1932	1,335	27.0	36,045	0.7	254.1	Trace	Trace
1933	1,121	21.0	23,541	Trace	Trace	Trace	Trace
1934	1,222	23.5	28,717	0.5	144.3	Trace	Trace
1935	1,402	33.5	46,967	Trace	Trace	Trace	Trace
1936	1,262	25.5	32,182	Trace	Trace	0.1	32.2
1937	1,224	28.0	34,272	0.1	34.3	0.1	34.3
1938	1,224	35.0	42,840	0.5	215.5	0.1	43.1
1939	1,139	37.5	42,712	Trace	Trace	Trace	Trace
1940	1,350	45.5	61,425	Trace	Trace		
1941	1,350	34.0	45,900	Trace	Trace		
1942	1,498	45.0	67,410	Trace	Trace		
1943	1,138	21.0	23,898	0.5	126.4	5.0	1,264.4
1944	1,309	32.9	43,066	0.5	216.4	Trace	Trace
1945	1,466	40.0	58,640	1.5	893.0	Trace	Trace
1946	1,525	45.5	69,388	0.1	69.4	0	0
1947	1,052	35.0	36,820	Trace	Trace		
1948	1,420	37.5	53,250	Trace	Trace	Trace	Trace
1949	1,448	34.5	49,956	0	0	0.5	251.0
1950	1,347	37.5	50,512	0.3	152.0	Trace	Trace
1951	1,387	38.5	53,400	Trace	Trace		
1952	1,401	33.0	46,233	Trace	Trace		
1953	1,247	34.0	42,398	1.0	428.3	Trace	Trace
1954	1,272	37.5	47,700	0.3	143.5	Trace	Trace
1955	1,297	44.0	57,068	Trace	Trace		
1956	1,025	34.0	34,850	1.5	530.7	0	0
1957	1,035	39.5	40,882	Trace	Trace	7.0	3,077.1
1958	1,035	51.0	52,785	Trace	Trace	0	0
1959	890	42.5	37,825	Trace	Trace	Trace	Trace
1960	735	51.0	37,485	Trace	Trace	Trace	Trace
1961	847	46.0	38,962	Trace	Trace	Trace	Trace
1962	754	49.0	36,946	Trace	Trace	Trace	Trace
1963	724	49.0	35,476	0	0	0	0
1964	644	49.5	31,878	Trace	Trace	Trace	Trace
1965	535	49.0	26,215	Trace	Trace	Trace	Trace
1966	563	44.0	24,772	Trace	Trace	Trace	Trace
1967	462	53.0	24,486	Trace	0	Trace	0
1968	559	39.0	32,981	0	0	Trace	0
1969	458	57.0	26,106	Trace	Trace	Trace	Trace
1970	467	58.0	27,086	Trace	Trace	Trace	Trace
1971	415	47.0	19,505	Trace	Trace	Trace	Trace
1972	320	55.0	17,600	Trace	Trace	Trace	Trace
1973	330	50.0	16,500	0	0	Trace	Trace
1974	350	55.0	19,250	0	0	1.0	194.4
1975	370	56.0	20,720	Trace	Trace	Trace	Trace
1976	385	51.0	19,635	Trace	Trace	Trace	Trace

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Crown rust	
				bu/A	1,000 bu	%	1,000 bu
MINNESOTA -- OATS							
1919	3,275	28.0	91,700	2.0	1,890.7	1.0	945.4
1920	3,702	37.5	138,825	1.0	1,402.3	Trace	Trace
1921	4,145	24.0	99,480	5.0	5,235.8		
1922	4,021	35.5	142,746	2.0	2,913.2	Trace	Trace
1923	4,142	37.0	153,254	1.0	1,549.6	0.1	155.0
1924	4,629	43.0	199,042	0.5	1,000.2	Trace	Trace
1925	4,770	42.0	200,340	Trace	Trace	Trace	Trace
1926	4,532	28.5	129,162	10.0	14,351.3	Trace	Trace
1927	4,350	26.8	116,580	15.0	24,981.3	15.0	24,981.3
1928	4,089	37.5	153,338	Trace	Trace	0	0
1929	4,212	36.5	153,738	3.0	4,754.8	Trace	Trace
1930	4,442	37.5	166,575	0.5	837.01	Trace	Trace
1931	4,575	27.0	123,525	1.0	1,247.7	Trace	Trace
1932	4,575	36.0	164,700	1.5	2,508.2	Trace	Trace
1933	4,484	21.5	96,406	Trace	Trace	Trace	Trace
1934	3,767	19.3	72,703	5.0	3,826.4	0	0
1935	4,897	37.0	181,189	1.0	1,848.9	1.0	1,848.9
1936	4,016	23.5	94,376	Trace	Trace	0	0
1937	4,239	39.0	165,321	0	0	0	0
1938	3,900	33.0	128,700	Trace	Trace	8.0	11,191.3
1939	3,939	38.5	151,652	Trace	Trace	1.0	1,531.8
1940	4,254	42.5	180,795	Trace	Trace		
1941	4,297	27.0	116,019	Trace	Trace		
1942	4,082	43.5	177,567	Trace	Trace		
1943	4,327	33.0	142,791	3.0	4,416.2		
1944	4,456	32.7	145,711	1.0	1,471.8		
1945	5,392	45.0	242,640	1.0	2,450.9	Trace	Trace
1946	5,338	37.0	197,506	Trace	Trace		
1947	4,537	36.0	163,332	1.0	1,649.8		
1948	4,855	42.5	206,338	Trace	Trace		
1949	4,952	35.5	175,796	Trace	Trace	Trace	Trace
1950	5,101	37.0	188,737	1.0	1,906.4		
1951	4,948	43.0	212,764	Trace	Trace		
1952	5,245	39.0	204,555	Trace	Trace		
1953	5,140	31.5	161,910	25.0	53,970.0	Trace	Trace
1954	5,191	34.5	179,090	10.0	19,898.8	Trace	Trace
1955	4,828	41.0	197,948	7.0	14,899.3	Trace	Trace
1956	4,297	39.0	167,583	1.0	1,692.8	Trace	Trace
1957	3,996	42.0	167,832	Trace	Trace	7.0	12,632.5
1958	3,836	54.0	207,144	Trace	Trace	0	0
1959	3,681	45.0	165,645	Trace	Trace	Trace	Trace
1960	3,865	49.0	189,385	0	0		
1961	3,478	46.0	159,988	0	0		
1962	3,235	45.5	147,192	Trace	Trace	5.0	7,746.9
1963	3,329	51.0	169,779	Trace	Trace		
1964	3,129	46.0	143,934	Trace	Trace	Trace	Trace
1965	3,004	55.0	165,220	Trace	Trace	Trace	Trace
1966	2,974	46.5	138,291	Trace	Trace	2.0	2,822.0
1967	2,885	54.5	157,232	Trace	Trace	1.0	1,588.2
1968	3,058	60.0	183,480	0	0	3.0	5,674.6
1969	3,453	56.0	193,368	0	0	2.0	3,946.3
1970	3,354	50.0	167,700	Trace	Trace	10.0	18,633.3
1971	3,000	59.0	177,000	Trace	Trace	5.0	9,315.8
1972	2,440	51.0	124,440	Trace	Trace	10.0	13,826.7
1973	2,550	56.0	142,800	Trace	Trace	5.0	7,515.8
1974	2,020	48.0	96,960	Trace	Trace	Trace	Trace
1975	2,000	50.5	101,000	0.5	528.8	4.0	4,230.4
1976	2,060	45.0	92,700	Trace	Trace	Trace	Trace

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Crown rust	
				bu/A	1,000 bu	%	1,000 bu
MISSOURI -- OATS							
1919	1,675	27.0	45,225	Trace	Trace	Trace	Trace
1920	1,918	30.5	58,499				
1921	2,148	20.0	42,960				
1922	1,200	16.0	19,200	Trace	Trace		
1923	1,380	25.0	34,500				
1924	1,630	25.0	40,750				
1925	1,923	26.0	49,998				
1926	2,173	20.0	43,460	Trace	Trace	0	0
1927	1,565	17.0	26,605	Trace	Trace	Trace	Trace
1928	1,606	28.0	44,968	Trace	Trace	Trace	Trace
1929	1,535	22.0	33,770	Trace	Trace	1.0	341.1
1930	1,727	24.0	41,448	Trace	Trace	0.5	208.3
1931	1,979	27.0	53,433	0	0	0.2	107.1
1932	1,939	19.0	36,841	1.0	379.8	2.0	759.6
1933	1,764	18.5	32,634	Trace	Trace	1.0	329.6
1934	1,235	11.0	13,585	Trace	Trace	Trace	Trace
1935	1,341	22.0	29,502	1.0	331.5	10.0	3,314.8
1936	1,676	17.5	29,330	Trace	Trace	Trace	Trace
1937	1,550	28.0	43,400	Trace	Trace		
1938	1,938	24.0	46,512	1.0	469.8		
1939	1,860	22.0	40,920	Trace	Trace		
1940	1,730	28.5	49,305	Trace	Trace		
1941	2,076	25.5	52,938	Trace	Trace		
1942	2,201	27.0	59,427	Trace	Trace		
1943	2,250	23.0	51,750	Trace	Trace		
1944	1,698	17.9	30,394	Trace	Trace		
1945	1,511	49.0	28,709	3.0	1,050.3	15.0	5,251.5
1946	1,813	21.0	57,133	Trace	Trace		
1947	1,309	23.0	30,107	3.5	1,091.9		
1948	1,623	26.5	43,010	Trace	Trace		
1949	1,396	23.0	32,108	Trace	Trace	Trace	Trace
1950	1,452	30.0	43,560	Trace	Trace	3.0	1,347.2
1951	1,074	23.0	24,702	Trace	Trace	Trace	Trace
1952	1,053	22.0	23,166	0	0		
1953	1,116	25.5	28,458	1.8	521.6		
1954	1,362	37.5	51,075	Trace	Trace	Trace	Trace
1955	1,416	36.0	50,976	Trace	Trace	0	0
1956	1,260	31.0	39,060	Trace	Trace		
1957	995	32.0	31,840	Trace	Trace	10.0	3,537.8
1958	657	32.0	21,024	Trace	Trace	Trace	Trace
1959	624	26.5	16,536	0	0	Trace	Trace
1960	500	35.0	17,500	0	0	0	0
1961	475	35.0	16,765	0	0	Trace	Trace
1962	316	29.0	9,164	0	0		
1963	348	42.0	14,616	Trace	Trace		
1964	310	38.0	11,780	Trace	Trace	3.0	364.3
1965	189	36.0	6,804	Trace	Trace	Trace	Trace
1966	246	40.0	9,840	Trace	Trace	Trace	Trace
1967	220	39.0	8,850	0	0	0	0
1968	252	45.0	11,340	Trace	Trace	0.5	56.9
1969	170	37.0	6,290	0	0	0	0
1970	224	41.0	9,184	0	0	Trace	Trace
1971	240	47.0	11,280	0	0	Trace	Trace
1972	150	46.0	6,900	0	0	Trace	Trace
1973	41	34.0	1,394	0	0	0	0
1974	140	31.0	4,340	0	0	0	0
1975	100	39.0	3,900	Trace	Trace	Trace	Trace
1976	170	40.0	6,800	Trace	Trace	Trace	Trace

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Crown rust	
				%	1,000 bu	%	1,000 bu
MONTANA -- OATS							
1919	650	9.4	6,110	0	0	0	0
1920	533	22.0	11,726	Trace	Trace	Trace	Trace
1921	618	24.0	14,832	1.0	149.8	0	0
1922	660	32.0	21,120	0	0		
1923	673	33.0	22,209	0	0	0	0
1924	570	29.5	16,815	0	0	0	0
1925	605	22.5	13,612			0	0
1926	641	26.0	16,666	Trace	Trace	0	0
1927	596	40.0	23,840	0	0	0	0
1928	554	36.5	20,221	0	0	0	0
1929	554	17.0	9,418	0	0		
1930	305	19.5	5,948	Trace	Trace		
1931	183	17.5	3,202	0	0	Trace	Trace
1932	403	25.0	10,075	Trace	Trace	0	0
1933	383	17.0	6,511	0	0	0	0
1934	306	24.0	7,344	0	0	0	0
1935	348	22.5	2,830	0	0	0	0
1936	136	16.5	2,244	0	0	0	0
1937	170	24.0	4,080	0	0	0	0
1938	255	36.0	9,180	0	0	0	0
1939	291	27.5	8,002	0	0	0	0
1940	371	28.5	10,574				
1941	404	36.0	14,544	0	0		
1942	521	39.0	20,319	0	0		
1943	448	40.0	17,920	0	0		
1944	425	34.8	14,790	Trace	Trace		
1945	323	29.0	9,367	Trace	Trace		
1946	352	31.0	10,912	0	0		
1947	338	31.0	10,478	0	0		
1948	324	37.0	11,988	0	0		
1949	200	30.0	6,000	0	0		
1950	326	37.0	12,062	Trace	Trace		
1951	231	32.0	7,392	0	0		
1952	240	32.5	7,800	0	0		
1953	262	33.0	8,646	1.5	131.6		
1954	280	29.5	8,260	1.0	83.4		
1955	297	36.5	10,840	Trace	Trace		
1956	202	35.0	7,070	0	0	0	0
1957	279	34.0	9,486	0	0		
1958	254	38.0	9,652	0	0		
1959	249	31.5	7,844	0	0		
1960	238	29.0	6,902	0	0		
1961	148	34.0	5,032	0	0	0	0
1962	263	41.0	10,783	0	0	0	0
1963	242	40.5	9,801	0	0		
1964	259	38.5	9,972	0	0	0	0
1965	254	44.0	11,176	0	0	0	0
1966	194	38.5	7,469	0	0	0	0
1967	140	37.0	5,180	0	0	0	0
1968	182	40.0	7,280	0	0	0	0
1969	291	50.0	14,550	0	0	0	0
1970	428	42.0	17,976	0	0	Trace	Trace
1971	210	40.0	8,400	Trace	Trace	0	0
1972	246	48.0	11,808	Trace	Trace	Trace	Trace
1973	270	38.0	10,260	0	0	0.1	10.3
1974	245	36.0	8,820	0	0	0	0
1975	250	43.0	10,750	0	0	0	0
1976	230	47.0	10,810	Trace	Trace	0	0

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Crown rust	
				%	1,000 bu	%	1,000 bu
NEBRASKA -- OATS							
1919	2,133	32.8	69,962	3.0	2,186.3	1.0	728.8
1920	2,400	34.6	83,040				
1921	2,585	27.1	70,054				
1922	2,408	23.3	56,106	Trace	Trace	Trace	Trace
1923	2,456	33.0	81,048	Trace	Trace	Trace	Trace
1924	2,456	28.0	68,768	0	0	0	0
1925	2,699	27.4	73,953	Trace	Trace		
1926	2,537	20.7	52,516	Trace	Trace		
1927	2,441	28.6	69,813	Trace	Trace	1.0	705.2
1928	2,392	33.0	78,936	Trace	Trace	Trace	Trace
1929	2,480	34.8	86,304	Trace	Trace	Trace	Trace
1930	2,485	32.2	72,065	Trace	Trace	Trace	Trace
1931	2,311	21.5	49,686	Trace	Trace		
1932	2,473	30.0	74,190	5.0	3,904.7		
1933	2,226	10.5	23,373	Trace	Trace		
1934	1,224	7.0	8,568	Trace	Trace		
1935	2,551	28.5	72,704				
1936	1,658	11.5	19,067	Trace	Trace		
1937	1,697	21.0	35,637	0	0	0	0
1938	1,867	29.5	55,076	Trace	Trace		
1939	1,419	14.5	20,576	Trace	Trace		
1940	1,426	24.0	35,760				
1941	1,840	29.5	54,280				
1942	1,766	33.0	58,278	Trace	Trace		
1943	2,172	33.0	71,676	1.0	724.0		
1944	2,085	16.8	35,028	10.0	3,892.0	Trace	Trace
1945	2,439	31.5	76,828	8.0	6,680.6		
1946	2,561	28.0	71,708	Trace	Trace		
1947	2,279	27.5	62,672	3.0	1,938.3		
1948	2,621	28.0	73,388	Trace	Trace		
1949	2,228	20.5	45,674	Trace	Trace	Trace	Trace
1950	2,562	24.0	61,488	Trace	Trace		
1951	2,101	27.0	56,727	Trace	Trace		
1952	2,374	19.0	45,106	0	0		
1953	2,232	18.5	41,292	Trace	Trace	Trace	Trace
1954	2,254	28.0	63,112	2.0	1,288.0		
1955	2,024	26.0	52,754	Trace	Trace		
1956	1,339	12.0	16,068	Trace	Trace	0	0
1957	1,500	33.5	50,250	0	0	Trace	Trace
1958	1,380	35.0	48,300	0	0		
1959	1,277	25.0	31,925	0	0	Trace	Trace
1960	1,213	35.5	43,062	0	0	3.0	1,331.8
1961	1,067	32.0	34,144	0	0		
1962	971	33.0	32,043	0	0	Trace	Trace
1963	913	28.5	26,020	0	0	Trace	Trace
1964	776	29.5	22,892	0	0	0	0
1965	772	40.0	28,880	0	0	0	0
1966	543	40.0	21,720	0	0	0	0
1967	451	43.5	19,618	0	0	0	0
1968	483	26.5	12,800	0	0	0	0
1969	548	43.5	23,838	0	0	0	0
1970	578	42.0	24,276	0	0	0	0
1971	517	51.0	26,367	0	0	Trace	Trace
1972	402	49.0	19,698	Trace	Trace	Trace	Trace
1973	460	48.0	22,080	0	0	Trace	Trace
1974	560	47.0	26,320	0	0	Trace	Trace
1975	570	49.0	27,930	Trace	Trace	1.0	282.1
1976	640	42.0	26,800	Trace	Trace	0	0

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Losses in yield					
		Crop production		Stem rust		Crown rust	
		bu/A	1,000 bu	%	1,000 bu	%	1,000 bu
NORTH DAKOTA -- OATS							
1919	2,280	15.5	35,340	5.0	1,860.0	Trace	Trace
1920	2,518	24.0	60,432	1.0	610.4	Trace	Trace
1921	2,568	19.0	48,792				
1922	2,388	33.0	78,804	5.0	4,169.5	0.5	417.0
1923	2,388	23.0	54,924	5.0	3,051.3	5.0	3,051.3
1924	2,616	34.0	88,944	1.5	1,354.5	Trace	Trace
1925	2,354	27.0	63,558	1.0	642.0	Trace	Trace
1926	2,024	17.0	34,408	1.1	382.7	Trace	Trace
1927	2,125	21.5	45,688	10.0	5,711.0	10.0	5,711.0
1928	1,934	31.0	59,954	0.8	488.4	1.0	610.5
1929	1,876	18.0	33,768	Trace	Trace	Trace	Trace
1930	1,827	22.0	40,194	Trace	Trace		
1931	1,498	12.2	18,276	Trace	Trace	Trace	Trace
1932	2,004	21.0	42,084	Trace	Trace	Trace	Trace
1933	1,703	13.0	22,139	0	0	Trace	Trace
1934	766	11.6	8,886	Trace	Trace	Trace	Trace
1935	2,046	25.0	49,104	5.0	2,728.0	5.0	2,428.0
1936	430	11.0	4,730	Trace	Trace	Trace	Trace
1937	1,312	22.5	29,520	0	0	Trace	Trace
1938	1,391	22.5	31,298	0	0	0.5	157.3
1939	1,502	23.5	35,297	Trace	Trace	Trace	Trace
1940	1,659	21.0	34,839	Trace	Trace		
1941	1,808	33.0	59,664	Trace	Trace		
1942	2,025	37.0	74,925	Trace	Trace		
1943	2,086	34.0	70,924	1.0	716.4	Trace	Trace
1944	2,653	33.0	87,549	0.5	439.9	Trace	Trace
1945	2,653	32.5	86,222	2.5	2,210.8		
1946	2,361	26.5	62,566	Trace	Trace		
1947	2,219	29.0	64,351	Trace	Trace		
1948	2,152	28.0	60,256	Trace	Trace		
1949	1,657	20.5	33,968	0	0		
1950	2,088	28.0	58,464	2.0	1,193.1		
1951	1,963	29.0	56,927	Trace	Trace		
1952	1,669	22.5	37,552	Trace	Trace		
1953	1,786	30.5	54,473	5.0	2,867.0		
1954	2,125	23.5	49,938	2.0	1,073.9	5.0	2,684.8
1955	1,955	28.0	54,760	10.0	7,298.7	15.0	10,948.0
1956	1,623	29.5	47,878	Trace	Trace	Trace	Trace
1957	1,850	32.5	60,125	Trace	Trace		
1958	1,924	39.0	75,036	Trace	Trace	Trace	Trace
1959	1,631	24.5	39,960	Trace	Trace	Trace	Trace
1960	1,967	33.5	65,894	0	0		
1961	1,263	23.0	29,049	0	0	0	0
1962	1,886	52.0	98,072	Trace	Trace	2.0	2,001.5
1963	1,852	37.5	69,450	Trace	Trace	Trace	Trace
1964	2,019	43.0	86,817	1.0	895.0	2.0	1,790.0
1965	2,040	52.0	106,080	0	0	Trace	Trace
1966	1,956	41.0	80,196	0	0	0.5	403.0
1967	1,702	36.0	61,272	0	0	0	0
1968	2,110	49.0	103,390	0	0	Trace	Trace
1969	2,490	56.0	139,440	0	0	0	0
1970	2,687	43.0	115,541	1.0	1,375.5	15.0	20,632.3
1971	2,015	55.0	110,825	0	0	10.0	12,313.8
1972	2,107	51.0	107,457	0.1	116.3	7.5	8,722.2
1973	1,800	41.0	73,800	0	0	3.0	2,282.5
1974	1,400	29.0	40,600	Trace	Trace	3.0	1,255.7
1975	1,370	41.0	56,170	Trace	Trace	4.0	2,340.7
1976	1,180	38.0	44,840	Trace	Trace	Trace	Trace

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Crown rust	
				%	1,000 bu	%	1,000 bu
OHIO -- OATS							
1919	1,523	33.5	51,020	0	0	1.0	484.0
1920	1,540	44.2	68,068			Trace	Trace
1921	1,550	23.0	35,650	1.0	363.8	1.0	363.8
1922	1,472	27.0	39,744	0.5	201.7	1.0	403.5
1923	1,516	34.5	52,302	0.5	264.2	0.5	264.2
1924	1,665	41.0	68,265	0.5	344.8	0.5	344.8
1925	2,000	41.5	83,000	0.1	83.2	0.1	83.2
1926	1,980	38.0	75,240	0.1	75.3		
1927	1,900	32.0	60,800	0.5	307.1	0.5	307.1
1928	2,413	37.0	89,281	0.5	405.9	0.5	405.9
1929	1,689	29.5	49,826	0.5	205.9	0.2	100.4
1930	1,726	36.0	62,136	0.2	124.6	0.1	62.3
1931	1,657	37.5	62,138	1.0	627.6	Trace	Trace
1932	1,591	28.5	45,344	0.5	229.0	0.5	229.0
1933	1,273	20.5	36,096	Trace	Trace	1.0	263.6
1934	1,209	21.5	25,994	0.5	131.3	0.5	131.3
1935	1,407	36.0	50,632	Trace	Trace	0.5	254.4
1936	1,210	33.5	40,535	Trace	Trace	Trace	Trace
1937	1,246	28.5	35,511	Trace	Trace	3.0	1,098.3
1938	1,121	33.0	36,993	Trace	Trace	1.5	563.3
1939	1,020	32.5	33,150	Trace	Trace	0.5	166.6
1940	1,009	44.0	44,396	Trace	Trace	Trace	Trace
1941	1,181	43.5	51,374	Trace	Trace	1.0	518.9
1942	1,264	41.0	51,824	Trace	Trace	1.0	523.5
1943	1,213	24.0	29,112	Trace	Trace	1.0	294.1
1944	1,047	33.1	34,656	Trace	Trace	Trace	Trace
1945	1,162	42.5	49,385	Trace	Trace	1.0	498.8
1946	1,348	45.0	60,660	Trace	Trace	Trace	Trace
1947	714	26.0	18,564	Trace	Trace	Trace	Trace
1948	1,171	45.0	52,695	Trace	Trace	0	0
1949	1,265	35.0	44,275	0	0	Trace	Trace
1950	1,075	36.0	38,700	0	0	0	0
1951	1,140	41.0	46,740	0	0	0	0
1952	1,186	37.0	43,882	0	0	0	0
1953	1,044	42.0	43,848	Trace	Trace	Trace	Trace
1954	1,117	45.5	50,824	2.0	1,047.9	1.0	524.0
1955	1,251	51.0	63,801	1.0	657.7	2.0	1,315.5
1956	1,101	43.0	47,343	3.0	1,510.9	3.0	1,510.9
1957	1,101	38.0	41,838	1.0	431.3	2.0	862.6
1958	1,068	52.0	55,536	Trace	Trace	0.5	279.1
1959	1,100	45.0	49,500	Trace	Trace	0.5	248.7
1960	1,045	63.0	65,835	0	0		
1961	737	50.0	36,850	Trace	Trace	Trace	Trace
1962	833	58.0	48,314	0	0		
1963	775	65.0	50,375	0	0	0	0
1964	659	55.0	36,245	0	0	0	0
1965	626	56.0	35,056	0	0	0	0
1966	642	51.0	32,742	0	0	Trace	Trace
1967	488	50.0	24,400	Trace	Trace	Trace	Trace
1968	683	66.0	45,078	0	0	Trace	0
1969	560	58.0	32,480	0	0	Trace	Trace
1970	515	58.0	29,870	0	0	Trace	Trace
1971	520	67.0	34,840	0	0	0	0
1972	367	61.0	22,387	Trace	Trace	Trace	Trace
1973	540	48.0	25,920	0	0	Trace	Trace
1974	490	60.0	29,400	0	0	Trace	Trace
1975	500	61.0	30,500	Trace	Trace	Trace	Trace
1976	500	55.0	27,500	0	0	Trace	Trace

Table 2.--Estimated loss of yield caused by oat rusts by State and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Crown rust	
				bu/A	1,000 bu	%	1,000 bu
OKLAHOMA -- OATS							
1919	1,425	33.0	47,025	2.0	968.6	1.0	484.8
1920	1,650	33.0	54,450				
1921	1,765	20.0	35,300			1.5	537.6
1922	1,500	20.0	30,000			Trace	Trace
1923	1,200	20.0	24,000				
1924	1,200	25.0	30,000	1.0	303.0		
1925	1,140	23.0	26,220				
1926	1,340	28.0	37,520				
1927	1,112	19.0	21,128				
1928	890	26.0	23,140				
1929	792	26.0	20,592				
1930	1,053	24.5	28,798				
1931	1,516	28.5	43,206				
1932	1,334	18.0	24,012				
1933	1,161	18.5	21,478				
1934	1,300	15.5	20,150				
1935	1,433	25.0	35,825				
1936	1,270	16.0	20,320	Trace	Trace	1.5	309.4
1937	1,334	20.5	27,347	Trace	Trace	0	0
1938	1,307	21.0	27,447	Trace	Trace	2.0	560.1
1939	1,242	17.0	21,114	Trace	Trace	1.0	213.3
1940	1,537	23.0	35,351	Trace	Trace		
1941	1,400	18.5	25,900				
1942	1,260	19.0	23,940	Trace	Trace		
1943	1,273	18.0	22,914	Trace	Trace		
1944	1,533	20.2	30,967	2.0	632.0	Trace	Trace
1945	1,027	19.0	19,513	2.0	398.2	Trace	Trace
1946	1,089	21.0	22,869	Trace	Trace		
1947	1,231	23.5	28,928	Trace	Trace	Trace	Trace
1948	714	16.5	11,781	0.5	59.2		
1949	514	18.0	9,252	1.0	93.4	Trace	Trace
1950	473	16.5	7,804	1.0	78.8	Trace	Trace
1951	236	16.0	3,776	Trace	Trace		
1952	340	21.0	7,140	Trace	Trace		
1953	534	21.5	11,481	Trace	Trace		
1954	838	26.0	21,788	1.0	220.1	Trace	Trace
1955	704	17.0	11,968	5.0	625.9	Trace	Trace
1956	683	19.0	12,977	Trace	Trace	0	0
1957	731	20.0	14,620	2.0	328.5	9.0	1,478.4
1958	760	30.5	23,180	0	0	Trace	Trace
1959	532	24.5	13,034	0	0	Trace	Trace
1960	425	29.0	12,325	0	0	Trace	Trace
1961	469	29.5	13,836	0	0	Trace	Trace
1962	319	18.5	5,902	0	0	0	0
1963	217	22.0	4,774	0	0		
1964	291	28.5	8,294	0	0	Trace	Trace
1965	227	34.0	7,718	0	0	Trace	Trace
1966	156	32.0	4,992	0	0	0	0
1967	112	30.0	3,360	0	0	0	0
1968	132	34.0	4,488	0	0	0	0
1969	100	43.0	4,300	Trace	Trace	Trace	Trace
1970	185	40.0	7,400	Trace	Trace	Trace	Trace
1971	139	31.0	4,309	0	0	Trace	Trace
1972	155	37.5	5,813	Trace	Trace	Trace	Trace
1973	194	41.0	7,954	Trace	Trace	Trace	Trace
1974	140	28.0	3,920	0	0	Trace	Trace
1975	120	33.0	3,960	Trace	Trace	Trace	Trace
1976	132	45.0	5,940	Trace	Trace	0	0

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Crown rust	
				%	1,000 bu	%	1,000 bu
PENNSYLVANIA -- OATS							
1919	1,189	38.5	45,825	Trace	Trace	1.0	368.2
1920	1,210	39.0	47,190	0	0	0	0
1921	1,238	28.5	35,283	Trace	Trace	Trace	Trace
1922	1,170	34.0	39,780	Trace	Trace	Trace	Trace
1923	1,170	29.0	33,930	Trace	Trace	1.0	342.7
1924	1,076	36.0	38,736	1.0	395.3	1.0	395.3
1925	1,157	35.0	40,495	1.5	619.8	0.5	206.6
1926	1,111	32.0	35,552	1.0	359.1	Trace	Trace
1927	1,100	36.0	39,600	1.0	404.1	1.0	404.1
1928	1,067	32.5	34,678	0.5	174.3	Trace	Trace
1929	1,014	29.5	29,913	0.5	151.8	1.0	303.7
1930	945	34.4	32,602	0	0	0	0
1931	954	29.5	28,143	0	0	0	0
1932	944	25.5	24,072	0.5	121.6	0.5	126.5
1933	925	22.5	20,812	Trace	Trace	0.5	104.6
1934	906	27.5	24,915	Trace	Trace	0.5	125.2
1935	915	29.0	26,535	Trace	Trace	0.5	133.3
1936	906	26.5	24,009	Trace	Trace	Trace	Trace
1937	915	27.0	24,705	8.0	2,150.6	0.1	26.9
1938	915	33.5	30,652	3.0	949.0	0.1	31.6
1939	906	29.0	26,274	Trace	Trace	0.1	26.3
1940	842	35.0	29,470	Trace	Trace	Trace	Trace
1941	876	34.5	30,222	Trace	Trace	Trace	Trace
1942	867	30.0	26,010	Trace	Trace	Trace	Trace
1943	763	19.5	14,878	Trace	Trace	20.0	3,719.5
1944	844	29.0	24,476	Trace	Trace	Trace	Trace
1945	802	30.5	24,461	0.25	72.2	15.0	4,329.4
1946	826	35.5	29,323	Trace	Trace	3.0	906.9
1947	661	39.0	19,169	0	0	0.45	86.6
1948	720	38.0	27,360	Trace	Trace	Trace	Trace
1949	756	30.5	23,058	0	0	8.0	2,005.0
1950	733	38.0	27,854	Trace	Trace	10.0	3,094.9
1951	770	42.0	32,340	0	0	0	0
1952	755	29.0	21,875	0.25	54.9	Trace	Trace
1953	740	37.0	27,380	0.3	82.4	Trace	Trace
1954	777	41.5	32,246	0.5	162.0	Trace	Trace
1955	755	42.0	31,710	Trace	Trace	Trace	Trace
1956	717	38.0	27,246	Trace	Trace	0.5	136.8
1957	731	39.0	28,509	Trace	Trace	0.5	143.2
1958	680	43.5	29,580	Trace	Trace	0.5	148.6
1959	680	45.0	30,600	Trace	Trace	1.0	309.1
1960	679	42.5	28,858	Trace	Trace	0.5	145.0
1961	620	47.0	29,140	Trace	Trace	Trace	Trace
1962	601	42.5	25,542	Trace	Trace	Trace	Trace
1963	589	55.0	32,395	Trace	Trace	Trace	Trace
1964	560	45.0	25,200	Trace	Trace	Trace	Trace
1965	543	46.0	24,978	Trace	Trace	Trace	Trace
1966	500	34.0	17,000	0	0	Trace	Trace
1967	450	45.0	20,250	0	0	0	0
1968	477	56.0	26,712	0	0	0	0
1969	444	51.0	22,644	0	0	0	0
1970	435	57.0	24,795	Trace	Trace	Trace	Trace
1971	431	54.0	23,274	0	0	Trace	Trace
1972	362	46.0	16,652	0	0	Trace	Trace
1973	375	47.0	17,625	0	0	Trace	Trace
1974	395	51.0	20,145	Trace	Trace	Trace	Trace
1975	375	51.0	19,125	Trace	Trace	Trace	Trace
1976	365	50.0	18,250	Trace	Trace	Trace	Trace

Table 2.--Estimated loss of yield caused by oat rusts by States
and years reported--Continued

Year	Acres harvested (1,000)	Losses in yield					
		Crop production		Stem rust		Crown rust	
		bu/A	1,000 bu	%	1,000 bu	%	1,000 bu
SOUTH DAKOTA -- OATS							
1919	1,850	29.0	53,650	5.0	2,884.4	2.0	1,153.8
1920	2,219	34.0	75,446	10.0	8,382.8	Trace	Trace
1921	2,650	22.0	58,300	10.0	6,477.7	Trace	Trace
1922	2,400	31.0	74,400	1.0	751.5	Trace	Trace
1923	2,304	34.0	78,336	4.0	3,298.3	1.0	824.6
1924	2,889	37.0	106,893	3.0	3,505.9	Trace	Trace
1925	2,834	34.0	96,356	1.0	973.3	0	0
1926	1,984	11.7	23,213	3.5	841.9	Trace	Trace
1927	2,550	29.3	74,715	12.0	10,933.8	6.0	5,466.9
1928	2,193	27.0	59,211	Trace	Trace	0	0
1929	2,259	28.5	64,382	1.0	650.3		
1930	2,385	29.5	70,358	Trace	Trace	Trace	Trace
1931	1,745	11.5	20,068	Trace	Trace		
1932	2,321	32.5	75,432	Trace	Trace		
1933	696	7.5	5,220	0	0		
1934	376	9.0	3,384	Trace	Trace		
1935	2,215	29.5	65,342	Trace	Trace	2.0	1,333.5
1936	908	14.5	12,712	Trace	Trace	Trace	Trace
1937	1,462	21.0	30,702	0	0	Trace	Trace
1938	1,564	30.0	46,920	Trace	Trace		
1939	1,627	27.0	43,929	Trace	Trace		
1940	1,938	27.5	53,295	Trace	Trace		
1941	2,112	26.0	54,912	Trace	Trace		
1942	2,260	40.0	90,400	Trace	Trace		
1943	2,350	30.0	70,500	1.0	712.1		
1944	2,914	29.8	86,837	4.0	3,618.2	Trace	Trace
1945	3,497	41.0	143,377	2.0	2,926.1		
1946	3,462	29.0	100,398	Trace	Trace		
1947	3,081	31.0	95,511	1.0	964.8		
1948	3,112	33.5	104,252	Trace	Trace		
1949	2,956	22.1	65,328	Trace	Trace		
1950	3,311	26.0	36,086	1.0	869.6		
1951	3,145	37.0	116,365	1.0	1,175.4		
1952	3,554	26.5	94,181	2.0	1,922.1		
1953	3,696	25.5	94,248	4.0	3,927.0		
1954	3,992	27.0	107,784	5.0	5,988.0	5.0	5,988.0
1955	3,872	25.5	98,736	6.0	4,201.5		
1956	2,323	20.0	46,460	1.0	469.3	Trace	Trace
1957	3,159	35.0	110,565	1.0	1,116.8	Trace	Trace
1958	3,127	39.0	121,953	Trace	Trace	0	0
1959	2,064	20.0	41,280	0	0	0	0
1960	2,704	41.0	110,864	0	0		
1961	2,515	34.0	85,510	0	0	Trace	Trace
1962	2,590	41.0	106,190	Trace	Trace	8.0	9,233.9
1963	2,590	35.0	90,650	Trace	Trace	Trace	Trace
1964	2,460	29.0	71,340	Trace	Trace	Trace	Trace
1965	2,460	48.0	118,080	0	0	4.0	4,920.0
1966	2,288	33.0	75,504	0	0	1.0	762.7
1967	2,357	46.5	109,600	0	0	0	0
1968	2,357	45.0	106,065	0	0	10.0	11,785.0
1969	2,357	46.5	109,600	Trace	Trace	1.0	1,107.1
1970	2,569	41.0	105,329	Trace	Trace	5.0	5,543.6
1971	2,329	54.0	125,766	1.0	1,310.1	3.0	3,930.2
1972	2,038	49.0	99,862	Trace	Trace	3.0	3,088.5
1973	2,140	47.0	100,580	0	0	Trace	Trace
1974	2,020	39.0	78,780	0	0	Trace	Trace
1975	2,230	44.0	98,120	Trace	Trace	2.0	2,002.4
1976	1,420	30.0	42,600	Trace	Trace	Trace	Trace

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Crown rust	
				bu/A	1,000 bu	%	1,000 bu
TEXAS -- OATS							
1919	2,250	42.0	94,500	1.0	974.2	2.0	1,948.4
1920	1,490	22.0	32,780	4.0	1,440.8	5.0	1,801.0
1921	1,865	18.0	33,570	Trace	Trace	20.0	8,392.4
1922	1,455	23.0	33,465			15.0	5,905.5
1923	1,370	32.0	43,840	1.0	451.9	2.0	903.9
1924	1,455	34.0	49,470	1.0	504.8	1.0	504.8
1925	1,091	12.3	13,419	0.1	13.5	0.5	67.5
1926	1,964	42.6	83,666	0	0	2.0	1,707.5
1927	2,003	21.0	42,063	0	0	3.0	1,300.9
1928	1,402	25.5	35,751	1.0	363.0	0.5	181.5
1929	1,542	38.0	43,176	0.5	223.7	3.0	1,342.2
1930	1,411	24.0	33,864	1.0	349.1	2.0	698.2
1931	1,732	34.0	58,888	0.5	298.9	1.0	597.8
1932	1,749	24.0	41,976	2.0	932.8	8.0	3,731.2
1933	1,189	17.5	20,808	5.0	1,224.0	10.0	2,448.0
1934	1,546	21.0	32,466	4.0	1,708.7	20.0	8,543.6
1935	1,670	23.0	38,410	10.0	4,364.7	2.0	872.9
1936	1,219	18.5	22,552	Trace	Trace	8.0	1,961.0
1937	1,268	24.0	30,432	Trace	Trace	1.0	307.4
1938	1,420	26.0	36,920	Trace	Trace	Trace	Trace
1939	1,250	23.0	28,750	Trace	Trace	0.2	57.6
1940	1,651	27.0	44,572	Trace	Trace		
1941	1,519	25.0	37,975	Trace	Trace		
1942	590	19.0	11,210	0	0		
1943	1,152	18.0	20,736	1.0	209.4		
1944	1,597	23.9	38,168	2.0	778.9		
1945	1,767	22.5	39,758	12.0	5,421.5		
1946	1,608	22.0	35,376	4.0	1,474.0	Trace	Trace
1947	1,431	21.0	30,051	Trace	Trace	Trace	Trace
1948	787	16.5	12,986	Trace	Trace		
1949	1,116	26.0	29,016	8.9	3,145.4	9.0	3,180.8
1950	1,228	19.5	23,946	4.0	997.7		
1951	503	15.0	7,545	0	0		
1952	754	25.5	19,227	Trace	Trace		
1953	1,320	27.0	35,640	Trace	Trace	Trace	Trace
1954	1,624	23.0	37,352	0	0	Trace	Trace
1955	1,283	17.5	22,452	1.5	341.9	Trace	Trace
1956	962	18.0	17,316	Trace	Trace	Trace	Trace
1957	1,443	21.5	31,024	2.0	714.8	11.2	4,003.1
1958	1,544	30.0	46,320	0.5	245.6	5.2	2,544.2
1959	942	22.5	21,195	Trace	Trace	Trace	Trace
1960	1,197	26.0	31,122	Trace	Trace	Trace	Trace
1961	1,074	27.0	28,998	0	0	0.35	101.8
1962	741	21.5	15,932	Trace	Trace	Trace	Trace
1963	667	20.5	13,674	0	0	0	0
1964	814	30.0	24,420	Trace	Trace	1.0	246.7
1965	879	25.0	21,975	Trace	Trace	18.0	4,823.0
1966	630	28.0	17,640	0.01	2.0	1.5	269.0
1967	315	21.0	6,615	0.1	6.6	2.0	135.0
1968	583	34.0	19,822	4.0	852.6	3.0	639.4
1969	670	38.0	25,460	Trace	Trace	2.0	519.6
1970	764	38.0	29,032	Trace	Trace	10.0	3,225.8
1971	222	27.0	5,994	0	0	Trace	Trace
1972	360	27.0	9,720	Trace	Trace	5.0	511.6
1973	650	41.0	26,650	0.5	141.0	5.0	1,410.0
1974	300	27.0	8,100	Trace	Trace	10.0	900.0
1975	650	30.0	19,500	5.0	1,147.1	10.0	2,294.1
1976	390	37.0	14,430	Trace	Trace	1.0	145.7

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Losses in yield					
		Crop production		Stem rust		Crown rust	
		bu/A	1,000 bu	%	1,000 bu	%	1,000 bu
VIRGINIA -- OATS							
1919	240	22.0	5,280	0	0	Trace	Trace
1920	148	21.9	3,241			Trace	Trace
1921	163	20.5	3,342	0	0	1.0	33.8
1922	166	20.0	3,320	Trace	Trace	1.0	33.5
1923	163	22.0	3,586			1.0	36.2
1924	226	23.5	5,311	Trace	Trace	1.0	53.6
1925	192	21.5	4,128	Trace	Trace	Trace	Trace
1926	186	26.0	4,836	0	0	Trace	Trace
1927	186	21.5	3,999			0.5	20.1
1928	182	25.5	4,641	Trace	Trace	1.0	46.9
1929	167	23.0	3,841	Trace	Trace	0	0
1930	152	17.3	2,630	Trace	Trace	1.0	26.6
1931	189	25.6	4,838	1.0	51.5	5.0	257.3
1932	166	19.5	3,237	1.0	34.8	6.0	208.8
1933	168	20.0	3,360	1.5	54.5	6.0	217.9
1934	123	19.5	2,398				
1935	82	20.0	1,640	1.5	25.3	1.0	16.8
1936	78	16.5	1,287	1.5	20.1	2.5	33.5
1937	80	21.0	1,680	Trace	Trace	1.0	16.9
1938	92	21.5	1,978	4.0	85.0	3.0	63.8
1939	80	20.0	1,600	1.0	16.3	1.0	16.3
1940	97	27.0	2,619	1.0	26.4		
1941	105	25.0	2,625	Trace	Trace		
1942	130	27.0	3,510	2.0	71.6		
1943	143	20.0	2,860	2.0	58.4		
1944	143	25.8	3,689	0.5	18.5	Trace	Trace
1945	140	28.0	3,920	2.0	80.0		
1946	134	30.0	4,020	2.0	41.0		
1947	121	27.0	3,267	0.5	16.4		
1948	131	33.0	4,323	0.5	21.7		
1949	106	31.0	3,286	0.5	16.5		
1950	110	32.0	3,520	3.0	108.8	Trace	Trace
1951	116	33.5	3,886	0.5	19.5		
1952	115	33.5	3,852	1.0	38.9		
1953	125	33.0	4,125	1.0	41.7		
1954	146	39.5	5,767	1.0	58.2		
1955	146	38.0	5,548	0.5	27.9		
1956	139	38.0	5,282	1.0	53.4		
1957	133	30.0	3,990	0.5	20.0		
1958	101	37.0	3,737	0.5	18.9	0.5	18.9
1959	112	38.0	4,256	0.5	21.5	0.5	21.5
1960	92	40.0	3,680	Trace	Trace		
1961	91	43.0	3,913	Trace	Trace		
1962	81	38.0	3,078	Trace	Trace		
1963	58	34.0	1,972	Trace	Trace		
1964	61	42.0	2,562	Trace	Trace		
1965	60	43.0	2,580	Trace	Trace	Trace	Trace
1966	53	48.0	2,544	Trace	Trace		
1967	55	52.0	2,860	Trace	Trace		
1968	55	48.0	2,640	0	0		
1969	49	49.0	2,401	0	0	0	0
1970	51	48.0	2,448	0	0	0	0
1971	50	48.0	2,400	0	0	0	0
1972	43	42.0	1,806	0	0	0	0
1973	46	42.0	1,932	2.0	39.4	Trace	Trace
1974	42	44.0	1,848	0	0	0	0
1975	40	42.0	1,680	0	0	0	0
1976	42	45.0	1,890	0	0	0	0

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Crown rust	
				bu/A	1,000 bu	%	1,000 bu
WASHINGTON -- OATS							
1919	324	40.0	12,960	Trace	Trace	0	0
1920	210	46.6	9,786			Trace	Trace
1921	210	50.0	10,500	Trace	Trace	0	0
1922	202	39.2	7,918	0	0	0	0
1923	210	57.0	11,970	Trace	Trace	1.0	120.9
1924	175	38.5	6,738	Trace	Trace	0	0
1925	254	44.0	11,176	Trace	Trace		
1926	229	43.0	9,847	Trace	Trace	0	0
1927	183	50.0	9,150	Trace	Trace		
1928	201	47.0	9,447	Trace	Trace	Trace	Trace
1929	191	47.0	8,977	Trace	Trace	0	0
1930	156	48.3	7,566				
1931	158	49.0	7,742			1.0	78.2
1932	166	50.0	8,300	Trace	Trace	Trace	Trace
1933	179	53.0	9,487	Trace	Trace	Trace	Trace
1934	170	40.0	6,800	Trace	Trace		
1935	192	47.5	9,120				
1936	167	51.0	8,517				
1937	155	52.0	8,060				
1938	158	42.5	6,715	0.4	27.2	0.9	61.2
1939	229	49.0	11,221	0.4	45.2	0.4	45.2
1940	178	39.0	6,942				
1941	169	45.0	7,605				
1942	210	48.0	10,080				
1943	191	48.5	9,264				
1944	160	44.7	7,152				
1945	150	43.0	6,450	0	0		
1946	128	48.0	6,144	0	0		
1947	131	51.0	6,681	0	0		
1948	153	42.5	6,502	0	0		
1949	150	44.0	6,600	0	0		
1950	172	48.0	8,256	0	0		
1951	150	45.0	6,750	0	0		
1952	146	51.0	7,446	0	0		
1953	142	50.0	7,100	0	0		
1954	185	45.0	8,325	0	0		
1955	185	45.0	8,325	Trace	Trace		
1956	148	47.0	6,956	0	0		
1957	189	51.0	9,639	Trace	Trace		
1958	170	42.0	7,140	Trace	Trace		
1959	141	44.0	6,204	Trace	Trace		
1960	109	40.0	4,360	Trace	Trace		
1961	121	44.0	5,324	Trace	Trace		
1962	105	52.0	5,460	0	0		
1963	102	55.0	5,610	0	0		
1964	93	50.0	4,650	Trace	Trace		
1965	95	54.0	5,130	0	0	0	0
1966	65	55.0	3,575	0	0	0	0
1967	37	45.0	1,665	0	0	Trace	Trace
1968	50	46.0	2,300	0	0	0	0
1969	75	56.0	4,200	0	0	0	0
1970	196	47.0	9,212	Trace	Trace	0	0
1971	30	60.0	1,800	0	0	0	0
1972	35	58.0	2,030	Trace	Trace	0	0
1973	50	44.0	2,200	0	0	0	0
1974	54	53.0	2,862	0	0	0	0
1975	55	54.0	2,970	0	0	0	0
1976	45	57.0	2,565	0	0	0	0

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Losses in yield					
		Crop production		Stem rust		Crown rust	
		bu/A	1,000 bu	%	1,000 bu	%	1,000 bu
WEST VIRGINIA -- OATS							
1919	120	21.0	4,750	1.0	48.9	2.0	97.9
1920	200	27.0	5,400	Trace	Trace	2.0	110.2
1921	210	22.0	4,620				
1922	200	23.0	4,600	Trace	Trace	Trace	Trace
1923	196	24.0	4,704	Trace	Trace	Trace	Trace
1924	165	24.0	3,960	Trace	Trace	Trace	Trace
1925	188	27.0	5,076	Trace	Trace	Trace	Trace
1926	207	28.0	5,796	Trace	Trace	Trace	Trace
1927	217	24.2	5,251	Trace	Trace	Trace	Trace
1928	204	28.0	5,712	0	0	0	0
1929	216	26.0	5,616				
1930	140	19.0	2,660	Trace	Trace	1.0	26.9
1931	148	24.0	3,552			5.0	186.9
1932	138	22.0	3,036	Trace	Trace	10.0	337.3
1933	124	19.0	2,356			3.0	72.8
1934	108	19.0	2,052			2.0	41.9
1935	69	20.5	1,414	Trace	Trace	1.0	14.3
1936	67	18.0	1,206	Trace	Trace	1.0	12.2
1937	80	20.0	1,700	Trace	Trace		
1938	86	21.0	1,806	0	0		
1939	73	20.0	1,460	Trace	Trace	Trace	Trace
1940	70	23.0	1,610	0	0		
1941	74	24.0	1,776	0	0		
1942	77	24.0	1,848	0.5	9.3		
1943	78	20.5	1,599	0.5	8.2	2.0	32.8
1944	67	22.4	1,501	Trace	Trace		
1945	72	28.0	2,016	Trace	Trace		
1946	68	30.0	2,040	Trace	Trace		
1947	64	30.5	1,952	0.5	9.8		
1948	58	30.5	1,769	0.5	8.9		
1949	44	28.0	1,232	0.5	6.2		
1950	41	31.0	1,271	3.0	39.3		
1951	40	34.0	1,360	0.5	6.8		
1952	36	31.0	1,116	1.5	17.0		
1953	36	29.0	1,044	1.0	10.5		
1954	35	37.5	1,312	1.5	20.0		
1955	38	40.0	1,520	0.5	7.6		
1956	30	31.5	945	1.0	9.5		
1957	31	36.0	1,116	0.5	5.6		
1958	25	33.5	838	0.5	4.2	0.5	4.2
1959	27	41.0	1,107	0.5	5.6	0.5	5.6
1960	26	41.0	1,066	Trace	Trace		
1961	23	37.5	862	Trace	Trace		
1962	24	41.0	984	Trace	Trace		
1963	23	45.0	1,035	Trace	Trace		
1964	20	36.0	720	Trace	Trace	Trace	Trace
1965	18	39.0	702	Trace	Trace		
1966	15	35.0	525	0	0		
1967	15	41.0	615	0	0		
1968	16	44.0	704	0	0	0	0
1969	12	42.0	504	0	0	0	0
1970	11	43.0	473	0	0	0	0
1971	14	44.0	616	0	0	0	0
1972	14	45.0	630	0	0	0	0
1973	18	46.0	828	4.0	34.5	0	0
1974	17	47.0	799	0	0	0	0
1975	18	43.0	774	1.0	7.9	1.0	7.9
1976	16	41.0	656	0	0	0	0

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Crown rust	
				bu/A	1,000 bu	%	1,000 bu
WISCONSIN -- OATS							
1919	2,348	33.4	78,423	1.0	808.5	2.0	1,617.0
1920	2,408	44.8	107,878	0.5	547.6	1.0	1,095.2
1921	2,632	24.3	63,958	0.5	324.6	1.0	649.3
1922	2,465	41.2	101,558	1.0	1,036.3	1.0	1,036.3
1923	2,539	36.3	92,166	0.5	465.5	0.5	465.5
1924	2,590	40.0	103,600	1.0	1,051.8	0.5	525.9
1925	2,603	48.5	126,246	1.0	1,288.2	1.0	1,288.2
1926	2,577	37.5	96,638	3.5	3,530.6	0.7	706.1
1927	2,422	38.5	93,247	0.5	473.3	1.0	946.7
1928	2,495	43.5	108,532	0.5	550.9	1.0	1,101.8
1929	2,470	34.5	85,215	6.7	6,253.4	2.0	1,866.7
1930	2,435	40.0	97,400	Trace	Trace	0.3	293.1
1931	2,459	28.0	68,852	1.5	1,051.7	0.3	210.3
1932	2,533	35.0	88,655	0	0	0.1	88.7
1933	2,457	26.0	63,882	0	0	0.1	63.9
1934	2,334	28.0	65,352	0.1	65.4	Trace	Trace
1935	2,663	32.5	86,548	Trace	Trace	8.0	7,525.9
1936	2,480	24.0	59,520	Trace	Trace	1.0	601.2
1937	2,480	32.0	79,360	0	0	2.0	1,619.6
1938	2,455	31.0	76,105	Trace	Trace	20.0	19,026.2
1939	2,185	32.5	71,012	0.5	367.9	3.0	2,207.6
1940	2,271	43.0	97,653	1.0	986.4	0	0
1941	2,293	33.0	75,669	1.0	957.8	20.0	19,156.7
1942	2,339	43.0	100,577	Trace	Trace	8.0	8,745.8
1943	2,573	39.0	100,347	Trace	Trace	Trace	Trace
1944	2,766	42.2	116,725	Trace	Trace	Trace	Trace
1945	2,987	51.0	152,337	Trace	Trace	Trace	Trace
1946	2,868	43.5	124,758	Trace	Trace	0	0
1947	2,811	43.0	120,873	0	0	0	0
1948	2,867	44.0	126,148	Trace	Trace	Trace	Trace
1949	2,896	41.0	118,736	Trace	Trace	2.0	2,423.2
1950	2,896	48.5	140,456	1.5	2,229.5	4.0	5,945.2
1951	2,867	49.5	141,916	Trace	Trace	Trace	Trace
1952	2,924	45.0	131,580	0.5	667.9	1.0	1,335.8
1953	2,953	41.5	122,550	7.0	9,748.3	5.0	6,963.1
1954	2,864	44.0	126,016	4.0	5,420.0	3.0	4,065.0
1955	2,806	49.0	137,484	3.0	4,364.6	2.5	3,637.1
1956	2,722	46.0	125,212	1.5	1,936.3	1.5	1,936.3
1957	2,613	55.0	143,715	Trace	Trace	4.0	5,989.6
1958	2,561	61.0	156,221	0	0	Trace	Trace
1959	2,562	50.0	128,100	0	0	0.3	1,284.8
1960	2,306	47.0	108,382	0	0	3.0	3,352.0
1961	2,322	56.0	130,032	Trace	Trace	3.0	4,021.6
1962	2,229	57.0	127,053	0.4	515.4	1.0	1,288.6
1963	2,162	55.5	119,991	Trace	Trace	1.0	1,212.0
1964	2,076	51.0	105,876	0.1	106.3	0.3	318.9
1965	1,993	61.0	121,573	0.7	857.0	0.3	366.0
1966	1,910	53.0	101,230	0.3	305.0	0.2	203.0
1967	1,757	61.0	107,177	0.2	214.7	0.3	322.5
1968	1,739	61.0	106,079	Trace	Trace	2.0	2,164.8
1969	1,687	61.0	102,907	Trace	Trace	2.5	2,638.6
1970	1,687	62.0	104,594	0.2	213.9	2.0	2,138.9
1971	1,535	61.0	93,635	0.2	190.5	1.5	1,428.8
1972	1,350	55.0	74,250	0.2	151.8	2.0	1,518.4
1973	1,370	41.0	56,170	0.2	125.1	10.0	6,255.0
1974	1,400	61.0	85,400	0.2	180.2	5.0	4,504.2
1975	1,350	55.0	74,250	0.1	75.1	1.0	750.8
1976	1,280	43.0	55,040	Trace	Trace	0.2	110.3

Table 2.--Estimated loss of yield caused by oat rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Crown rust	
				%	1,000 bu	%	1,000 bu
WYOMING -- OATS							
1919	285	18.0	5,130				
1920	115	38.0	4,370				
1921	150	30.0	4,500	0	0		
1922	158	31.0	4,898	0	0		
1923	165	34.0	5,610				
1924	125	30.0	3,750				
1925	134	35.0	4,690	Trace	Trace	0	0
1926	120	35.0	4,200	Trace	Trace		
1927	120	36.0	4,320	Trace	Trace		
1928	132	31.0	4,092	Trace	Trace		
1929	139	26.0	3,614	0	0		
1930	140	22.5	3,150	Trace	Trace		
1931	83	21.5	1,784	Trace	Trace		
1932	154	22.5	3,465	0	0		
1933	151	21.5	3,246	0	0		
1934	83	21.0	1,743	Trace	Trace		
1935	111	26.0	2,886	Trace	Trace		
1936	67	25.0	1,675	Trace	Trace		
1937	104	26.0	2,704	0	0		
1938	114	27.0	3,078	0	0		
1939	88	26.0	2,288	0	0		
1940	102	29.0	2,958	0	0	0	0
1941	125	31.0	3,875	1.0	39.1	Trace	Trace
1942	122	30.0	3,660	Trace	Trace		
1943	129	28.5	3,676	0.5	18.5	Trace	Trace
1944	150	31.4	4,710	Trace	Trace	2.0	96.1
1945	164	30.0	4,920	Trace	Trace	Trace	Trace
1946	153	30.5	4,666	Trace	Trace	0	0
1947	150	33.0	4,950	Trace	Trace	Trace	Trace
1948	143	30.0	4,290	0	0	0	0
1949	134	30.5	4,087	0	0	0	0
1950	152	32.0	4,864	0	0	0	0
1951	149	31.5	4,694	0	0	0	0
1952	145	31.0	4,495	0	0	0	0
1953	129	28.0	3,612	Trace	Trace	4.0	150.5
1954	95	26.0	2,470	0	0	0	0
1955	113	29.0	3,277	0	0	0	0
1956	93	31.0	2,883	0	0	0	0
1957	112	36.0	4,032	Trace	Trace		
1958	109	38.0	4,142	0	0		
1959	102	33.0	3,366	0	0		
1960	92	31.0	2,852	0	0		
1961	90	33.0	2,970	Trace	Trace	Trace	Trace
1962	94	39.0	3,666	Trace	Trace	1.0	37.0
1963	94	36.0	3,384	0	0	0	0
1964	94	33.5	3,149	0	0	0	0
1965	102	39.0	3,978	0	0	0	0
1966	67	36.0	2,412	0	0	0	0
1967	92	44.0	4,048	0	0	0	0
1968	77	45.0	3,465	Trace	Trace	Trace	Trace
1969	94	37.0	3,478	0	0	0	0
1970	95	48.0	4,560	0	0	0	0
1971	90	45.0	4,050	0	0	0	0
1972	53	50.0	2,650	0	0	0	0
1973	52	44.0	2,288	0	0	0	0
1974	45	37.0	1,665	0	0	0	0
1975	50	40.0	2,000	0	0	Trace	Trace
1976	53	46.0	2,438	0	0	0	0

Barley Stem Rust

Barley, like oats, is grown on less acreage than wheat, but winter barley is grown further north than winter oats. The same pathogen that causes the wheat stem rust causes barley stem rust. Thus, the disease moves from one crop to the other, overcoming the advantage barley might have from its relatively small acreage. The real advantage barley has over wheat is shorter maturation period that limits the time for the pathogen to increase.

The number of years in which losses greater than 5 percent occurred on a State basis were Iowa (5); Minnesota and North Dakota (4); Illinois, South Dakota, and Wisconsin (2); and Colorado, Michigan, Nebraska, Texas, and Wyoming (1). No losses over 20 percent have been recorded on a statewide basis. The most severe losses were in 1935, when losses of 12 to 15 percent occurred in Iowa, Minnesota, Nebraska, North Dakota, and Wisconsin. The most serious wheat stem epidemics occurred in the North Central States in 1935 and 1937. Most barleys have moderate seedling resistance to stem rust

at 15° C, and most cultivars in the north-central region have an additional gene for stem rust resistance effective against the prevalent races in the United States. Rye stem rust can also attack barley, but none of the losses reported here are thought to have been caused by this stem rust.

Leaf rust of barley has been even less important than barley stem rust. This relates partly to the small acreage of barley grown in the Southern States, where barley is the major host for overwintering of barley leaf rust. Additionally, the early maturity of barley seriously limits leaf rust development. The only epidemics in which losses were 5 percent or more on a statewide basis are as follows: Illinois 5 percent in 1938 and 10 percent in 1939; Oklahoma 5 percent, 1974 and 1975; North Dakota 10 percent, 1955; and Virginia 5 percent, 1945. Although many commercial cultivars are resistant to leaf rust, some of those grown most widely are susceptible. Losses caused by barley leaf rust have increased throughout the Great Plains in the past few years.

Text continues on page 72.

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
CALIFORNIA -- BARLEY							
1969	1,153	47.0	54,191	0	0	1.0	547.3
1970	1,188	52.0	61,776	0	0	1.0	624.0
1971	1,087	53.0	57,611	0	0	1.0	581.9
1972	926	55.0	50,930	0	0	Trace	Trace
1973	940	51.0	47,940	0	0	0	0
1974	877	52.0	45,604	0	0	0	0
1975	1,060	57.0	60,420	0	0	0	0
1976	1,010	56.0	56,560	0	0	0	0
IDAHO -- BARLEY							
1965	597	52.0	31,044	0	0	0	0
1966	545	43.0	23,435	0	0	0	0
1967	529	49.0	25,921	0	0	0	0
1968	508	48.0	24,384	0	0	0	0
1969	584	52.0	30,368	0	0	0	0
1970	660	55.0	36,600	0	0	0	0
1971	706	55.0	38,830	0	0	0	0
1972	736	54.0	39,774	0	0	0	0
1973	820	53.0	43,460	0	0	0	0
1974	695	46.0	31,970	0	0	0	0
1975	755	50.0	37,750	0	0	0	0
1976	800	54.0	43,206	Trace	Trace	Trace	Trace
OREGON -- BARLEY							
1965	369	46.0	16,974	0	0	0	0
1966	424	42.0	17,808	0	0	0	0
1967	266	32.5	8,645	0	0	0	0
1968	279	37.5	10,462				
1969	399	43.0	17,157	Trace	Trace	0.5	86.2
1970	395	45.0	17,775	Trace	Trace	Trace	Trace
1971	375	51.0	19,125	0	0	Trace	Trace
1972	250	48.0	12,000	Trace	Trace	Trace	Trace
1973	280	39.0	10,920	0	0	0	0
1974	200	45.0	9,000	0	0	0	0
1975	177	50.0	8,850	0	0	0	0
1976	160	46.0	7,360	0	0	Trace	Trace

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
COLORADO -- BARLEY							
1919	153	18.5	2,830	2.0	57.7	0	0
1920	216	22.5	4,860				
1921	202	21.5	4,343	Trace	Trace		
1922	186	20.5	3,813	Trace	Trace		
1923	223	22.0	4,906	5.0	258.2	0	0
1924	312	16.0	4,992	0	0	0	0
1925	376	15.0	5,640	0	0	0	0
1926	350	15.5	5,425	Trace	Trace	0	0
1927	385	20.0	7,700	Trace	Trace		
1928	512	23.0	11,776	Trace	Trace		
1929	608	17.7	10,762	Trace	Trace	0	0
1930	530	21.5	11,395	Trace	Trace		
1931	439	17.9	7,858	Trace	Trace		
1932	472	17.4	8,213	Trace	Trace	Trace	Trace
1933	405	16.1	6,520	0	0	0	0
1934	192	19.6	3,763	0	0		
1935	321	21.4	6,869	Trace	Trace		
1936	385	18.8	7,238	Trace	Trace	0	0
1937	408	21.8	8,894	0	0	0	0
1938	510	24.2	12,342	Trace	Trace		
1939	420	19.1	8,022	0	0		
1940	500	20.2	10,100	0	0		
1941	660	25.2	16,632	1.0	168.0		
1942	673	23.5	15,816	0	0	0	0
1943	734	24.0	17,616	Trace	Trace	0	0
1944	726	21.4	15,536	2.0	317.1	0	0
1945	791	28.5	22,544	0	0		
1946	593	23.5	13,936	0	0	0	0
1947	605	28.0	16,940	0	0	0	0
1948	563	25.0	14,075	0	0	0	0
1949	788	28.1	22,143	0	0		
1950	489	19.5	9,536	0	0	0	0
1951	406	23.5	9,541	0	0		
1952	325	26.5	8,612	0	0		
1953	344	27.0	9,288	2.0	189.5		
1954	382	18.5	7,067	1.0	71.4	0	0
1955	313	26.5	8,294	Trace	Trace	0	0
1956	319	25.0	7,975	0	0	0	0
1957	597	30.5	18,208	Trace	Trace	0	0
1958	448	30.5	13,664	0	0		
1959	529	29.0	15,341				
1960	561	33.0	18,513	0	0	0	0
1961	518	33.5	17,353	Trace	Trace	0.5	87.2
1962	451	30.0	13,530	Trace	Trace	0.5	68.0
1963	328	28.0	9,184	0	0	Trace	Trace
1964	351	30.5	10,706	0	0	Trace	Trace
1965	269	39.5	10,626	0	0	0	0
1966	258	37.5	9,675	Trace	Trace	Trace	Trace
1967	229	48.0	10,992	0	0	Trace	0
1968	232	47.0	10,904	Trace	0	Trace	0
1969	261	44.0	11,484	0	0	0	0
1970	321	45.5	14,606	0	0	0	0
1971	360	42.5	15,300	0	0	0	0
1972	239	46.0	10,944	0	0	0	0
1973	263	47.0	12,361	0	0	0	0
1974	210	51.0	10,710	Trace	Trace	Trace	Trace
1975	265	53.0	14,045	0	0	0	0
1976	245	55.0	13,475	0	0	0	0

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
ILLINOIS -- BARLEY							
1919	177	24.0	4,248	Trace	Trace		
1920	182	30.4	5,533	Trace	Trace	Trace	Trace
1921	173	26.3	4,500	5.0	239.4		
1922	190	29.5	5,605	0.5	28.2		
1923	228	29.0	6,612	0	0	0	0
1924	225	32.0	7,200	Trace	Trace	Trace	Trace
1925	241	33.0	7,953	Trace	Trace	Trace	Trace
1926	277	31.0	8,587	0.4	34.6	0.5	43.3
1927	416	29.5	12,272	Trace	Trace	0.6	74.1
1928	624	29.5	18,408	Trace	Trace	Trace	Trace
1929	400	25.5	10,200	0	0	Trace	Trace
1930	312	30.0	9,360	0	0		
1931	324	29.0	9,396	3.0	290.6		
1932	392	28.5	11,172	1.0	112.8		
1933	345	15.0	5,175	Trace	Trace	Trace	Trace
1934	100	11.1	1,100	0	0		
1935	80	24.5	1,960	0.5	9.8		
1936	92	26.5	2,438	0	0		
1937	116	27.5	3,190	20.0	807.4	1.0	40.4
1938	124	30.0	3,720	1.0	39.6	5.0	197.8
1939	135	24.5	3,308	Trace	Trace	10.0	367.5
1940	117	36.5	4,270	Trace	Trace	Trace	Trace
1941	147	31.5	4,630	Trace	Trace	1.0	46.8
1942	154	22.0	3,388	Trace	Trace	1.0	34.2
1943	83	22.0	1,826	Trace	Trace	0.5	9.2
1944	45	24.0	1,080	0.5	5.5	1.0	11.0
1945	31	25.0	775	Trace	Trace	Trace	Trace
1946	24	26.0	624	Trace	Trace	1.0	6.3
1947	26	28.5	741	0	0	Trace	Trace
1948	31	34.0	1,054	0.2	2.1	1.4	160.6
1949	41	30.0	1,230	Trace	Trace	0.5	6.2
1950	42	28.0	1,176	Trace	Trace	2.0	24.0
1951	29	28.0	812	0	0	2.0	
1952	22	29.5	649	0	0	Trace	Trace
1953	26	32.5	845	Trace	Trace	Trace	Trace
1954	70	33.0	2,310	Trace	Trace	4.0	Trace
1955	155	34.0	5,270	Trace	Trace	Trace	Trace
1956	143	36.0	5,148	Trace	Trace	Trace	Trace
1957	148	23.0	3,404	Trace	Trace	Trace	Trace
1958	106	29.0	3,074	0	0		
1959	72	26.0	1,872	Trace	Trace		
1960	61	33.0	2,013	Trace	Trace	Trace	Trace
1961	69	37.0	2,553	Trace	Trace	Trace	Trace
1962	55	31.0	1,705	Trace	Trace	Trace	Trace
1963	40	36.0	1,440	0	0	Trace	Trace
1964	24	34.0	816	Trace	Trace	Trace	Trace
1965	20	39.0	780	0	0	0	0
1966	17	42.0	714	0	0	0	0
1967	17	46.0	782	0	0	0	0
1968	19	44.0	836	0	0	0	0
1969	18	40.0	720	0	0	0	0
1970	13	41.0	533	0	0	0	0
1971	17	48.0	816	0	0	0	0
1972	17	45.0	765	0	0	0	0
1973	14	35.0	490	0	0	0	0
1974	15	36.0	590	0	0	0	0
1975	14	42.0	588	0	0	Trace	Trace
1976	13	40.0	520	0	0	Trace	Trace

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
INDIANA -- BARLEY							
1919	74	19.2	1,421	Trace	Trace	0	0
1920	59	23.0	1,357	Trace	Trace		
1921	50	17.0	850				
1922	19	15.0	285	Trace	Trace	Trace	Trace
1923	17	20.0	340				
1924	19	23.2	441				
1925	27	20.0	540	Trace	Trace	0	0
1926	22	25.0	550	0	0	Trace	Trace
1927	35	20.0	700	Trace	Trace		
1928	78	20.5	1,599	Trace	Trace	Trace	Trace
1929	37	21.1	781	Trace	Trace	0.5	3.9
1930	38	23.0	874	0	0		
1931	45	24.0	1,080	Trace	Trace		
1932	40	20.0	800	Trace	Trace		
1933	31	12.5	388	0	0		
1934	19	16.1	306	0	0		
1935	21	24.0	504	Trace	Trace		
1936	20	19.0	380	0	0		
1937	27	26.0	702	0	0	Trace	Trace
1938	25	20.0	500	Trace	Trace	Trace	Trace
1939	28	21.0	588	0	0	0.4	2.4
1940	40	27.0	1,080	Trace	Trace		
1941	77	28.0	2,156	Trace	Trace		
1942	110	24.0	2,640	Trace	Trace	Trace	Trace
1943	65	21.5	1,398	Trace	Trace		
1944	47	24.3	1,142	Trace	Trace		
1945	44	24.0	1,056	0	0	Trace	Trace
1946	25	24.0	600	0	0		
1947	21	26.0	546	0	0		
1948	18	27.0	486	Trace	Trace		
1949	21	26.5	556	0	0		
1950	24	26.0	624	0	0		
1951	19	21.5	408	0	0		
1952	21	27.0	567	0	0	Trace	Trace
1953	27	27.5	742	0	0		
1954	55	37.0	2,035	0	0	0	0
1955	91	32.5	2,958	0	0	0	0
1956	82	34.0	2,788	0	0		
1957	98	28.5	2,793	Trace	Trace	Trace	Trace
1958	70	31.0	2,170	Trace	Trace		
1959	53	27.0	1,431	Trace	Trace	Trace	Trace
1960	49	35.0	1,715	Trace	Trace	Trace	Trace
1961	50	38.0	1,900	0	0		
1962	37	34.0	1,258	0	0	0	0
1963	32	37.5	1,200	0	0	0	0
1964	20	38.0	760	Trace	Trace	0	0
1965	18	38.0	684	0	0	0	0
1966	14	37.0	518	0	0	0	0
1967	11	42.0	462	0	0	0	0
1968	10	41.0	410	0	0	0	0
1969	9	38.0	342	0	0	0	0
1970	10	43.0	430	0	0	0	0
1971	15	42.0	630	0	0	0	0
1972	15	43.0	645	0	0	0	0
1973	11	42.0	462	0	0	0	0
1974	12	43.0	516	0	0	0	0
1975	10	42.0	420	0	0	Trace	Trace
1976	9	42.0	378	0	0	0	0

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
IOWA -- BARLEY							
1919	236	23.0	5,428	4.0	226.2	0	0
1920	180	26.5	4,770	17.0	976.8	Trace	Trace
1921	137	22.5	3,082	7.0	231.9		
1922	165	27.0	4,455	6.0	284.3	Trace	Trace
1923	162	27.0	4,374	4.0	182.2		
1924	136	29.7	4,039	1.0	40.8	Trace	Trace
1925	175	30.5	5,338	2.0	108.9	Trace	Trace
1926	268	28.5	7,638	1.0	77.2		
1927	454	30.0	13,620	Trace	Trace	0	0
1928	802	32.5	26,065	0.5	131.0	0	0
1929	685	29.0	19,865	0.5	99.8		
1930	529	29.5	15,606	0.5	78.4		
1931	498	26.0	12,948	0.5	65.1		
1932	597	25.0	14,925	0.8	120.4	0	0
1933	580	16.0	9,280	Trace	Trace		
1934	389	12.6	4,901	Trace	Trace		
1935	576	26.5	15,264	10.0	1,696.0		
1936	374	16.0	5,984	Trace	Trace		
1937	389	32.0	12,488	15.0	2,196.6	Trace	Trace
1938	436	30.5	13,298	1.0	137.2	2.1	288.2
1939	550	23.5	12,925	Trace	Trace		
1940	429	30.0	12,870	0.5	64.7		
1941	266	27.5	7,315	0.5	36.8		
1942	189	22.0	4,158	Trace	Trace		
1943	34	20.0	680	0.5	3.4		
1944	7	16.6	116	Trace	Trace		
1945	3	28.0	84	Trace	Trace		
1946	13	31.5	410	Trace	Trace		
1947	34	23.5	799	Trace	Trace		
1948	33	32.0	1,056	Trace	Trace		
1949	31	25.9	803	Trace	Trace		
1950	53	32.0	1,696	Trace	Trace		
1951	33	21.0	693	0	0		
1952	15	30.0	450	Trace	Trace		
1953	7	23.0	161	1.0	1.6		
1954	23	29.0	667	2.0	13.6		
1955	20	33.0	660	0	0		
1956	27	22.5	608	Trace	Trace		
1957	32	32.0	1,024	Trace	Trace	0	0
1958	31	38.0	1,178	Trace	Trace	0	0
1959	29	37.0	1,073	Trace	Trace	Trace	Trace
1960	26	32.0	832	0	0	0	0
1961	26	39.0	1,014	0	0	Trace	Trace
1962	15	38.0	570	Trace	Trace		
1963	7	37.0	259	Trace	Trace	Trace	Trace
1964	7	39.0	273	Trace	Trace	0.5	1.4
1965	5	44.0	220	Trace	Trace	0	0
1966	5	45.0	225	Trace	Trace	0	0
1967	4	46.0	184	Trace	0	1.0	1.86
1968	7	48.0	336	0	0	Trace	0
1969	5	46.0	230	0	0	0	0
1970	5	40.0	200	0	0	0	0
1971	4	45.0	180	0	0	0	0
1972	6	43.0	258	0	0	0	0

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
KANSAS -- BARLEY							
1919	425	21.0	8,925	Trace	Trace	0	0
1920	599	20.5	12,280	Trace	Trace		
1921	570	15.5	8,835	Trace	Trace		
1922	627	14.4	9,029	Trace	Trace		
1923	614	18.0	11,052	Trace	Trace	0	0
1924	583	13.0	7,579				
1925	496	10.5	5,208	Trace	Trace	0	0
1926	347	9.8	3,401			0	0
1927	452	12.0	5,424	Trace	Trace	Trace	Trace
1928	633	21.0	13,293	0	0	0	0
1929	582	16.5	9,603				
1930	466	20.5	9,553				
1931	513	16.0	8,208	Trace	Trace		
1932	586	14.0	8,204	Trace	Trace	Trace	Trace
1933	282	8.5	2,397	0	0	Trace	Trace
1934	145	8.2	1,189				
1935	260	14.0	3,640				
1936	364	11.0	4,004	Trace	Trace		
1937	298	11.5	3,424	1.0	34.6		
1938	393	17.0	6,681	1.0	67.5	Trace	Trace
1939	647	11.0	7,117	Trace	Trace		
1940	1,136	17.0	19,312	Trace	Trace		
1941	1,326	21.0	27,846	0	0	Trace	Trace
1942	1,233	13.5	16,646				
1943	1,110	14.0	15,540				
1944	722	17.8	12,852				
1945	383	18.5	7,086	Trace	Trace	Trace	Trace
1946	287	17.5	5,022	0	0	0	0
1947	290	22.0	6,380	Trace	Trace	0	0
1948	362	19.0	6,878	Trace	Trace	0	0
1949	221	17.5	3,868	0	0	0	0
1950	254	14.5	3,683	0	0	0	0
1951	119	13.0	1,547	0	0	0	0
1952	86	15.5	1,333	0	0	0	0
1953	112	14.0	1,568	0	0	0	0
1954	459	22.5	10,328	0	0	0	0
1955	688	18.5	12,728	0.5	62.2	0	0
1956	578	18.0	10,404	Trace	Trace	0	0
1957	688	22.0	15,136	0	0	0	0
1958	674	27.5	18,535	0	0	0	0
1959	890	26.0	23,140	Trace	Trace	0	0
1960	730	26.0	18,980	0	0	0	0
1961	840	31.0	26,040	0	0	0	0
1962	689	19.0	13,091	0	0	0	0
1963	276	18.0	4,968	0	0		
1964	406	25.0	10,150	Trace	Trace	0	0
1965	138	26.5	3,657	0	0	0	0
1966	182	25.0	4,550	0	0	0	0
1967	80	27.0	2,160	0	0	0	0
1968	100	37.0	3,700	0	0	0	0
1969	165	37.0	6,105	0	0	0	0
1970	193	37.0	7,141	0	0	0	0
1971	187	40.0	7,480	0	0	0	0
1972	105	44.0	4,620	0	0	0	0
1973	80	41.0	3,280	0	0	Trace	Trace
1974	50	31.0	1,550	Trace	Trace	0	0
1975	55	35.0	1,925	0	0	Trace	Trace
1976	76	34.0	2,584	Trace	Trace	0	0

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
MICHIGAN -- BARLEY							
1919	302	16.2	4,892	5.0	257.4		
1920	242	25.5	6,171			Trace	Trace
1921	218	15.0	3,270	1.0	33.0		
1922	140	23.0	3,220	Trace	Trace		
1923	128	21.0	2,688				
1924	115	29.4	3,381	Trace	Trace	Trace	Trace
1925	129	22.5	2,902	0.2	5.8	0	0
1926	133	26.5	3,524	Trace	Trace	Trace	Trace
1927	182	26.5	4,823	Trace	Trace	1.0	48.7
1928	264	28.5	7,524	0	0	Trace	Trace
1929	226	19.4	4,384	Trace	Trace	Trace	Trace
1930	231	27.5	6,352	0.5	31.9	Trace	Trace
1931	268	26.0	6,968	Trace	Trace	0.1	7.0
1932	303	20.5	6,212	0.5	31.2	Trace	Trace
1933	236	13.5	3,186	Trace	Trace	Trace	Trace
1934	176	20.2	3,555	0.5	17.9		
1935	172	27.0	5,184	Trace	Trace		
1936	186	20.0	3,720	Trace	Trace		
1937	210	23.0	4,830	Trace	Trace	Trace	Trace
1938	177	28.5	5,044	Trace	Trace		
1939	215	30.2	6,493	0	0		
1940	192	34.0	6,528	Trace	Trace		
1941	207	31.5	6,520	1.0	65.8		
1942	221	33.0	7,293	Trace	Trace	Trace	Trace
1943	155	16.5	2,558	0.7	18.2	1.0	26.0
1944	140	25.6	3,584	0.7	25.3	Trace	Trace
1945	118	31.0	3,658	Trace	Trace	Trace	Trace
1946	138	36.5	5,037	Trace	Trace		
1947	115	30.0	3,450	Trace	Trace	Trace	Trace
1948	140	32.0	4,480	Trace	Trace	Trace	Trace
1949	125	27.0	3,375	Trace	Trace	Trace	Trace
1950	115	34.0	3,910	Trace	Trace	0	0
1951	112	33.0	3,696	Trace	Trace	Trace	Trace
1952	83	28.0	2,324	0	0	Trace	Trace
1953	62	30.5	1,891	Trace	Trace	Trace	Trace
1954	85	33.5	2,848	Trace	Trace	Trace	Trace
1955	102	34.0	3,465	0	0	Trace	Trace
1956	88	31.0	2,728	Trace	Trace	Trace	Trace
1957	78	32.5	2,535	0	0	Trace	Trace
1958	80	43.0	3,440	0	0	0	0
1959	89	33.5	2,982	Trace	Trace	Trace	Trace
1960	74	35.0	2,590	0	0	0	0
1961	67	39.0	2,613	Trace	Trace	Trace	Trace
1962	62	38.0	2,356	Trace	Trace	Trace	Trace
1963	45	42.0	1,890	0	0	Trace	Trace
1964	37	43.0	1,591	Trace	Trace	Trace	Trace
1965	32	39.0	1,248	0	0	0	0
1966	21	42.0	882	0	0	Trace	Trace
1967	20	42.0	840	0	0	Trace	0
1968	27	47.0	1,269	0	0	Trace	0
1969	23	47.0	1,081	0	0	Trace	Trace
1970	23	49.0	1,127	Trace	Trace	Trace	Trace
1971	20	43.0	860	0	0	Trace	Trace
1972	21	51.0	1,071	0	0	Trace	Trace
1973	23	39.0	897	0	0	Trace	Trace
1974	20	51.0	1,020	0	0	0	0
1975	22	48.0	1,056	0	0	Trace	Trace
1976	21	42.0	882	0	0	Trace	Trace

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Losses in yield					
		Crop production		Stem rust		Leaf rust	
		bu/A	1,000 bu	%	1,000 bu	%	1,000 bu
MINNESOTA -- BARLEY							
1919	814	19.0	15,466	5.0	814.0	0	0
1920	1,031	23.5	24,228	5.0	1,275.2	0	0
1921	969	17.5	16,958	3.0	524.5		
1922	911	25.0	22,775	1.0	230.0		
1923	984	22.5	22,140	1.5	337.2	0	0
1924	915	30.5	27,908	Trace	Trace	0	0
1925	1,135	28.0	31,780	0.5	159.7	0	0
1926	1,328	22.5	29,880	Trace	Trace	0	0
1927	1,474	27.0	39,798	Trace	Trace	Trace	Trace
1928	2,064	27.5	56,760	0	0	0	0
1929	2,276	24.0	54,624	4.0	2,276.0	Trace	Trace
1930	2,026	26.5	53,689	0.5	269.8		
1931	1,864	20.0	37,280	Trace	Trace	0	0
1932	1,994	24.0	47,856	Trace	Trace	0	0
1933	1,795	15.5	27,822	0	0	Trace	Trace
1934	1,500	14.7	22,050	2.0	450.0		
1935	2,340	25.5	59,670	15.0	10,530.0		
1936	2,012	15.5	31,186	0	0		
1937	1,972	25.5	50,286	5.0	2,646.6		
1938	1,952	24.5	47,824	0.5	240.3	Trace	Trace
1939	2,099	28.3	59,402	1.0	600.0	0	0
1940	1,889	30.0	56,670	1.0	572.4		
1941	1,625	27.0	43,875	Trace	Trace		
1942	1,706	29.5	50,327	Trace	Trace		
1943	1,228	18.5	22,718	Trace	Trace	Trace	Trace
1944	688	20.2	13,898	Trace	Trace		
1945	447	29.0	12,963	Trace	Trace		
1946	733	29.0	21,257	Trace	Trace		
1947	975	26.5	25,838	Trace	Trace	Trace	Trace
1948	1,219	27.0	32,913	Trace	Trace		
1949	1,110	23.0	25,530	Trace	Trace		
1950	1,252	29.0	36,308	Trace	Trace		
1951	1,402	27.5	38,555	0	0		
1952	1,136	25.0	28,400	Trace	Trace		
1953	1,000	25.5	25,500	Trace	Trace		
1954	1,130	25.5	28,815	Trace	Trace		
1955	1,175	24.5	28,788	Trace	Trace		
1956	975	29.0	28,275	Trace	Trace	0	0
1957	819	25.0	20,475	0	0	Trace	Trace
1958	860	36.0	30,960	0	0		
1959	980	29.0	28,420	Trace	Trace	Trace	Trace
1960	892	33.5	29,882	0	Trace		
1961	910	30.0	27,300	0	0	0	0
1962	764	26.0	19,864	Trace	Trace	Trace	Trace
1963	719	36.0	25,884	Trace	Trace	0	0
1964	604	32.5	19,630	0	0	0	0
1965	610	44.0	26,840	0	0	0	0
1966	655	32.0	20,960	0	0	0	0
1967	753	46.0	34,638	Trace	Trace	0	0
1968	881	47.0	41,407	0	0	0	0
1969	627	46.0	28,842	0	0	Trace	Trace
1970	582	37.0	21,534	1.0	219.7	1.0	219.7
1971	840	48.5	40,740	0	0	Trace	Trace
1972	790	43.0	33,970	Trace	Trace	0.5	170.7
1973	894	45.0	40,230	0	0	Trace	Trace
1974	778	38.0	29,564	0	0	0.5	148.6
1975	850	37.5	31,875	Trace	Trace	1.0	322.0
1976	860	40.5	34,820	Trace	Trace	Trace	Trace

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
MISSOURI -- BARLEY							
1919	9	18.0	162	Trace	Trace	0	0
1920	7	21.5	150				
1921	6	20.0	120				
1922	7	18.0	126	Trace	Trace		
1923	11	18.5	204				
1924	8	19.0	152	1.0	1.5		
1925	10	22.0	220				
1926	12	19.0	228			0	0
1927	8	18.0	144				
1928	11	18.0	198				
1929	10	13.0	130	0	0	Trace	Trace
1930	13	20.0	260				
1931	20	22.0	440				
1932	19	17.0	323				
1933	15	16.5	248				
1934	16	15.0	240				
1935	82	18.0	1,476	Trace	Trace		
1936	84	17.0	1,428	0	0		
1937	136	19.0	2,548	0	0		
1938	110	19.0	2,090	Trace	Trace		
1939	200	20.6	4,120	0	0		
1940	190	24.0	4,560	0	0		
1941	189	20.0	3,780	Trace	Trace		
1942	180	17.0	3,060	0	0		
1943	120	18.0	2,160	0	0		
1944	82	21.2	1,738	0	0		
1945	66	19.0	1,254	0	0	0	0
1946	63	20.0	1,260	0	0		
1947	63	23.0	1,449	0	0		
1948	73	25.0	1,825	0	0		
1949	85	21.5	1,828	0	0		
1950	80	20.5	1,640	0	0	Trace	Trace
1951		21.5	1,290	0	0		
1952	60	25.0	1,500	0	0		
1953	103	31.0	3,193	0	0		
1954	340	29.0	9,860	0	0	Trace	Trace
1955	561	27.5	15,428	0	0	Trace	Trace
1956	438	27.0	11,826	0	0		
1957	359	22.0	7,898	Trace	Trace	0	0
1958	291	28.0	8,148	0	0		
1959	210	28.5	5,985	0	0	0	0
1960	137	32.0	4,384	0	0	0	0
1961	140	35.0	4,900	0	0		
1962	101	26.0	2,626	0	0		
1963	71	30.0	2,130	0	0		
1964	43	34.0	1,462	0	0	0	0
1965	22	32.0	704	0	0	0	0
1966	21	34.0	714	0	0	0	0
1967	24	37.0	888	0	0	0	0
1968	25	40.0	1,000	0	0	0	0
1969	22	35.0	770	0	0	0	0
1970	22	38.0	836	0	0	0	0
1971	21	38.0	798	0	0	0	0
1972	18	35.0	630	0	0	0	0
1973	13	33.0	429	0	0	0	0
1974	11	27.0	297	0	0	Trace	Trace
1975	11	36.0	396	0	0	0	0
1976	10	32.0	320	Trace	Trace	0	0

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
MONTANA -- BARLEY							
1919	30	12.0	360	0	0		
1920	64	18.0	1,152	Trace	Trace	Trace	Trace
1921	75	20.5	1,538	0	0		
1922	68	24.0	1,632	0	0		
1923	85	25.5	2,168				
1924	101	20.5	2,070	0	0	Trace	Trace
1925	141	21.0	2,961	0	0		
1926	150	23.0	3,450	0	0	0	0
1927	195	31.0	6,045	0	0	0	0
1928	215	28.0	6,020	0	0	0	0
1929	258	16.0	4,128	0	0	0	0
1930	232	16.5	3,828	0	0		
1931	128	15.0	1,920	0	0	0	0
1932	147	22.0	3,234	Trace	Trace	0	0
1933	132	15.0	1,980	0	0	0	0
1934	84	20.0	1,680	0	0		
1935	151	19.0	2,869	0	0		
1936	57	14.0	798	0	0		
1937	91	23.0	2,093				
1938	127	29.0	3,683	Trace	Trace		
1939	195	23.5	4,582	0	0		
1940	187	22.5	4,208				
1941	224	28.0	6,272	0	0		
1942	488	28.5	13,908	0	0		
1943	605	29.5	17,848	0	0		
1944	611	27.3	16,680	0	0		
1945	672	22.0	14,784	0	0		
1946	780	22.5	17,550	0	0		
1947	796	23.5	18,706	Trace	Trace		
1948	876	29.0	25,404	0	0		
1949	526	21.0	11,046	0	0		
1950	852	27.5	23,430	Trace	Trace		
1951	460	27.5	12,650	0	0		
1952	474	28.5	13,509	0	0		
1953	550	27.0	14,850	2.0	303.1		
1954	1,265	25.0	31,625	1.0	319.4		
1955	1,354	30.0	40,620	Trace	Trace		
1956	1,043	28.5	29,726	Trace	Trace	0	0
1957	1,721	26.5	45,606	0	0		
1958	1,583	34.0	53,822	0	0		
1959	1,852	27.5	50,930	0	0		
1960	1,733	23.5	40,726	0	0		
1961	1,465	18.0	26,370	0	0		
1962	1,802	30.5	54,961	Trace	Trace	Trace	Trace
1963	1,514	29.5	44,663	Trace	Trace		
1964	1,529	33.0	50,457	0	0		
1965	1,300	39.0	50,700	1.0	512.0	0	0
1966	1,651	38.5	63,564	0	0	0	0
1967	1,255	29.5	37,022	0.3	111.7	0.3	111.7
1968	1,155	37.0	42,735	0	0	0	0
1969	1,617	42.0	67,914	Trace	Trace	Trace	Trace
1970	1,714	38.0	65,132	Trace	Trace	Trace	Trace
1971	1,680	35.0	58,800	Trace	Trace	Trace	Trace
1972	1,707	37.5	64,013	Trace	Trace	Trace	Trace
1973	2,000	30.0	60,000	0	0	Trace	Trace
1974	1,280	29.0	37,120	0	0	Trace	Trace
1975	1,300	39.0	50,700	0	0	0	0
1976	1,170	44.5	52,065	Trace	Trace	0	0

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
NEBRASKA -- BARLEY							
1919	217	21.0	4,557	4.0	189.8		
1920	256	25.0	6,400	Trace	Trace		
1921	199	20.5	4,080				
1922	242	15.0	3,630	1.0	36.7		
1923	339	23.0	7,797	Trace	Trace	0	0
1924	251	17.6	4,418	0	0	0	0
1925	233	18.0	4,194	Trace	Trace		
1926	227	16.5	3,746	Trace	Trace		
1927	246	26.0	6,396	0	0		
1928	430	28.0	12,040	Trace	Trace	0	0
1929	648	23.7	15,358	0	0	0	0
1930	726	25.5	18,513	0.3	55.7	0	0
1931	820	16.0	13,120	Trace	Trace		
1932	918	19.5	17,901	0.7	126.2		
1933	799	10.5	8,390	Trace	Trace		
1934	209	8.7	1,818	Trace	Trace		
1935	648	22.0	14,256	16.0	2,715.4		
1936	551	10.0	5,510	Trace	Trace		
1937	606	16.5	9,999	2.0	204.1		
1938	861	23.5	20,234	1.0	206.5	1.0	206.5
1939	1,057	12.9	13,635	Trace	Trace		
1940	1,321	16.0	21,136	0	0		
1941	1,915	25.5	48,832	0	0		
1942	2,068	18.5	38,258	Trace	Trace		
1943	1,551	18.0	27,918	0	0		
1944	760	11.5	8,740	2.0	178.4		
1945	610	22.0	13,420	Trace	Trace	Trace	Trace
1946	549	21.0	13,835	0	0		
1947	467	22.0	10,274	1.0	103.8		
1948	472	19.5	9,204	Trace	Trace		
1949	326	18.7	6,096	Trace	Trace		
1950	310	15.0	4,650	Trace	Trace		
1951	202	22.0	4,444	Trace	Trace		
1952	166	20.5	3,403	Trace	Trace		
1953	174	19.0	3,306	Trace	Trace		
1954	226	17.5	3,955	Trace	Trace		
1955	190	20.0	3,800	0	0	0	0
1956	190	12.0	2,280	0	0	0	0
1957	239	31.0	7,409	Trace	Trace		
1958	244	27.5	6,710	0	0		
1959	317	21.5	6,816	Trace	Trace		
1960	234	29.0	6,786	0	0	Trace	Trace
1961	225	28.0	6,300	Trace	Trace		
1962	160	26.0	4,160	Trace	Trace	0	0
1963	115	19.0	2,185	Trace	Trace		
1964	108	22.0	2,376	Trace	Trace		
1965	54	30.0	1,620	0	0	0	0
1966	45	30.0	1,350	0	0	0	0
1967	20	35.0	700	0	0	0	0
1968	30	33.5	1,005	0	0	0	0
1969	25	34.0	850	0	0	0	0
1970	58	36.0	2,088	0	0	0	0
1971	55	40.0	2,200	0	0	0	0
1972	38	34.0	1,292	0	0	0	0
1973	33	36.0	1,188	0	0	Trace	Trace
1974	30	35.0	1,050	Trace	Trace	0	0
1975	35	36.0	1,260	Trace	Trace	0	0
1976	38	36.0	1,368	Trace	Trace	0	0

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production bu/A 1,000 bu		Losses in yield			
				Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
NORTH DAKOTA -- BARLEY							
1919	1,105	11.5	12,708	5.0	668.8	0	0
1920	1,194	17.5	20,895	Trace	Trace	Trace	Trace
1921	1,096	14.5	15,892	Trace	Trace		
1922	1,008	22.0	22,176	5.0	1,167.2	Trace	Trace
1923	1,250	16.0	20,000	3.0	618.6	0	0
1924	1,468	23.5	34,498	1.0	348.5	0	0
1925	1,820	20.0	36,400	0.75	275.1	0	0
1926	1,530	13.5	20,655	Trace	Trace	0	0
1927	1,820	20.0	40,590	2.0	828.4	0	0
1928	2,435	23.0	56,005	Trace	Trace		
1929	2,875	13.5	38,812	Trace	Trace		
1930	2,588	16.5	42,702	Trace	Trace		
1931	1,812	11.0	19,932	Trace	Trace		
1932	2,225	17.0	37,825	Trace	Trace		
1933	1,705	10.5	17,902	0	0	0	0
1934	751	10.4	7,810	Trace	Trace		
1935	2,380	18.0	42,840	15.0	7,560.0		
1936	476	9.5	4,522	0	0		
1937	1,280	16.5	21,120	8.0	1,836.5		
1938	1,254	17.0	21,318	1.0	215.3		
1939	1,633	17.2	28,088	Trace	Trace		
1940	1,747	16.0	27,952	Trace	Trace		
1941	1,817	24.5	44,516	Trace	Trace		
1942	2,326	28.0	65,128	0	0		
1943	2,652	23.0	60,996	Trace	Trace		
1944	2,625	21.6	56,700	Trace	Trace		
1945	2,284	23.0	52,532	Trace	Trace		
1946	2,284	20.0	45,680	0	0		
1947	2,444	21.0	51,324	Trace	Trace		
1948	2,640	21.0	55,440	Trace	Trace		
1949	1,690	15.0	25,350	0	0		
1950	2,146	24.0	51,504	Trace	Trace		
1951	2,275	22.5	51,188	0	0		
1952	1,820	19.0	34,580	Trace	Trace		
1953	2,129	23.0	48,967	Trace	Trace		
1954	3,130	21.5	67,295	Trace	Trace		
1955	3,631	22.5	81,698	Trace	Trace	10.0	9,077.6
1956	3,123	24.0	74,952	Trace	Trace	0	0
1957	3,498	22.0	76,956	0	0		
1958	3,918	28.0	109,704	0	0	0	0
1959	3,840	19.5	74,880	Trace	Trace	Trace	Trace
1960	3,268	24.5	80,066	0	0		
1961	2,386	18.0	42,948	0	0	0	0
1962	2,839	35.0	99,365	0	0	Trace	Trace
1963	3,262	32.0	104,384	Trace	Trace	0	0
1964	2,675	34.0	90,950	Trace	Trace	0	0
1965	2,568	41.0	105,288	0	0	0	0
1966	2,908	30.5	88,694	0	0	0	0
1967	2,682	32.0	85,824	0	0	0	0
1968	2,626	41.0	107,666	0	0	Trace	Trace
1969	2,180	42.5	92,650	0	0	Trace	Trace
1970	1,963	35.0	68,705	Trace	Trace	Trace	Trace
1971	2,218	45.0	99,810	0	0	0.5	501.6
1972	2,617	40.0	104,680	0	0	Trace	Trace
1973	2,790	37.0	103,230	0	0	0.1	103.3
1974	2,090	26.5	55,385	0.1	56.0	1.0	560.0
1975	1,990	38.0	75,620	Trace	Trace	Trace	Trace
1976	2,140	38.0	81,320	Trace	Trace	0	0

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
OHIO -- BARLEY							
1919	114	22.5	2,565	Trace	Trace	0	0
1920	93	25.5	2,372			Trace	Trace
1921	87	19.5	1,696				
1922	59	19.5	1,150	0.5	5.8		
1923	58	26.0	1,508	0.5	7.6		
1924	55	27.5	1,512	0.5	7.6		
1925	132	28.0	3,696	0.1	3.7	0.1	3.7
1926	114	30.0	3,420	Trace	Trace		
1927	147	26.0	3,822	1.0	38.8	0.5	19.4
1928	318	26.5	8,427	0.5	42.4	0.1	8.5
1929	91	23.0	2,093	1.0	21.4	1.0	21.4
1930	109	25.5	2,780	0.1	2.8	0.2	5.6
1931	96	27.5	2,640	0.5	13.5	1.5	40.4
1932	90	20.0	1,800	Trace	Trace	1.5	27.4
1933	44	15.0	660	0.5	3.4	1.5	10.1
1934	19	17.5	332	0.1	0.3	0	0
1935	14	27.0	378	Trace	Trace	Trace	Trace
1936	16	26.0	416	Trace	Trace	0	Trace
1937	23	25.0	575	Trace	Trace	Trace	Trace
1938	19	24.0	456	Trace	Trace	0.5	2.3
1939	27	22.3	602	Trace	Trace	1.0	6.1
1940	30	28.0	840	Trace	Trace	Trace	Trace
1941	40	28.5	1,140	Trace	Trace	0	0
1942	70	25.5	1,785	0	0	Trace	Trace
1943	40	20.0	800	Trace	Trace	Trace	Trace
1944	21	25.6	538	Trace	Trace	Trace	Trace
1945	23	30.0	690	Trace	Trace	Trace	Trace
1946	17	29.5	502	0	0	Trace	Trace
1947	15	26.0	390	0	0	Trace	Trace
1948	18	30.0	540	Trace	Trace	Trace	Trace
1949	18	31.0	558	0	0	Trace	Trace
1950	26	28.0	728	0	0	0	0
1951	19	26.0	494	0	0	0	0
1952	18	30.0	540	0	0	0	0
1953	36	33.0	1,188	0	0	Trace	Trace
1954	94	36.5	3,431	0	0	Trace	Trace
1955	103	38.0	3,914	0	0	Trace	Trace
1956	97	35.0	3,395	Trace	Trace	Trace	Trace
1957	99	31.0	3,069	0	0	0	0
1958	86	37.0	3,182	0	0	Trace	Trace
1959	59	31.0	1,829	Trace	Trace	Trace	Trace
1960	63	43.0	2,709	0	0		
1961	52	43.0	2,236	Trace	Trace	Trace	Trace
1962	45	36.0	1,620	0	0		
1963	29	36.0	1,044	0	0	0	0
1964	19	38.0	722	0	0	0	0
1965	18	42.0	756	0	0	0	0
1966	15	43.0	645	0	0	Trace	Trace
1967	12	46.0	552	0	0	0	0
1968	19	48.0	912	0	0	Trace	0
1969	20	46.0	920	0	0	Trace	Trace
1970	17	50.0	850	0	0	Trace	Trace
1971	16	50.0	800	0	0	0	0
1972	15	50.0	750	0	0	0	0
1973	12	39.0	468	0	0	0	0
1974	13	46.0	598	0	0	0	0
1975	12	47.0	564	0	0	Trace	Trace
1976	12	47.0	564	0	0	0	0

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
OKLAHOMA -- BARLEY							
1919	77	23.0	1,771	0	0		
1920	116	16.5	1,914	Trace	Trace		
1921	122	14.5	1,769				
1922	129	12.5	1,612			Trace	Trace
1923	129	15.5	2,000				
1924	210	17.5	3,675				
1925	113	11.0	1,243				
1926	114	30.0	3,420				
1927	147	26.0	3,822	1.0	38.8	0.5	19.4
1928	62	16.5	1,023				
1929	71	16.0	1,136				
1930	53	14.5	768				
1931	106	21.0	2,226				
1932	138	13.0	1,794				
1933	73	9.0	657				
1934	100	16.0	1,600				
1935	95	16.5	1,568				
1936	78	10.0	780				
1937	129	17.5	2,258				
1938	218	19.0	4,142	Trace	Trace	Trace	Trace
1939	525	16.1	8,452	Trace	Trace	Trace	Trace
1940	457	17.0	7,769				
1941	530	18.0	9,540				
1942	625	17.5	10,938				
1943	425	10.0	4,250				
1944	285	20.1	5,728	1.0	57.8		
1945	185	16.0	2,960				
1946	109	14.0	1,526	Trace	Trace		
1947	86	18.0	1,548	0	0		
1948	66	15.5	1,023	Trace	Trace		
1949	52	17.5	910	0	0		
1950	52	13.5	702	0	0		
1951	18	11.0	198	0	0		
1952	26	17.5	455	0	0		
1953	45	19.0	855	0	0		
1954	265	19.0	5,035	Trace	Trace		
1955	233	13.0	3,029	Trace	Trace		
1956	268	14.5	3,886	0	0		
1957	397	18.5	7,344	Trace	Trace		
1958	556	28.5	15,846	0	0	0	0
1959	645	22.0	14,190	0	0		
1960	639	24.0	15,336	0	0	Trace	Trace
1961	770	25.0	19,250	Trace	Trace	2.5	493.6
1962	547	16.5	9,026	0	0	0	0
1963	383	18.5	7,086	0	0		
1964	506	26.0	13,156	1.0	132.9	Trace	Trace
1965	299	31.0	9,269	0	0	0	0
1966	362	28.0	10,136	0	0	0	0
1967	167	23.0	3,841	0	0	0	0
1968	269	36.0	9,684	0	0	Trace	0
1969	422	35.0	14,770	0	0	Trace	Trace
1970	490	37.0	18,130	0	0	Trace	Trace
1971	470	25.0	11,750	0	0	Trace	Trace
1972	270	32.5	8,775	Trace	Trace	2.0	179.1
1973	235	33.0	7,755	0.5	39.0	Trace	Trace
1974	120	28.0	3,360	Trace	Trace	5.0	176.8
1975	93	30.0	2,790	Trace	Trace	5.0	146.8
1976	85	42.0	3,570	0	0	0	0

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
PENNSYLVANIA -- BARLEY							
1919	14	19.0	226	0	0	Trace	Trace
1920	13	21.0	273	0	0	0	0
1921	12	19.5	234	0	0	Trace	Trace
1922	10	22.0	220	0	0	0	0
1923	11	19.5	214	0	0	Trace	Trace
1924	11	25.5	280	Trace	Trace	Trace	Trace
1925	14	22.0	308	Trace	Trace	Trace	Trace
1926	17	24.5	416	0	0	Trace	Trace
1927	20	24.0	480	0	0	Trace	Trace
1928	29	24.5	710	Trace	Trace	Trace	Trace
1929	37	21.5	774	Trace	Trace	2.0	15.8
1930	45	25.0	1,125	0	0	0	0
1931	60	25.5	1,530	0	0	0	0
1932	69	25.0	1,725	Trace	Trace	4.0	71.8
1933	81	25.0	2,025	Trace	Trace	2.0	41.3
1934	68	24.5	1,666	Trace	Trace	0	0
1935	56	28.0	1,568	Trace	Trace	0	0
1936	61	29.0	1,769	Trace	Trace	0	0
1937	60	32.5	1,950	0.5	9.8	0.5	9.8
1938	67	33.0	2,211	Trace	Trace	1.0	22.3
1939	115	32.0	3,680	Trace	Trace	1.0	37.2
1940	145	26.0	3,770	Trace	Trace	0	0
1941	139	27.0	3,753	Trace	Trace	0	0
1942	157	28.0	4,396	Trace	Trace	Trace	Trace
1943	132	24.0	3,168	Trace	Trace	Trace	Trace
1944	105	29.8	3,129	Trace	Trace	Trace	Trace
1945	103	35.0	3,605	Trace	Trace	2.0	73.6
1946	112	36.5	4,088	Trace	Trace	2.0	83.4
1947	130	33.0	4,290	0	0	1.0	43.3
1948	126	34.5	4,347	Trace	Trace	Trace	Trace
1949	154	39.5	6,083	Trace	Trace	4.0	253.5
1950	182	35.5	6,461	Trace	Trace	2.0	131.8
1951	157	34.5	5,416	Trace	Trace	Trace	Trace
1952	148	37.0	5,476	Trace	Trace	0	0
1953	161	37.0	5,957	0.5	29.9	Trace	Trace
1954	219	42.0	9,198	Trace	Trace	Trace	Trace
1955	245	37.0	9,065	Trace	Trace	Trace	Trace
1956	225	38.0	8,550	0	0	Trace	Trace
1957	218	38.0	8,284	0	0	Trace	Trace
1958	240	40.0	9,600	Trace	Trace	Trace	Trace
1959	146	30.0	4,380	0	0	0.5	22.0
1960	168	42.0	7,056	0	0	0.3	21.2
1961	180	43.0	7,740	Trace	Trace	Trace	Trace
1962	184	38.0	6,992	0	0	Trace	Trace
1963	177	37.5	6,638	0	0	Trace	Trace
1964	163	45.0	7,335	Trace	Trace	Trace	Trace
1965	174	48.0	8,352	Trace	Trace	Trace	Trace
1966	156	58.0	9,048	0	0	0	0
1967	165	60.0	9,900	0	0	0	0
1968	185	53.0	9,805	0	0	0	0
1969	191	51.0	9,741	0	0	0	0
1970	185	50.0	9,250	0	0	0	0
1971	185	54.0	9,990	0	0	0	0
1972	158	47.0	7,426	0	0	0	0
1973	155	44.0	6,820	0	0	0	0
1974	158	55.0	8,690	0	0	Trace	Trace
1975	155	50.0	7,750	Trace	Trace	Trace	Trace
1976	147	43.0	6,321	Trace	Trace	Trace	Trace

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
SOUTH DAKOTA -- BARLEY							
1919	760	17.0	12,920	4.0	538.3	0	0
1920	1,028	22.0	22,616				
1921	1,120	15.0	16,800	2.0	342.8		
1922	881	20.0	17,620	2.0	359.6		
1923	890	19.5	17,355	5.0	913.4		
1924	790	23.7	18,723	2.0	382.1	0	0
1925	915	23.0	21,045	1.0	212.6	0	0
1926	778	12.0	9,336	0.5	46.9	0	0
1927	1,200	26.0	31,200	1.5	475.1	Trace	Trace
1928	1,715	20.5	35,158	0.5	176.7		
1929	2,070	17.3	35,811	1.4	508.5		
1930	1,987	21.5	42,720	0.3	128.5		
1931	1,629	9.5	15,476	Trace	Trace		
1932	2,053	23.0	47,219	Trace	Trace		
1933	493	7.0	3,451	0	0		
1934	203	8.3	1,685	Trace	Trace		
1935	2,153	19.5	41,964	8.0	3,649.0		
1936	818	9.5	7,771	0	0		
1937	1,358	14.5	19,691	3.0	609.0	Trace	Trace
1938	1,304	22.0	28,688	Trace	Trace		
1939	1,421	16.2	23,020	Trace	Trace		
1940	1,634	17.0	27,778	Trace	Trace		
1941	1,699	22.5	38,228	1.0	386.1		
1942	2,328	25.5	59,364	0	0		
1943	2,142	16.5	35,343	Trace	Trace		
1944	1,756	14.7	25,813	1.0	260.7		
1945	1,299	24.5	31,826	Trace	Trace		
1946	1,377	22.0	30,294	0	0		
1947	1,432	22.0	31,504	Trace	Trace		
1948	1,518	23.0	34,914	Trace	Trace		
1949	1,093	12.5	13,662	0	0		
1950	1,148	16.5	18,942	0.5	95.2		
1951	838	23.5	19,693	Trace	Trace		
1952	628	15.5	9,734	Trace	Trace		
1953	477	16.5	7,870	2.5	201.8		
1954	487	18.5	9,010	Trace	Trace		
1955	511	18.0	9,198	Trace	Trace		
1956	434	15.5	6,727	Trace	Trace	0	0
1957	529	23.0	12,167	0	0		
1958	513	30.5	15,646	0	0		
1959	441	13.5	5,954	Trace	Trace	Trace	Trace
1960	498	30.0	14,940	Trace	Trace		
1961	493	24.0	11,832	Trace	Trace	Trace	Trace
1962	409	27.0	11,043	Trace	Trace	Trace	Trace
1963	356	25.0	8,900	Trace	Trace		
1964	235	25.0	5,875	Trace	Trace	Trace	Trace
1965	221	38.0	8,398	0	0	0	0
1966	285	26.0	7,410	0	0	0	0
1967	319	41.0	13,079	0	0	0	0
1968	419	39.0	19,149	0	0	0	0
1969	324	35.0	11,340	0	0	Trace	Trace
1970	368	33.0	12,144	0	0	Trace	Trace
1971	455	41.0	18,655	0	0	0	0
1972	576	36.0	20,736	Trace	Trace	Trace	Trace
1973	631	35.0	22,085	0	0	Trace	Trace
1974	512	25.0	12,800	0	0	Trace	Trace
1975	570	31.0	17,670	Trace	Trace	Trace	Trace
1976	350	17.0	5,950	0	0	0	0

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
TEXAS -- BARLEY							
1919	78	30.0	2,340	Trace	Trace		
1920	89	19.0	1,691	Trace	Trace	Trace	Trace
1921	98	19.0	1,862				
1922	102	15.0	1,530				
1923	128	19.5	2,496	1.0	25.5	1.0	25.5
1924	166	17.1	2,839	1.0	29.0	1.0	29.0
1925	166	10.0	1,160	1.0	11.8	0.5	5.9
1926	179	26.0	4,654	0	0		
1927	200	13.5	2,700	0	0		
1928	172	18.0	3,096				
1929	194	19.3	3,744			1.0	37.8
1930	146	15.0	2,190	0.5	11.0		
1931	212	23.5	4,982				
1932	225	16.0	3,600	1.0	36.5	0.5	18.3
1933	120	10.0	1,200	1.0	12.2	1.0	12.2
1934	132	14.2	1,874	0.1	1.9		
1935	99	15.0	1,485	5.0	78.3	0.2	3.1
1936	89	14.0	1,246	Trace	Trace		
1937	107	16.5	1,766				
1938	144	17.0	2,448				
1939	240	14.0	3,360	0.1	3.4	Trace	Trace
1940	271	16.0	4,336				
1941	325	22.0	7,150	Trace	Trace		
1942	270	16.5	4,555				
1943	248	13.0	3,224				
1944	340	22.2	7,548				
1945	235	14.5	3,408				
1946	164	15.0	2,460	0	0	Trace	Trace
1947	134	17.5	2,345	0	0		
1948	113	15.5	1,752	Trace	Trace		
1949	133	19.0	2,527	Trace	Trace	0.9	22.9
1950	125	13.0	1,625	0	0		
1951	45	11.5	518	0	0		
1952	60	14.5	870	0	0		
1953	90	19.5	1,755				
1954	190	16.5	3,135				
1955	148	14.0	2,072	0	0		
1956	145	16.0	2,320	0	0		
1957	261	22.5	5,872	Trace	Trace	1.1	65.3
1958	441	25.0	11,025	Trace	Trace	1.2	133.9
1959	300	21.2	6,300	0	0		
1960	401	22.0	8,822	0	0		
1961	421	24.0	10,104	0	0	3.0	312.5
1962	227	17.0	3,859	0	0	3.0	119.3
1963	180	21.0	3,780	0	0	0	0
1964	200	21.0	4,200	0	0	Trace	Trace
1965	142	19.0	2,698	Trace	Trace	Trace	Trace
1966	125	22.0	2,750	0	0	0.5	14.0
1967	75	18.0	1,350	0.05	0.6	3.0	41.75
1968	124	27.0	3,348	2.0	68.3	3.0	103.5
1969	94	35.0	3,290	Trace	Trace	10.0	365.6
1970	132	32.0	4,224	Trace	Trace	10.0	469.3
1971	66	20.0	1,320	0	0	0	0
1972	60	33.0	1,980	Trace	Trace	Trace	Trace
1973	90	39.0	3,510	0	0	1.0	35.4
1974	50	27.0	1,350	Trace	Trace	Trace	Trace
1975	70	34.0	2,380	Trace	Trace	Trace	Trace
1976	52	39.0	2,028	Trace	Trace	Trace	Trace

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
VIRGINIA -- BARLEY							
1919	9	26.4	238				
1920	9	25.0	225	Trace	Trace	Trace	Trace
1921	8	21.5	172	0	0		
1922	8	26.0	208	Trace	Trace	1.0	2.1
1923	11	25.0	275			Trace	Trace
1924	15	24.5	368	Trace	Trace	Trace	Trace
1925	15	24.0	288	Trace	Trace	Trace	Trace
1926	11	29.0	319			Trace	Trace
1927	10	24.0	240	0	0	Trace	Trace
1928	11	27.0	297	0	0	Trace	Trace
1929	13	25.6	333	0	0	Trace	Trace
1930	20	22.5	450			Trace	Trace
1931	24	33.0	792	1.0	8.0		
1932	39	24.0	936	Trace	Trace	Trace	Trace
1933	46	23.0	1,058	Trace	Trace	Trace	Trace
1934	46	27.0	108				
1935	44	26.0	1,144	Trace	Trace		
1936	45	20.0	900	1.5	13.7		
1937	47	29.0	1,363	0	0	0.5	6.8
1938	55	24.0	1,320	2.0	27.8	3.0	41.7
1939	70	28.0	1,960	Trace	Trace	1.0	19.8
1940	80	27.0	2,160	0.5	10.8		
1941	75	24.0	1,800	Trace	Trace		
1942	80	27.0	2,160	Trace	Trace		
1943	75	21.0	1,575	Trace	Trace		
1944	72	30.4	2,189	Trace	Trace		
1945	68	27.0	1,836	Trace	Trace	5.0	96.6
1946	71	32.0	2,272	1.0	22.9	Trace	Trace
1947	84	29.5	2,478	Trace	Trace		
1948	86	34.5	2,967	Trace	Trace	3.0	91.8
1949	86	30.4	2,614	Trace	Trace		
1950	89	30.5	2,714	Trace	Trace		
1951	82	32.0	2,624	Trace	Trace		
1952	84	34.0	2,856	Trace	Trace		
1953	91	33.0	3,003	Trace	Trace		
1954	109	38.0	4,142	Trace	Trace		
1955	116	36.0	4,176	Trace	Trace		
1956	115	41.0	4,715	Trace	Trace	Trace	Trace
1957	115	32.0	3,686	Trace	Trace		
1958	113	35.5	4,012	Trace	Trace	1.0	40.5
1959	114	39.0	4,446	Trace	Trace	Trace	Trace
1960	120	39.0	4,680	Trace	Trace		
1961	120	43.5	5,220	Trace	Trace		
1962	112	36.5	4,088	Trace	Trace		
1963	90	29.0	2,610	Trace	Trace		
1964	115	44.5	5,118	Trace	Trace		
1965	115	43.0	4,945	Trace	Trace		
1966	110	51.0	5,610	Trace	Trace		
1967	117	51.0	5,967	0	0		
1968	121	46.0	5,566	0	0		
1969	117	50.0	5,850	0	0	0	0
1970	116	51.0	5,916	0	0	0	0
1971	111	49.0	5,439	0	0	0	0
1972	105	43.0	4,515	0	0	0	0
1973	98	47.0	4,606	0	0	0	0
1974	105	50.0	5,250	Trace	Trace	Trace	Trace
1975	104	47.0	4,888	Trace	Trace	Trace	Trace
1976	103	46.0	4,738	0	0	0	0

Table 3.--Estimated loss of yield caused by barley rusts by States and year reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield					
				Stem rust		Leaf rust		Stripe rust	
				bu/A	1,000 bu	%	1,000 bu	%	1,000 bu
WASHINGTON -- BARLEY									
1919	85	27.0	2,295	Trace	Trace				
1920	82	33.0	2,706						
1921	80	33.0	2,640						
1922	74	21.0	1,554	0	0	0	0		
1923	72	42.0	3,024	0	0	0	0		
1924	70	23.0	1,610	Trace	Trace	0	0		
1925	84	31.0	2,604	0	0				
1926	67	30.5	2,044			0	0		
1927	56	37.0	2,072						
1928	49	31.5	1,544						
1929	54	30.0	1,620						
1930	54	20.0	1,620						
1931	47	30.0	1,410						
1932	52	29.0	1,508	Trace	Trace	0	0		
1933	60	35.0	2,100	Trace	Trace	Trace	Trace		
1934	48	29.5	1,416						
1935	65	32.0	2,080						
1936	60	37.0	2,220						
1937	61	35.0	2,135						
1938	64	34.0	2,176	0.1	2.2	Trace	Trace		
1939	96	33.0	3,168	Trace	Trace	Trace	Trace		
1940	150	29.0	4,350						
1941	165	37.0	6,105						
1942	365	40.0	14,600						
1943	300	39.0	11,700						
1944	176	36.8	6,477						
1945	125	35.0	4,375	0	0				
1946	90	37.0	3,330	0	0				
1947	105	33.5	3,518	0	0				
1948	126	34.5	4,347	0	0				
1949	101	28.0	2,828	0	0				
1950	254	34.5	8,763	0	0				
1951	94	36.0	3,384	0	0				
1952	84	36.0	3,024	0	0				
1953	103	38.0	3,914	0	0				
1954	610	37.5	22,875	Trace	Trace				
1955	738	25.0	18,450	Trace	Trace				
1956	635	35.0	22,225	0	0				
1957	781	43.0	33,583	Trace	Trace				
1958	703	32.0	22,496	Trace	Trace				
1959	703	40.0	28,120	Trace	Trace	Trace	Trace		
1960	654	36.0	23,544	Trace	Trace				
1961	714	40.0	28,560	Trace	Trace				
1962	607	44.0	26,708	0	0				
1963	664	41.0	27,224	0	0				
1964	498	45.0	22,410	Trace	Trace				
1965	309	49.0	15,141	0	0	Trace	Trace		
1966	390	49.0	19,110	0	0	Trace	Trace		
1967	226	42.0	9,492	0	0	Trace	Trace		
1968	246	41.0	10,006	0	0	Trace	Trace		
1969	370	46.0	17,020	Trace	Trace	Trace	Trace	Trace	Trace
1970	414	47.0	19,458	Trace	Trace	Trace	Trace	Trace	Trace
1971	447	58.0	25,926	0	0	Trace	Trace	Trace	Trace
1972	258	55.0	14,190	Trace	Trace	Trace	Trace	Trace	Trace
1973	375	40.0	15,000	0	0	Trace	Trace	Trace	Trace
1974	320	55.0	14,720	Trace	Trace	Trace	Trace	Trace	Trace
1975	400	53.0	21,200	Trace	Trace	Trace	Trace	Trace	Trace
1976	390	54.0	21,060	Trace	Trace	Trace	Trace	Trace	Trace

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
WISCONSIN -- BARLEY							
1919	516	24.5	12,642	5.0	665.4	0	0
1920	502	28.5	14,307	3.0	442.5	Trace	Trace
1921	473	21.0	9,933	Trace	Trace		
1922	443	31.0	13,733	2.0	280.3	Trace	Trace
1923	465	26.0	12,090	1.0	122.1		
1924	391	30.0	11,730	0.5	58.9	Trace	Trace
1925	461	33.0	15,213	0.5	76.4	Trace	Trace
1926	521	31.0	16,151	0.5	162.3	Trace	Trace
1927	620	31.0	19,220	0.5	96.6	Trace	Trace
1928	725	33.0	23,925	Trace	Trace	Trace	Trace
1929	703	29.0	20,387	1.5	310.4	Trace	Trace
1930	703	34.0	23,902	Trace	Trace	Trace	Trace
1931	731	26.0	19,006	Trace	Trace	Trace	Trace
1932	789	30.0	23,670	0	0	0.1	23.7
1933	766	22.0	16,852	0	0	Trace	Trace
1934	724	25.6	18,534	Trace	Trace		
1935	929	27.5	25,548	Trace	Trace	0	0
1936	836	20.5	17,138	Trace	Trace		
1937	847	26.0	22,022	12.0	3,003.0		
1938	771	31.5	24,286	Trace	Trace	0	0
1939	770	29.0	22,330	0.5	112.8	0.5	112.8
1940	654	37.5	24,525	Trace	Trace	Trace	Trace
1941	543	31.0	16,833	Trace	Trace	Trace	Trace
1942	489	32.0	15,648	Trace	Trace	Trace	Trace
1943	347	26.0	9,022	0	0	0	0
1944	184	26.7	4,913	1.0	49.6	0	0
1945	90	40.0	3,600	0	0	0	0
1946	124	37.5	4,650	0	0	0	0
1947	159	36.5	5,804	0	0	0	0
1948	204	38.0	7,752	0	0	0	0
1949	194	33.2	6,441	Trace	Trace	Trace	Trace
1950	219	42.0	9,198	0	0	Trace	Trace
1951	201	33.5	6,734	0	0	Trace	Trace
1952	108	35.5	3,834	0	0	Trace	Trace
1953	89	36.0	3,204	Trace	Trace	Trace	Trace
1954	88	37.0	3,256	Trace	Trace	Trace	Trace
1955	70	35.0	2,450	Trace	Trace		
1956	69	36.0	2,484	0	0		
1957	48	35.0	1,680	0	0	Trace	Trace
1958	39	47.0	1,833	0	0	0	0
1959	44	41.0	1,804	0	0	Trace	Trace
1960	37	35.5	1,314	0	0	0	0
1961	31	45.0	1,395	Trace	Trace	0	0
1962	30	40.0	1,200	0	0	0	0
1963	28	50.0	1,400	0	0	0	0
1964	29	42.0	1,218	0	0	0	0
1965	25	50.0	1,250	0	0	0	0
1966	31	52.0	1,612	0	0	0	0
1967	45	50.0	2,250	0	0	Trace	Trace
1968	59	56.0	3,304	0	0	0.2	6.6
1969	35	55.0	1,925	0	0	0.3	5.8
1970	33	51.0	1,683	0	0	0.1	1.7
1971	36	57.0	2,052	0	0	0.1	2.1
1972	22	45.0	990	0	0	0.1	1.0
1973	21	37.0	777	0	0	0.1	0.8
1974	19	47.0	893	0	0	0.3	2.7
1975	35	43.0	1,505	0	0	0.1	1.5
1976	32	40.0	1,280	0	0	0	0

Table 3.--Estimated loss of yield caused by barley rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
WYOMING -- BARLEY							
1919	8	14.5	116				
1920	8	26.0	208				
1921	10	20.5	205				
1922	14	21.0	294	0	0		
1923	20	21.5	430				
1924	23	20.5	475				
1925	37	25.0	925	0	0		
1926	48	25.5	1,224	Trace	Trace		
1927	73	27.0	1,971	Trace	Trace		
1928	104	24.0	2,496	Trace	Trace		
1929	137	20.5	2,808	0	0		
1930	145	19.5	2,828	Trace	Trace		
1931	71	17.5	1,242	Trace	Trace		
1932	86	20.0	1,720	0	0		
1933	69	18.0	1,242	0	0		
1934	38	22.0	836	0	0		
1935	66	23.5	1,551	5.0	81.6		
1936	38	20.5	779	Trace	Trace		
1937	68	27.0	1,836	0.1	1.8		
1938	74	27.5	2,035	Trace	Trace		
1939	73	28.1	2,051	0	0		
1940	87	27.0	2,349	0	0		
1941	97	32.0	3,104	Trace	Trace		
1942	112	27.0	3,024	0	0		
1943	129	30.0	3,870	Trace	Trace	0	0
1944	131	31.0	4,061	2.0	82.9	0	0
1945	124	30.0	3,720	Trace	Trace		
1946	144	30.0	4,320	0	0	0	0
1947	138	32.0	4,416	Trace	Trace	0	0
1948	159	27.5	4,372	0	0		
1949	151	29.8	4,500	0	0		
1950	151	28.0	4,228	0	0	0	0
1951	134	34.0	4,556	0	0		
1952	117	30.5	3,568	0	0		
1953	101	27.5	2,778	4.0	115.7		
1954	120	24.5	2,940	0	0		
1955	110	28.0	3,080	Trace	Trace	0	0
1956	100	27.0	2,700	0	0	0	0
1957	112	37.0	4,144	Trace	Trace		
1958	105	37.0	3,885	Trace	Trace		
1959	117	31.0	3,627	Trace	Trace		
1960	96	32.0	3,072	Trace	Trace		
1961	103	31.0	3,193	Trace	Trace	0.5	16.0
1962	112	37.0	4,144	3.0	130.9	2.0	87.2
1963	114	36.0	4,104	Trace	Trace	Trace	Trace
1964	109	37.0	4,033	0	0	Trace	Trace
1965	121	43.0	5,203	Trace	Trace	2.0	106.0
1966	92	35.0	3,220	0	0	0	0
1967	96	47.0	4,512	Trace	Trace	Trace	Trace
1968	102	47.0	4,794	0	0	Trace	Trace
1969	116	51.0	5,916	0	0	0	0
1970	126	47.0	5,922	0	0	0	0
1971	132	52.0	6,864	0	0	0	0
1972	133	53.0	7,049	0	0	0	0
1973	130	48.0	6,240	0	0	Trace	Trace
1974	132	49.0	6,468	Trace	Trace	0	0
1975	134	57.0	7,638	Trace	Trace	0	0
1976	138	60.0	8,280	0	0	0	0

Rye Stem Rust

Rye stem rust has not been a major disease. Rye itself is now grown on minor acreage. Although both spring and winter ryes exist, most of the acreage is of the winter type. Much of the southern-planted acreage is used for grazing and not harvested. In the Northern States much of the rye is grown on light soils, which is normally an unfavorable site for rust development. Rye is the only small grain cereal crop that is cross-pollinated;

thus, a cultivar is normally a mixture of genotypes for rust resistance. The only stem rust epidemics with losses of 5 percent or more occurred in 1920 with losses of 10 percent in South Dakota and 5 percent in Wisconsin. The only recent measurable loss was 0.1 percent in North Dakota in 1974, a year when rye stem rust occurred on both commercial barley cultivars and wild barley, *Hordeum jubatum*.

Rye Leaf Rust

Rye leaf rust is more damaging than stem rust but is still not usually an important disease. Rye leaves senesce earlier than those of other small grain cereals. In the areas where epidemics occur, leaf rust normally overwinters on rye. Statewide epidemics with losses of 5 percent have occurred in Pennsylvania (7); Indiana and Kansas (3); and

Nebraska, North Dakota, and Wisconsin (1). The greatest percent loss was 22 percent in Wisconsin in 1938. Generally, as the acreage of rye in the United States has decreased, the percentage of loss has decreased. The only exceptions have been in North Dakota where a loss of 3, 5, and 1 percent occurred in 1969, 1971, and 1974, respectively.

Text continues on page 84.

Table 4.--Estimated loss of yield caused by rye rusts by States and years reported

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
GEORGIA -- RYE							
1972	75	20.0	1,500	0	0	10.0	166.7
1973	115	14.0	1,600	0	0	1.5	24.5
1974	115	18.0	2,070	Trace	Trace	0.5	10.4
1975	105	15.0	1,575	0	0	1.0	15.9
1976	110	22.0	2,420	0	0	1.0	24.4

Table 4.--Estimated loss of yield caused by rye rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
ILLINOIS -- RYE							
1919	235	16.5	3,878				
1920	141	15.6	2,200	Trace	Trace		
1921	127	17.0	2,159	Trace	Trace	Trace	Trace
1922	165	16.0	2,640	0.5	13.5	2.0	54.1
1923	132	15.0	1,980	Trace	Trace	1.0	20.0
1924	81	14.5	1,174	0	0	0.5	5.9
1925	63	12.5	788	0	0	0.4	3.2
1926	66	14.5	957	0	0	0.2	1.9
1927	46	11.5	529	0	0	0.02	0.1
1928	46	12.5	575				
1929	62	11.2	694				
1930	75	12.0	900				
1931	86	14.0	1,204	0	0		
1932	60	11.0	660	0	0		
1933	66	10.5	693	0	0	Trace	Trace
1934	85	8.9	756	Trace	Trace	0.3	2.3
1935	128	12.0	1,536	Trace	Trace	1.0	15.5
1936	69	12.5	856	0	0	Trace	Trace
1937	118	14.5	1,711	0	0	2.0	34.9
1938	94	13.5	1,269	Trace	Trace		
1939	91	13.0	1,183	Trace	Trace	1.0	11.9
1940	59	14.5	856	Trace	Trace	Trace	Trace
1941	58	13.0	754	1	7.6	1.0	Trace
1942	49	11.0	539	Trace	Trace	1.5	8.2
1943	59	11.0	649	Trace	Trace	1.0	6.6
1944	63	11.3	712	Trace	Trace	1.0	7.2
1945	47	12.0	564	Trace	Trace	1.0	5.7
1946	38	12.5	475	Trace	Trace	1.0	4.8
1947	47	14.0	658	0	0	1.0	6.6
1948	53	15.0	795	Trace	Trace	1.0	8.0
1949	56	14.1	790	Trace	Trace	0.7	5.6
1950	50	13.5	675	Trace	Trace	0.5	3.4
1951	41	13.0	533	0	0		
1952	36	14.0	504	0	0	Trace	Trace
1953	43	14.0	602	Trace	Trace		
1954	108	18.5	1,988	Trace	Trace		
1955	108	17.0	1,836	Trace	Trace		
1956	68	19.0	1,292	Trace	Trace		
1957	75	15.0	1,125	Trace	Trace		
1958	53	17.5	928	Trace	Trace		
1959	56	19.0	1,064	Trace	Trace		
1960	53	19.0	1,007	Trace	Trace	2.0	20.5
1961	58	22.0	1,276	Trace	Trace	2.0	27.8
1962	61	19.0	1,159	Trace	Trace	2.0	23.6
1963	49	21.0	1,029	0	0	Trace	Trace
1964	39	21.0	819	Trace	Trace	Trace	Trace
1965	34	23.0	782	0	0	0	0
1966	29	21.0	609	0	0	0	0
1967	25	23.5	588	0	0	0	0
1968	21	21.0	441	0	0	0	0
1969	26	23.5	611	0	0	0	0
1970	27	22.0	594	0	0	0	0
1971	28	23.0	644	0	0	0	0
1972	20	23.0	460	0	0	0	0
1973	21	22.0	460	0	0	0	0
1974	19	19.0	361	0	0	0	0
1975	17	22.0	374	0	0	Trace	Trace
1976	15	21.0	315	0	0	0	0

Table 4.--Estimated loss of yield caused by rye rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
INDIANA -- RYE							
1919	351	12.6	4,423	Trace	Trace	1.0	44.7
1920	333	13.0	4,329	Trace	Trace	Trace	Trace
1921	393	12.0	4,716	Trace	Trace	1.0	47.6
1922	389	11.5	4,774	Trace	Trace	2.0	97.4
1923	249	13.5	3,362	Trace	Trace	Trace	Trace
1924	159	12.3	1,956				
1925	116	11.4	1,322	0	0	Trace	Trace
1926	117	14.5	1,696	0	0	0.2	3.4
1927	90	12.5	1,125	0	0	5.0	59.2
1928	72	10.0	720	0	0		
1929	100	11.2	1,120	Trace	Trace		
1930	87	11.5	1,000	0	0		
1931	113	14.5	1,638	0.5	8.7	5.0	86.6
1932	89	11.5	1,024	Trace	Trace		
1933	97	10.0	970	0	0	1.0	9.8
1934	138	11.0	1,518	0	0		
1935	212	11.5	2,438	0	0	15.0	430.2
1936	108	12.0	1,296	0	0	0	0
1937	140	12.5	1,750			Trace	Trace
1938	105	11.5	1,208	Trace	Trace		
1939	129	12.5	1,612	0	0		
1940	124	15.0	1,860	0	0		
1941	130	15.5	2,015	Trace	Trace		
1942	144	13.5	1,944	0	0	Trace	Trace
1943	101	12.0	1,212	0	0		
1944	86	11.8	1,015	Trace	Trace		
1945	70	12.5	875	Trace	Trace	Trace	Trace
1946	46	13.5	621	Trace	Trace		
1947	60	14.0	840	Trace	Trace		
1948	64	14.5	928	0	0		
1949	57	13.5	770	0	0		
1950	59	13.5	796	0	0		
1951	45	12.5	562	0	0		
1952	52	14.5	754	0	0	Trace	Trace
1953	66	16.5	1,089	0	0		
1954	120	18.5	2,220	0	0	Trace	Trace
1955	100	17.0	1,700	0	0	4.0	66.0
1956	63	20.0	1,260	0	0		
1957	71	15.0	1,065	Trace	Trace		
1958	60	20.0	1,200	Trace	Trace		
1959	62	19.5	1,209			Trace	Trace
1960	59	22.5	1,328	Trace	Trace	Trace	Trace
1961	66	21.0	1,386	0	0		
1962	53	21.0	1,113	0	0	Trace	Trace
1963	50	24.0	1,200	0	0	0	0
1964	36	22.0	792	0	0	0	0
1965	34	23.0	782	0	0	0	0
1966	26	25.0	650	0	0	0	0
1967	19	23.0	437	0	0	0	0
1968	16	23.0	368	0	0	0	0
1969	18	23.0	414	0	0	0	0
1970	18	23.5	423	0	0	0	0
1971	16	27.0	432	0	0	0	0
1972	12	25.0	300	0	0	0	0
1973	13	23.0	299	0	0	0	0
1974	9	24.0	216	0	0	0	0
1975	9	26.0	234	0	0	Trace	Trace
1976	10	23.0	230	0	0	0	0

Table 4.--Estimated loss of yield caused by rye rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
KANSAS -- RYE							
1919	190	10.5	1,995			Trace	Trace
1920	95	12.5	1,188			Trace	Trace
1921	78	9.5	741	Trace	Trace		
1922	54	11.0	594	Trace	Trace	Trace	Trace
1923	34	8.5	289	Trace	Trace	Trace	Trace
1924	33	11.1	366	Trace	Trace	Trace	Trace
1925	32	16.0	512	0.2	1.0	Trace	Trace
1926	33	10.7	353	0	0	Trace	Trace
1927	39	10.7	417			1.0	4.2
1928	20	12.0	240				
1929	14	10.5	147				
1930	18	10.5	189				
1931	25	12.0	300				
1932	19	11.0	209	0	0	0	0
1933	16	9.0	144	0	0	Trace	Trace
1934	20	9.8	196				
1935	60	10.5	630				
1936	58	10.5	609	0	0	0	0
1937	84	11.5	966				
1938	65	11.0	715				
1939	65	10.5	682				
1940	64	10.5	672				
1941	89	11.0	979	0	0	2.0	20.0
1942	117	11.0	1,287				
1943	129	10.5	1,354				
1944	101	10.5	1,060				
1945	81	10.5	850	Trace	Trace	5.0	44.7
1946	53	10.5	556	0	0	Trace	Trace
1947	57	11.0	627	0	0	0	0
1948	34	11.5	391	0	0	0	0
1949	28	9.7	272	0	0	0	0
1950	42	10.0	420	0	0	0	0
1951	30	9.5	285	0	0	0	0
1952	42	11.0	462	0	0	0	0
1953	38	9.5	361	0	0	Trace	Trace
1954	85	11.5	978	0	0	1	9.9
1955	69	10.0	690			5.0	36.3
1956	66	11.5	759	0	0	Trace	Trace
1957	160	16.0	2,560	0	0	Trace	Trace
1958	168	17.5	2,940	0	0	1.0	29.7
1959	143	15.0	2,145	0	0	10.0	238.3
1960	129	18.0	2,322	0	0	Trace	Trace
1961	118	17.0	2,006	0	0	0	0
1962	189	15.5	2,930	0	0	0	0
1963	130	12.5	1,625	0	0		
1964	143	15.0	2,145	0	0	0	0
1965	64	16.0	1,024	0	0	0	0
1966	57	15.0	855	0	0	0	0
1967	30	13.5	405	0	0	0	0
1968	33	15.5	512	0	0	0	0
1969	59	19.0	1,121	0	0	0	0
1970	86	22.0	1,892	0	0	0	0
1971	120	22.0	2,640	0	0	0	0
1972	25	20.0	500	0	0	0	0
1973	40	21.0	840	0	0	Trace	Trace
1974	20	19.0	380	0	0	Trace	Trace
1975	15	21.0	315	0	0	Trace	Trace
1976	15	17.0	255	Trace	Trace	0	0

Table 4.--Estimated loss of yield caused by rye rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production bu/A 1,000 bu		Losses in yield			
				Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
MICHIGAN -- RYE							
1919	913	13.3	12,143			1.0	122.6
1920	676	14.7	9,937	Trace	Trace	Trace	Trace
1921	649	12.5	8,112	1.0	81.9	Trace	Trace
1922	648	12.0	7,776	Trace	Trace		
1923	395	13.0	5,135	Trace	Trace	Trace	Trace
1924	231	14.5	3,350	1.0	33.8	Trace	Trace
1925	201	11.5	2,312	1.0	23.4	0	0
1926	161	12.0	1,932	Trace	Trace	Trace	Trace
1927	164	13.0	2,132	Trace	Trace	1.0	21.5
1928	167	11.5	1,920				
1929	147	11.1	1,632				
1930	147	13.0	1,911	0	0		
1931	162	13.5	2,187	Trace	Trace	0.1	2.2
1932	168	12.5	1,100	0	0	Trace	Trace
1933	131	10.5	1,376	Trace	Trace	Trace	Trace
1934	157	8.8	1,382	Trace	Trace	Trace	Trace
1935	228	13.5	2,078	Trace	Trace	Trace	Trace
1936	130	11.5	1,495	Trace	Trace	Trace	Trace
1937	133	11.5	1,530	0	0		
1938	104	13.5	1,404	Trace	Trace	0.1	1.4
1939	101	13.0	1,313	Trace	Trace		
1940	80	14.5	1,160	0	0		
1941	56	13.5	756	0	0		
1942	75	14.5	1,088	0	0		
1943	58	11.5	667	0	0	3.0	20.6
1944	62	12.7	787	0	0	Trace	Trace
1945	56	14.0	784	0	0	Trace	Trace
1946	48	13.5	648	0	0	Trace	Trace
1947	70	14.5	1,015	0	0		
1948	80	15.0	1,200	0	0	Trace	Trace
1949	57	14.0	798	0	0	Trace	Trace
1950	60	14.5	870	0	0	Trace	Trace
1951	62	14.0	868	0	0		
1952	45	14.0	630	0	0		
1953	46	15.0	690	0	0		
1954	57	17.0	969	0	0		
1955	40	15.0	600	0	0		
1956	45	17.0	765	0	0		
1957	46	19.5	897	0	0	Trace	Trace
1958	47	21.5	1,010	0	0	Trace	Trace
1959	47	20.5	964	0	0	0	0
1960	39	18.0	702	0	0	Trace	Trace
1961	33	23.0	759	0	0	Trace	Trace
1962	42	22.0	924	0	0	Trace	Trace
1963	44	23.0	1,012	0	0	Trace	Trace
1964	40	26.0	1,040	0	0	Trace	Trace
1965	44	24.0	1,056	0	0	0	0
1966	41	24.0	984	0	0	0	0
1967	38	23.0	874	0	0	Trace	Trace
1968	34	24.5	833	0	0	Trace	Trace
1969	40	26.0	1,040	0	0	Trace	Trace
1970	42	26.0	1,092	0	0	Trace	Trace
1971	34	24.0	816	0	0	Trace	Trace
1972	31	26.0	806	0	0	Trace	Trace
1973	33	25.0	825	0	0	Trace	Trace
1974	25	25.0	625	0	0	1.0	6.3
1975	28	25.0	700	0	0	Trace	Trace
1976	26	26.0	676	0	0	Trace	Trace

Table 4.--Estimated loss of yield caused by rye rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
MINNESOTA -- RYE							
1919	640	13.0	8,320			Trace	Trace
1920	550	17.5	9,625	Trace	Trace	Trace	Trace
1921	660	16.5	10,890	Trace	Trace	Trace	Trace
1922	1,238	19.0	23,522	0.5	118.2	Trace	Trace
1923	978	14.0	13,692	Trace	Trace	Trace	Trace
1924	616	20.0	12,320	Trace	Trace		
1925	480	13.5	6,480	Trace	Trace	Trace	Trace
1926	440	13.0	5,720	0	0		
1927	370	17.5	6,275	0	0	0	0
1928	421	14.0	5,894	0	0		
1929	420	16.1	6,762				
1930	449	16.0	7,184				
1931	368	13.5	4,968	0	0	Trace	Trace
1932	309	15.0	4,635	0	0	Trace	Trace
1933	278	10.0	2,780	0	0	Trace	Trace
1934	315	6.9	2,174	0	0	0	0
1935	485	17.5	8,488	0	0	0	0
1936	340	10.5	3,570	0	0	0	0
1937	554	16.5	9,141	0	0	0	0
1938	543	16.0	8,688	0	0	0	0
1939	500	12.5	6,250	0	0		
1940	330	16.5	5,445	0	0		
1941	290	11.5	3,335	0	0		
1942	223	15.0	3,345	0	0		
1943	123	11.5	1,414	0	0		
1944	108	8.7	940	0	0		
1945	107	16.0	1,712	0	0		
1946	118	13.0	1,534	0	0		
1947	164	15.0	2,460	0	0		
1948	239	15.0	3,585	Trace	Trace		
1949	172	14.5	2,494	Trace	Trace		
1950	162	14.5	2,349	0			
1951	190	15.0	2,850	0	0		
1952	129	13.5	2,742	0	0		
1953	125	15.0	1,875	0	0		
1954	99	14.5	1,436	Trace	Trace		
1955	115	15.0	1,725	0	0		
1956	99	16.0	1,584	0	0	0	0
1957	72	15.0	1,080	Trace	Trace	0.5	5.4
1958	60	19.5	1,170	0	0		
1959	58	18.5	1,073	0	0		
1960	58	21.0	1,218	0	0		
1961	74	19.0	1,406	0	0		
1962	86	17.0	1,462	0	0	Trace	Trace
1963	79	19.0	1,501	0	0		
1964	85	19.0	1,615	0	0	0	0
1965	102	20.5	2,091	0	0	0	0
1966	67	20.0	1,340	0	0	0	0
1967	81	23.5	1,904	0	0	0	0
1968	70	25.0	1,750	0	0	0	0
1969	84	25.5	2,142	0	0	Trace	Trace
1970	100	27.0	2,700	0	0	0	0
1971	170	27.0	4,590	Trace	Trace	Trace	Trace
1972	115	26.0	2,990	0	0	Trace	Trace
1973	90	35.0	3,150	0	0	Trace	Trace
1974	72	25.0	1,800	0	0	Trace	Trace
1975	89	25.0	2,225	Trace	Trace	Trace	Trace
1976	105	19.5	2,048	Trace	Trace	Trace	Trace

Table 4.--Estimated loss of yield caused by rye rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
NEBRASKA -- RYE							
1919	360	10.0	3,600	0	0		
1920	220	11.0	2,420	Trace	Trace	Trace	Trace
1921	230	11.0	2,530				
1922	155	10.0	1,550	Trace	Trace		
1923	165	11.0	1,815				
1924	159	10.0	1,590	0	0		
1925	180	10.0	1,800	0	0	Trace	Trace
1926	230	7.5	1,725	0	0	Trace	Trace
1927	250	11.0	2,750				
1928	230	10.5	2,415				
1929	244	11.3	2,757				
1930	317	11.5	3,646	Trace	Trace		
1931	333	8.0	2,664	Trace	Trace		
1932	206	9.0	1,854	0.7	13.1		
1933	161	7.0	1,127	Trace	Trace		
1934	122	4.4	537	0	0		
1935	379	13.0	4,927	0	0		
1936	406	8.0	3,248	0	0		
1937	345	11.0	3,795	Trace	Trace		
1938	369	12.0	4,428	Trace	Trace		
1939	395	9.3	3,674	Trace	Trace		
1940	296	9.5	2,812				
1941	394	11.5	4,531				
1942	465	13.0	6,045	0	0		
1943	451	11.5	5,186				
1944	365	9.1	3,322	Trace	Trace		
1945	361	12.5	4,512	Trace	Trace	Trace	Trace
1946	282	11.0	3,102	0	0		
1947	305	9.0	2,745	Trace	Trace		
1948	238	9.5	2,261	Trace	Trace		
1949	207	7.4	1,532	Trace	Trace		
1950	224	11.0	2,464	Trace	Trace		
1951	202	8.5	1,717	Trace	Trace		
1952	170	9.5	1,615	0	0		
1953	128	9.0	1,152	0	0		
1954	146	9.5	1,387	0	0		
1955	155	11.0	1,705	0	0	5.0	89.7
1956	186	9.0	1,674	0	0	0	0
1957	166	15.0	2,490	0	0		
1958	166	17.5	2,905	0	0	Trace	Trace
1959	156	13.5	2,106	0	0		
1960	151	17.0	2,567	0	0	2.0	52.4
1961	168	17.5	2,940	0	0		
1962	225	16.0	3,600	0	0	0	0
1963	158	12.0	1,896	0	0		
1964	142	15.5	2,201	0	0		
1965	96	17.5	1,680	0	0	0	0
1966	147	21.0	3,087	0	0	0	0
1967	88	15.0	1,320	0	0	0	0
1968	88	15.0	1,320	0	0	0	0
1969	140	19.5	2,730	0	0	0	0
1970	210	26.0	5,460	0	0	0	0
1971	235	28.0	6,580	0	0	0	0
1972	75	24.0	1,800	0	0	0	0
1973	89	20.0	1,780	0	0	0	0
1974	55	20.0	1,100	0	0	Trace	Trace
1975	55	20.0	1,100	0	0	Trace	Trace
1976	60	17.0	1,020	Trace	Trace	0	0

Table 4.--Estimated loss of yield caused by rye rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
NORTH DAKOTA -- RYE							
1919	2,100	8.0	11,800	0	0	1.0	119.1
1920	974	10.0	9,740			Trace	Trace
1921	1,022	11.0	11,242	Trace	Trace	Trace	Trace
1922	1,942	16.1	31,266	Trace	Trace	Trace	Trace
1923	1,437	8.0	11,496	0.5	57.8	Trace	Trace
1924	1,365	15.7	21,430	Trace	Trace	0	0
1925	1,556	10.5	16,338	Trace	Trace	0	0
1926	1,291	8.0	10,328	Trace	Trace		
1927	1,459	16.5	24,074	Trace	Trace	0	0
1928	1,371	11.0	15,081	0	0		
1929	1,042	9.5	9,899	0	0		
1930	1,244	11.2	13,933	Trace	Trace		
1931	760	7.0	5,320	0	0		
1932	1,060	10.5	11,130	0	0	0	0
1933	550	6.5	3,575	0	0	0	0
1934	121	5.8	702	Trace	Trace	0	0
1935	855	14.5	12,398	Trace	Trace	Trace	Trace
1936	445	4.5	2,002	0	0	0	0
1937	672	10.0	6,700	0	0	0	0
1938	961	13.0	12,493	0	0		
1939	875	7.8	6,825	0	0		
1940	752	11.5	8,648	0	0		
1941	910	13.0	11,830	0	0		
1942	864	15.0	12,960	0	0		
1943	285	11.0	3,135	0	0		
1944	145	9.2	1,334	0	0		
1945	115	13.5	1,552	0	0	Trace	Trace
1946	196	11.0	2,156	0	0		
1947	323	14.0	4,522	0	0		
1948	401	12.0	4,812	0	0		
1949	229	11.5	2,634	0	0		
1950	220	10.5	2,310	0	0		
1951	178	15.0	2,670	0	0		
1952	140	11.5	1,610	Trace	Trace		
1953	200	17.5	3,500	0	0		
1954	308	16.0	4,928	Trace	Trace		
1955	551	16.0	8,816	0	0		
1956	314	12.0	3,768	0	0	0	0
1957	236	18.0	4,248	Trace	Trace		
1958	354	18.5	6,549	0	0	Trace	Trace
1959	202	13.5	2,727	0	0		
1960	303	22.0	6,666	0	0		
1961	267	13.5	3,604	0	0	0	0
1962	539	28.0	15,092	0	0	Trace	Trace
1963	399	21.5	8,578	0	0	0	0
1964	499	21.0	10,479	0	0	0	0
1965	472	26.0	12,272	0	0	0	0
1966	267	24.5	6,542	0	0	0	0
1967	179	22.5	4,028	0	0	0	0
1968	161	26.0	4,186	0	0	0	0
1969	238	22.5	5,355	0	0	3.0	165.6
1970	191	29.0	5,539	t	t	t	t
1971	300	32.5	9,750	0	0	5.0	513.2
1972	142	32.5	4,615	0	0	0	0
1973	107	29.5	3,157	0	0	Trace	Trace
1974	106	26.0	2,956	0.1	2.8	1.0	27.9
1975	119	25.0	2,975	Trace	Trace	Trace	Trace
1976	111	25.5	2,831	Trace	Trace	Trace	Trace

Table 4.--Estimated loss of yield caused by rye rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
OHIO -- RYE							
1919	104	14.3	1,487	0	0	1.0	15.0
1920	96	12.5	1,200			Trace	Trace
1921	77	10.5	808	1.0	8.4	3.0	25.2
1922	76	11.5	874	1.0	9.0	2.0	18.0
1923	59	13.0	769	2.0	16.2	3.0	24.2
1924	55	13.6	748	1.0	7.8	3.0	23.4
1925	51	13.0	663	0.1	0.7	0.1	0.7
1926	46	15.0	690	Trace	Trace		
1927	30	13.5	405	1.0	4.1	0.5	2.0
1928	26	10.5	273	Trace	Trace		
1929	50	12.6	630	Trace	Trace		
1930	45	12.0	540	0.9	62.0		
1931	84	18.0	1,512	0	0		
1932	54	13.0	702	0	0	0.1	0.7
1933	73	12.5	912	0	0	1.0	9.2
1934	88	13.4	1,179	0	0	1.0	11.9
1935	120	16.0	1,920	Trace	Trace	1.0	19.4
1936	50	14.5	725	Trace	Trace	0.5	3.6
1937	35	15.5	542	0	0	2.0	11.1
1938	23	14.5	334	Trace	Trace	1.0	3.4
1939	62	15.9	986	Trace	Trace	0.1	1.0
1940	72	18.0	1,296	0	0	Trace	Trace
1941	72	18.5	1,332	0	0	Trace	Trace
1942	110	17.0	1,870	0	0	Trace	Trace
1943	76	14.5	1,102	Trace	Trace	Trace	Trace
1944	33	15.2	502	0	0	Trace	Trace
1945	27	17.5	472	0	0	Trace	Trace
1946	17	17.0	289	0	0	Trace	Trace
1947	30	17.0	510	0	0	Trace	Trace
1948	20	18.0	360	0	0		
1949	18	17.0	306	0	0	Trace	Trace
1950	33	16.0	528	0	0		
1951	18	16.0	288	0	0	Trace	Trace
1952	15	17.5	262	0	0		
1953	20	19.0	380	0	0		
1954	48	20.0	960	0	0		
1955	32	20.5	656	0	0	Trace	Trace
1956	26	19.0	494	Trace	Trace	Trace	Trace
1957	30	17.5	525	0	0	0	0
1958	33	22.0	726	0	0	Trace	Trace
1959	24	20.0	480	Trace	Trace	Trace	Trace
1960	25	23.0	575	0	0		
1961	27	23.0	621	Trace	Trace	1.0	6.3
1962	31	23.5	728	0	0		
1963	20	26.0	676	0	0	0	0
1964	19	24.0	456	0	0	0	0
1965	20	25.0	500	0	0	Trace	Trace
1966	18	29.0	522	0	0	1.0	5.3
1967	12	24.0	288	0	0	Trace	0
1968	11	27.0	297	0	0	Trace	0
1969	16	28.0	448	0	0	Trace	Trace
1970	15	27.0	405	0	0	Trace	Trace
1971	15	31.0	465	0	0	Trace	Trace
1972	8	31.0	248	0	0	0	0
1973	8	26.0	208	0	0	0	0
1974	6	28.0	168	0	0	Trace	Trace
1975	7	28.0	196	0	0	Trace	Trace
1976	7	28.0	196	0	0	0	0

Table 4.--Estimated loss of yield caused by rye rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
PENNSYLVANIA -- RYE							
1919	243	13.5	3,280	0	0	2.0	66.9
1920	190	13.5	2,565	0	0	Trace	Trace
1921	188	13.5	2,538	0	0	Trace	Trace
1922	163	14.0	2,282	0	0	Trace	Trace
1923	134	13.5	1,809	0	0	Trace	Trace
1924	125	14.0	1,750	Trace	Trace	0.5	8.8
1925	119	14.0	1,666	Trace	Trace	0.5	8.4
1926	89	13.5	1,202	Trace	Trace	0.5	6.0
1927	78	13.5	1,053	Trace	Trace	1.0	10.6
1928	103	12.5	1,288	0	0	Trace	Trace
1929	127	13.0	1,651	0	0	Trace	Trace
1930	127	14.5	1,842	0	0	Trace	Trace
1931	135	15.0	2,025	0	0	Trace	Trace
1932	124	12.5	1,550	Trace	Trace	10.0	172.2
1933	119	13.5	1,600	Trace	Trace	5.0	84.2
1934	112	12.1	1,355	Trace	Trace	6.0	86.5
1935	108	15.0	1,620	Trace	Trace	8.0	140.9
1936	83	14.0	1,162	Trace	Trace	6.0	74.2
1937	68	15.5	1,054	Trace	Trace	5.0	55.5
1938	52	15.0	780	0.5	4.0	3.0	24.2
1939	61	14.5	884	Trace	Trace	3.0	27.3
1940	60	15.0	900	Trace	Trace	Trace	Trace
1941	57	14.0	798	Trace	Trace	Trace	Trace
1942	58	14.5	841	0	0	Trace	Trace
1943	45	13.0	585	Trace	Trace	Trace	Trace
1944	43	14.8	636	Trace	Trace	Trace	Trace
1945	41	15.5	636	0.3	1.9	0.6	3.8
1946	22	15.5	341	0	0	3.0	10.5
1947	18	15.5	279	0	0	2.0	5.7
1948	16	14.5	232	Trace	Trace	Trace	Trace
1949	14	16.5	231	0	0	10.0	25.7
1950	13	15.5	202	0	0	1.0	2.0
1951	12	15.5	186	0	0	Trace	Trace
1952	12	17.0	204	0	0	Trace	Trace
1953	12	18.0	216	0	0	Trace	Trace
1954	15	22.0	330	Trace	Trace	Trace	Trace
1955	22	22.0	484	Trace	Trace	Trace	Trace
1956	23	21.0	483	0	0	Trace	Trace
1957	22	23.0	506	0	0	Trace	Trace
1958	26	26.0	676	Trace	Trace	Trace	Trace
1959	18	22.0	396	0	0	Trace	Trace
1960	16	25.0	400	Trace	Trace	Trace	Trace
1961	16	25.0	400	Trace	Trace	Trace	Trace
1962	16	24.0	384	0	0	Trace	Trace
1963	18	26.0	468	0	0	Trace	Trace
1964	18	25.0	450	Trace	Trace	Trace	Trace
1965	18	27.0	486	Trace	Trace	Trace	Trace
1966	19	29.0	551	0	0	0	0
1967	22	27.0	594	0	0	0	0
1968	12	30.0	360	0	0	0	0
1969	16	32.0	512	0	0	0	0
1970	16	31.5	504	0	0	Trace	Trace
1971	22	34.0	748	0	0	0	0
1972	14	29.0	406	0	0	0	0
1973	15	27.0	405	0	0	0	0
1974	16	32.0	512	0	0	Trace	Trace
1975	16	29.0	464	0	0	Trace	Trace
1976	14	26.0	364	Trace	Trace	Trace	Trace

Table 4.--Estimated loss of yield caused by rye rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
		bu/A	1,000 bu	Stem rust		Leaf rust	
				%	1,000 bu	%	1,000 bu
SOUTH DAKOTA -- RYE							
1919	463	13.0	6,019	0	0	Trace	Trace
1920	285	13.5	3,848	10.0	427.5		
1921	270	14.5	3,915	Trace	Trace	Trace	Trace
1922	600	18.0	10,800	Trace	Trace		
1923	335	11.0	3,685	1.0	37.2	0	0
1924	245	14.0	3,430	1.0	34.6	0	0
1925	177	10.0	1,770	1.0	17.9	0	0
1926	103	7.5	772	Trace	Trace		
1927	154	18.5	2,849	Trace	Trace		
1928	168	10.5	1,764	0	0		
1929	230	11.8	2,714	0	0		
1930	414	15.2	6,293	0	0		
1931	352	7.0	2,464	Trace	Trace		
1932	475	15.0	7,125	0	0		
1933	190	4.0	760	0	0		
1934	21	3.5	74	0	0		
1935	470	17.5	8,225	Trace	Trace	2.0	167.8.
1936	268	6.0	1,608	0	0		
1937	586	12.0	7,032	0	0		
1938	786	16.0	12,576	0	0		
1939	635	8.4	5,334	0	0		
1940	527	11.5	6,060	0	0		
1941	653	11.5	7,510	0	0		
1942	816	15.5	12,648	0	0		
1943	522	9.5	4,959	0	0		
1944	392	10.1	3,959	0	0		
1945	290	14.5	4,205	0	0		
1946	241	10.5	2,530	0	0		
1947	347	14.0	4,858	Trace	Trace		
1948	392	13.0	5,096	Trace	Trace		
1949	267	11.7	3,124	0	0		
1950	420	13.0	5,460	Trace	Trace		
1951	512	13.0	6,656	0	0		
1952	287	11.0	3,157	0	0		
1953	250	12.5	3,125	0	0		
1954	172	15.0	2,580	Trace	Trace		
1955	327	12.5	4,088	0	0		
1956	213	10.0	2,130	Trace	Trace	0	0
1957	187	21.0	3,927	0	0		
1958	224	23.0	5,152	0	0		
1959	103	12.5	1,288	0	0		
1960	231	23.0	5,313	0	0		
1961	202	17.5	3,535	0	0	0	0
1962	261	19.0	4,959	0	0	Trace	Trace
1963	157	15.5	2,434				
1964	163	20.0	3,260	0	0	0	0
1965	160	27.0	4,320	0	0	0	0
1966	176	24.5	4,312	0	0	0	0
1967	215	30.0	6,450	0	0	0	0
1968	191	29.0	5,539	0	0	0	0
1969	269	28.5	7,666	0	0	0	0
1970	274	33.0	9,042	Trace	Trace	Trace	Trace
1971	352	36.0	12,672	0	0	0	0
1972	290	33.0	9,570	0	0	0	0
1973	234	34.0	7,256	0	0	Trace	Trace
1974	202	21.0	4,242	0	0	Trace	Trace
1975	102	23.0	2,346	Trace	Trace	Trace	Trace
1976	99	15.0	1,485	Trace	Trace	0	0

Table 4.--Estimated loss of yield caused by rye rusts by States and years reported--Continued

Year	Acres harvested (1,000)	Crop production		Losses in yield			
				Stem rust		Leaf rust	
				bu/A	1,000 bu	%	1,000 bu
WISCONSIN -- RYE							
1919	529	13.0	6,877	0	0	1.0	69.5
1920	475	13.2	6,270	5.0	330.0	Trace	Trace
1921	410	12.5	5,125	Trace	Trace	Trace	Trace
1922	535	11.8	6,313	Trace	Trace	Trace	Trace
1923	365	12.8	4,672	0.1	4.7	Trace	Trace
1924	333	13.7	4,562	Trace	Trace	Trace	Trace
1925	256	11.5	2,944	Trace	Trace	Trace	Trace
1926	256	11.5	2,944	Trace	Trace	Trace	Trace
1927	238	12.7	3,023	Trace	Trace	Trace	Trace
1928	167	10.5	1,754	0	0		
1929	188	11.4	2,143	Trace	Trace		
1930	194	12.0	2,328				
1931	175	11.0	1,925	0	0	Trace	Trace
1932	254	11.0	2,794	Trace	Trace	Trace	Trace
1933	226	9.0	2,034	Trace	Trace	Trace	Trace
1934	210	7.4	1,554	Trace	Trace	Trace	Trace
1935	314	12.5	3,925	Trace	Trace	0.5	19.7
1936	210	10.0	2,100	Trace	Trace	3.0	64.9
1937	336	13.5	4,536	0	0	0.5	22.8
1938	322	13.0	4,186	0	0	22.0	1,180.6
1939	228	10.3	2,348	0	0	1.0	23.7
1940	182	14.0	2,548	0	0	0	0
1941	142	11.0	1,562	0	0	Trace	Trace
1942	135	11.5	1,552	Trace	Trace	Trace	Trace
1943	109	9.5	1,036	0	0	0	0
1944	98	8.7	853	0	0	Trace	Trace
1945	95	12.0	1,140	0	0	1.0	11.5
1946	76	11.5	874	0	0	Trace	Trace
1947	87	12.0	1,044	0	0	Trace	Trace
1948	92	12.0	1,104	Trace	Trace	Trace	Trace
1949	92	12.0	1,104	0	0	Trace	Trace
1950	92	13.0	1,196	0	0	0	0
1951	97	12.0	1,164	0	0	Trace	Trace
1952	58	12.0	696	0	0	Trace	Trace
1953	46	12.0	552	0	0	Trace	Trace
1954	42	13.0	546	0	0	0	0
1955	44	12.5	550	0	0		
1956	35	13.0	455	0	0		
1957	30	12.0	360	0	0	Trace	Trace
1958	26	15.0	390	0	0	Trace	Trace
1959	27	16.0	432	0	0	0	0
1960	23	15.5	356	0	0	0	0
1961	22	18.0	396	0	0	0	0
1962	23	20.0	460	0	0	0	0
1963	20	22.0	440	0	0	0	0
1964	24	20.0	480	0	0	0	0
1965	23	18.0	414	0	0	0	0
1966	18	19.5	351	Trace	Trace	0	0
1967	20	23.0	460	Trace	Trace	Trace	Trace
1968	19	23.0	437	0	0	0	0
1969	18	21.0	378	Trace	Trace	0	0
1970	17	22.0	374	Trace	Trace	0	0
1971	18	23.0	414	Trace	Trace	0	0
1972	10	20.0	200	Trace	Trace	0	0
1973	9	19.5	176	Trace	Trace	0	0
1974	10	24.0	240	Trace	Trace	0	0
1975	15	21.0	315	Trace	Trace	Trace	Trace
1976	12	21.0	252	Trace	Trace	Trace	Trace

Stripe Rust

Stripe rust occurs on barley, rye, and wheat and is a major factor in world Winter wheat and barley production in areas with cool, moist climates. It overwinters on cereals and grasses and can spread to spring grown cereals. In the United States only trace losses have been reported on rye and barley in California, Idaho, Montana, Oregon, Utah, and Washington. The Cereal Rust Laboratory started recording stripe rust losses in 1966-67. Since then, major losses have occurred only in the Pacific Northwest, although stripe rust has also occurred in the Great Plains.

Stripe rust was first reported in the United States in 1915 as present in Arizona, California, Idaho, Oregon, and Washington. By 1924 it had been reported from Arizona, California, Idaho, Oregon, Montana, extreme western South Dakota, Utah, Washington, and Wyoming. Later evidence from herbarium specimens indicates that stripe rust had been present on native grasses as early as 1892 and on wild rye and wild brome in 1896 but had been misidentified. There was a series of stripe rust epidemics in the Western States between 1915 and 1935. From 1935 through 1959 the disease was present in minor amounts. Severe epidemics developed in 1960 and 1961 with losses in commercial fields of 20 to 75 percent in the Western States. This was followed by lesser epidemics in the Pacific Northwest in 1964, 1967, and 1968.

With the exception of a 1919 report of stripe rust on barley in the Black Hills of South Dakota, reports of stripe rust were confined to the east slope of the Rocky Mountains and westward. Stripe rust was reported on the Great Plains proper in 1941, when it was found in Brazos County, Tex. It was again found in Denton and Waller Counties, Tex., in 1953 and 1956, respectively. The first extensive occurrence in the Great Plains was in 1957—in Kansas, Nebraska, Oklahoma, South Dakota, Texas and Wyoming. In 1958, stripe rust again occurred in the Great Plains States of Colorado, Kansas, Nebraska, Minnesota, North Dakota, and South Dakota.

Since 1958, stripe rust has been reported in Texas in 1959, 1960, 1969, 1973, 1974, and 1975; Colorado in 1959; Kansas in 1973 and 1975; Oklahoma in 1969 and 1973; and Nebraska in 1960, 1973, and 1975. In 1974, stripe rust was observed in experimental plots in Desha County, Ark., and was reported in the wheat nursery in Bossier Parish, La. Both of these are probably first reports for the State. Possibly, our ability to detect stripe rust has increased or stripe rust is currently more adapted to the Great Plains States. The two areas most favorable for stripe rust east of the Rocky Mountains would be the Gulf Coast States in the winter and early spring and the northwestern part of Minnesota and north-central and northeastern North Dakota in the summer.

Cereal Rust Control Efforts

Progress and problems in the control of the cereal rusts are evident in this publication on rust losses. Frequency of losses from wheat stem rust has declined because of barberry eradication and the development and use of resistant cultivars in the Northern States. Nevertheless, sufficient stem rust inoculum exists to result in epidemics on the small acreage of susceptible wheats in years with favorable environmental conditions. Thus, the disease is a continuing threat that requires a continued effort to develop and maintain stem rust resistant cultivars. Although nearly all oat cultivars in use are susceptible to oat stem rust race 31, which has predominated since 1965, no serious statewide epidemics of oat stem rust have occurred under existing cultural practices. This race caused some damage to late-planted fields in northern Minne-

sota and North Dakota and more extensive damage in Manitoba, Canada, during 1970.

Barley stem rust has not been a major problem since the addition of resistance of the 'Chevron' and 'Kindred' type to commercial cultivars of spring barleys of the North Central States. Stripe rust continues to cause problems in the western wheat region. At present, the major rust losses in small grain production are caused by wheat leaf and oat crown rusts. Resistance has provided protection against leaf rust in the Durum, Hard Red Spring, and northern Soft Red Winter wheats in recent years, but most of the remaining wheats are susceptible. Most oat cultivars are susceptible to crown rust, and although resistant cultivars and the Iowa multilines are available, they are not widely used. Indeed, the cereal rusts are persistent foes to small grain production.

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