The 2004 WCC97 meeting on June 28-29 was hosted by Washington State University at Pullman. The group meet jointly with the Western Wheat Workers.

The meeting was called to order by Tim Murray of Washington State University. The lead off mini-symposium speaker was Dr. Jorg Dubkovsky (University of California at Davis) talking on Regulation of wheat and barley flowering time by vernalization.

The final speaker of the morning was Dr. Tim Paulitz on Epidemiology of soilborne pathogens in direct-seeded cereals: New insights form GPS and spatial analysis.

The two speakers were followed by state reports. The afternoon ended with a business meeting and a tour of the new glasshouse facilities on the WSU campus.

State Reports

California Report - Lee Jackson, Extension Agronomist, UC Davis

General. Most small grains in California are sown in the fall and consist primarily of hard red and hard white spring wheat, durum wheat, 6-row spring feed barley, triticale and oat. Small acreages of fall-sown winter wheat and winter barley and spring-sown spring wheat and spring barley also are grown in the intermountain valleys of northern California. Planted acreage in 2004 included 662,000 acres of wheat (including 117,000 acres of durum), 110,000 acres of barley, and 280,000 acres of oat. No statistics on triticale are available, but acreage probably increased above the 50,000 + acres of last season as an alternative to wheat because most triticale varieties are less affected by stripe rust. About 250,000 acres of wheat and triticale are harvested as green-chop forage for dairies in California's Central Valley. With regard to wheat acreage in 2004, wheat growers responded to last season's stripe rust epidemic by significantly reducing acreage of susceptible varieties and increasing acreage of the few available resistant varieties. For varieties that began the 2004 season as resistant, acreage of Summit increased from 57,000 to 210,000 acres and Blanca Grande (hard white) increased from 13,000 to 74,000 acres. For stripe rust susceptible varieties: acreage of Yecora Rojo declined from 135,000 to 80,000 acres, Dirkwin (forage) from 37,000 to 17,000 acres; Bonus, from 60,000 to 200 acres; Express, from 98,000 to 13,000 acres; Anza, from 28,000 to 13,500 acres; Brooks, from 32,000 to 5,000 acres;

and Klasic (hard white), from 20,000 to 5,000 acres. Warm weather and a dry season resulted in an early maturing crop; my plot harvests were about 2-3 weeks earlier than average. Rainfall in the Sacramento Valley after the end of February was about 2.5 inches or less; rainfall after the end of February in the San Joaquin Valley was less than one inch.

Wheat stripe rust. Fourteen races of the wheat stripe rust fungus were identified in California in the 2003 season, including 3 races that had not been detected previously. Two races accounted for over 50% of the total infections. Both of these races (races PST-98 and PST-100) have very wide virulence. Judging from the high (100%) disease severity on susceptible check varieties in statewide nurseries this season (2004), there was very high inoculum pressure throughout the Central Valley. From my observations there were several waves of infection: In mid-March only the most susceptible varieties (such as Yecora Rojo and Cavalier) had high levels of disease. By late March and early April, additional varieties (Anza, Klasic, Serra, Express, Stander) and several advanced breeding lines showed high disease severity; and finally, despite a short period of unseasonable hot temperatures (greater that 90 F) in mid-April, many additional lines and varieties that were uninfected in early April began showing high levels of disease and at least a few highly infected plants were visible in nearly all entries from the last two weeks of April through the first week of May. Stripe rust generally was less severe on durum wheat, but most entries in statewide tests were affected and several had very high disease severity, including varieties Kofa, Ria, Kronos, Mohawk, Matt, Orita, Topper, and Candura. Yield loss from stripe rust this season will be much less than in 2003 and probably will amount to only about 5% because of the wide-use of resistant varieties and the late development of severe levels of disease. A major concern is what the infection levels that occurred on so much of the germplasm at the end of the 2004 season portend for next season. Additional diversity has developed and become established in the stripe rust population. Small infection foci in plots and fields of Summit and Blanca Grande indicate that new strains have developed that have the ability to overcome the resistance that was effective last season and through most of 2004. Whether these strains survive in the stripe rust population and appear in higher frequency next season is impossible to predict.

Barley stripe rust. Barley stripe rust occurred relatively late in California nurseries this season, but increased to high severity by the end of the season on the UC Davis research farm. Stripe rust was very severe (50 to 100% severity) on about 85% of the entries in the Western Regional Spring Barley Nursery (sown in Fall, 2003) at UC Davis, but only on about 15% of entries (notably on Max, Legacy, and Tradition) in the statewide nurseries. Varieties developed for stripe rust resistance, UC 933 and UC 937, show excellent resistance. Yield impact of barley stripe rust this season will be low because of the late development of the disease.

Leaf rust. Leaf rusts of wheat and barley were very late to develop and were detected on only a few genotypes in 2004. With the early maturity of this season's wheat and barley crops, leaf rust will have very little affect on yield. In 2003, leaf rust of durum wheat occurred in the Imperial Valley. I arranged with Jim Kolmer of the Cereal Disease laboratory to screen advanced lines from California's wheat breeding programs for reaction to the durum wheat collections of leaf rust. Jim is quite sure that the durum leaf rust in California is the same race as what currently occurs in Mexico. Twenty-four of 136 entries tested showed presumptive resistance; seed treatment may have affected the reaction of some of these entries, however. A recent article in *Plant Disease* by R.P. Singh et al.(*Plant Disease* 88:703-708) summarized the susceptibility of

durum wheat to the new leaf rust race, BBG/BN. Leaf rust was not detected on durum wheat in California in 2004.

Other Diseases. Septoria tritici blotch of wheat was severe early in the season in nurseries and fields in the Sacramento Valley; low rainfall limited the damage, however, since we received very little rain after the end of February. Barley scald also was severe early in the season on lines grown at UC Davis in the barley stripe rust screening nursery. Dry weather after the end of February limited damage.

Department of Agronomy and Range Science. The Department of Agronomy and Range Science at UC Davis will soon cease to exist. Four departments in the College of Agricultural and Environmental Sciences (Agronomy and Range Science, Environmental Horticulture, Pomology, and Vegetable Crops) are being combined into one very large (96 FTE) Department of Plant Sciences with three sections (Crop and Ecosystems Sciences, Agricultural Plant Biology, and Horticultural Sciences). Faculty of the 4 departments were allowed to select the section they wish to be part of. About 50% of the faculty chose the Crop and Ecosystems Sciences section. Chris van Kessel (current chair of the Department of Agronomy and Range Science) will be chair of the new department. There also will be Vice Chairs for Outreach and Extension (Jim Hill) and Teaching and Curriculum Development (still to be filled). Section chairs are John Yoder (Agricultural Plant Biology), Beth Mitcham (Horticultural Sciences), and Joe DiTomaso (Crop and Ecosystems Sciences). The consolidation was supposed to be complete by July 1, but now is set for January, 2005, at the earliest.

Colorado – report not submitted

Idaho – report not submitted

Kansas report - William W. Bockus

Personnel news. The plant pathology department head (Dr. Robert Zeigler) left KSU in January to take the position of director of the CGIAR Challenge Program. That program seeks to unlock genetic diversity in crops for the resource-poor. Dr. Scot Hulbert is serving as the interim Head until a replacement is found; however, that position is temporarily frozen due to budget constraints.

Wheat crop condition. As of a week before the writing of this report (July 7, 2004), 43% of the wheat acreage was rated good to excellent. About 9.9 million acres were planted and harvest is about 83% complete with about 9 million acres projected to be harvested. So far, grain yields are averaging about 39 bushels per acre, down from 50 bushels per acre for last year. The main reasons for the reduced production are drought, freeze damage, disease, and severe weather including hail.

Disease loss estimates for 2003. Data are from Jon Appel, Bob Bowden, Jim Stack, and Bill Bockus.

Table 2. Wheat disease losses in Kansas

Disease	Loss in 2003	Loss in 2002	20-year avg.
Stripe rust	10.6%	0.01%	0.39%
Leaf rust	1.3	1.0	3.96
Tan spot	0.8	0.5	1.36
Wheat streak mosaic	0.4	1.3	1.76
Septoria complex	0.1	0.2	1.60
Crazy top	0.1	0	0
Fusarium head blight	0.05	0.01	0.24
Common root rot	0.01	0.1	0.22
Soilborne, spindle streak	0.01	0.001	0.79
Bunt & loose smut	0.01	0.01	0.02
Barley yellow dwarf	0.001	1.4	1.34
Take-all	0.001	0.01	0.52
Stem rust	0.0001	0.0001	0.30
Cephalosporium stripe	0	0	0.10
Powdery mildew	0	0.01	0.26
Strawbreaker	0	0.0001	0.12
Total	13.38	4.55	12.98

Potential wheat disease losses for 2004. Although final estimates of wheat disease losses during 2004 have not yet been produced, the following diseases were observed during the season. Powdery mildew was the most important disease during the early to mid parts of the season. It normally is not a serious problem in Kansas but caused significant losses this past year. Other diseases that will cause significant losses are wheat streak mosaic, leaf rust, and stripe rust. Diseases that were more prevalent than usual but will still cause fairly minor losses include take-all, Fusarium head blight, and bunt/loose smuts. Fusarium head blight was particularly severe in irrigated fields where wheat was planted after corn with indices approaching 50%.

Minnesota – Did not attend this year

Montana Report - Bob Johnston – Plant Sciences and Plant Pathology, Montana State University

Small grain production is essentially the same over the last couple of years with total acres at 5.3 million. Of this

winter wheat - 35% (1,850,000)
spring wheat - 53% (2,800,000)
durum -12% (620,000)

Barley is down 200,000 acres to 950, 000

The state received widespread rain in early June which resulted in 64% of the topsoil having adequate moisture. However, the subsoil moisture which is critical to advance the crop to maturity is adequate in 35% of the acreage.

Current disease problems

Barley yellow streak mosaic virus - Harden area – brown wheat mite and hot dry conditions

Frost damage due to sub freezing temps in late May

Expect Fusarium root rot to develop if weather turns hot and dry.

Straw decomposition study - Percent weight lost determined at first sampling – Approx 8 months after burial.

Cultivar	Treatment	mean
Choutou	Clean	43.1
Choutou	Diseased	33.5
Outlook	Clean	35.8
Outlook	Diseased	38.9
Utopia	Clean	37.2
Utopia	Diseased	45.6

Hollow stems – Outlook (3%) and Utopia (8%) – diseased tissue lost more weight than the clean

Solid stem Choutou – was just the opposite. (10%)

Effect of spring wheat seeding rate on susceptibility to Fusarium crown rot and effect on yield

Rate	Hiline	Utopia	Mean
30	41.2	33.5	37.3 a
45	42.6	34.3	38.4 a
60	42.0	35.7	38.9 a
Mean	41.9 a	34.5 b	

	Inoc	No Inoc	%yield loss
Hiline	39.3	44.6	12.0 a
Utopia	21.7	47.3	54.1 b
Mean	30.5 b	46.0 a	

Rate	Inoc	No Inoc	%yield loss
30	31.0	43.7	29.1
45	30.0	47.0	36.2
60	30.6	47.2	35.2
Mean	30.5 b	46.0 a	

% yield loss associated with seeding rate

Cultivar	Treatment	30	45	60	
HiLine	Inoc	8.8	15.2	11.6	
Utopia	Inoc	48.8	56.5	56.5	

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Ag statistics for 2002-2004

Year	Total Acres Planted (000)	Total Acres Harvested (000)	Total Production Yield Per Acre Bu.	Total Production Total Bushels (000)	Value Price Per Bu. Dols.	Value Value of Production (000) Dols	Value Per Acre Dols.
2004	5,270						
2003	5,290	5,050	27.2	137,530	3.85	525,741	105
2002	5,790	4,795	23.1	110,735	4.04	446,350	93

OTHER SPRING WHEAT
Acreage, Yield, Production, Price, and Total Value, Montana, USA
Last updated March 31, 2004

Year	Acres Planted (000)	Acres Harvested (000)	Total Production Yield Per Acre Bu.	Total Production Total Bushels (000)	Value Price Per Bu. Dols.	Value Value of Production (000) Dols	Value Per Acre Dols.
2004	2,800						
2003	2,850	2,700	22	59,400	3.85	228,690	85
2002	3,750	3,450	22	75,900	4.08	309,672	90

DURUM WHEAT
Acreage, Yield, Production, Price, and Total Value, Montana, USA
Last updated May 12, 2004

Year	Acres Planted (000)	Acres Harvested (000)	Total Production Yield Per Acre Bu.	Total Production Total Bushels (000)	Value Price Per Bu. Dols.	Value Value of Production (000) Dols	Value Per Acre Dols.
2004	620						
2003	640	630	23	14,490	4.25	61,583	98
2002	590	565	23	12,995	4.49	58,348	103

WINTER WHEAT
Acreage, Yield, Production, Price, and Total Value, Montana, USA
Last updated June 10, 2004

Year	Acres	Total Production Yield	Total Production Total	Price	Value Value of	Value

	Planted (000)	Harvested (000)	Per Acre Yield Bu.	Bushels (000)	Per Bu. Dols.	Production (000) Dols	Per Acre Dols.
2004	1,850						
2003	1,800	1,720	37	63,640	3.70	235,468	137
2002	1,450	780	28	21,840	3.73	81,463	104

ww – 35% sw- 53% durum-12%

BARLEY
Acreage, Yield, Production, Price, and Value, Montana, USA
Last updated March 31, 2004

Year	Acres Planted (000)	Acres Harvested (000)	TOTAL Production Yield Per Acre Bu.	Production Total Bushels (000)	Price Per Bu. Dols.	Value Value of Production (000) Dols.	Value Per Acre Dols.
2004	950						
2003	1,100	810	39	31,590	3.00	94,770	117
2002	1,180	930	42	39,060	2.86	111,712	120

Nebraska State Report - John Watkins, Extension Plant Pathologist

In western Nebraska where most of the wheat is grown, drought was the overriding factor affecting dryland wheat yields. Because of dry conditions last fall many stands emerged unevenly. Stands were thin and the wheat short. A freeze on May 14, when some fields were flowering, also caused significant injury to the crop. In some instances there wasn't anything to harvest. Irrigated wheat in the west faired much better that the dryland wheat, but some irrigated fields were also affected by the May 14 freeze. Diseases were not a major production factor in western Nebraska in 2004. Some instances of loss to wheat streak mosaic were reported but the disease was not wide spread.

The disease picture for central and eastern Nebraska was totally different. Overcast, sometimes wet, weather brought on an abundance of leaf disease. Powdery mildew was widespread across the region and had begun moving onto the flag leaf by flowering. Heads on those short lower tillers were heavily mildewed. This is the highest incidence of powdery mildew I have seen in Nebraska in the 30 years I have been here. Normally, it is only a troublesome disease our greenhouses during the winter.

Stripe rust which has been our most important leaf disease since 2000 was basically non existent this season. However, this year leaf rust took up the void left by stripe rust. By grain fill leaf rust was severe on the flag leaves of susceptible varieties. It was interesting to note that some of our best and most leaf rust resistant varieties were the ones most susceptible to powdery mildew.

The effect of mildew and rust on yields will be difficult to judge this year. The wheat was about 3 weeks early this year which probably lessened the impact of the leaf diseases. In addition frequent moisture and moderate temperatures during grain fill were big yield boosters. Unfortunately, the wet weather hampered harvest and caused some sprouting in the heads.

Fusarium head blight incidence in eastern Nebraska was higher than normal due to the wet May and June weather. The incidence was as high as 30% in some fields but in most it was probably less that 5%.

Last year common bunt incidence was much higher than normal. This year I have already had three reports of common bunt being present in harvested grain. Because of the scab situation and the reports of common bunt, we are stressing the importance of planting certified seed that has been treated.

NorthDakota – Did not attend

O*regon -Chris Mundt*

Wheat stripe rust: This was a very favorable year for wheat stripe rust. The biggest impact has been on the cultivar Foote, the most widely grown wheat cultivar in the Willamette Valley. This has been the most serious wheat stripe rust I have seen; some fields sprayed two or three times still had severity levels greater than 50% and serious head infections. Foote was originally released because of its high level of quantitative resistance to Septoria tritici. This cultivar has no PNW parentage in its pedigree and, therefore, has no significant high temperature adult plant (HTAP) resistance to stripe rust. We expect that Foote may have a major gene for resistance to stripe rust that masked its underlying susceptibility until that resistance "broke-down".

Fields of the cultivar Basin are being sprayed on the east side of the Cascades. Other cultivars grown on the east side have adequate levels of HTAP. The only problem may be in high elevation areas, if temperatures are not sufficient to "kick-in" the HTAP. The cultivar "Foote" is not grown on the east side of the Cascades. Spring wheats are likely to be vulnerable to stripe rust throughout the state.

Wheat leaf rust: Wheat leaf rust initially appeared about a month earlier than normal in the Willamette Valley, perhaps owing to a warm spell in late winter. Leaf rust then subsided during a cool period in the spring, and then came on strong in late spring/early summer. Sprays applied to control Septoria and stripe rust in the Willamette Valley will likely provide adequate control of leaf rust. Leaf rust is unlikely to be a significant factor east of the Cascades.

Septoria tritici blotch: Has been moderately severe in the Willamette Valley this year, and not as serious an issue as stripe rust.

Pseudocercosporella eyespot: Seems to be present in significant levels on susceptible cultivars across the state, including both the Willamette Valley and eastern Oregon. Most of this seems to be "standing eyespot", but the severity and extensiveness are probably sufficient to cause significant damage to susceptible cultivars, such as Stephens.

Cephalosporium stripe: The final situation is unclear, but unlikely to be severe, in general, because low moisture prevented early seeding in many fields in fall 2003.

Dryland foot rot: Likely to be significant in specific locations, depending on the amount and distribution of rainfall during the cropping season.

South Dakota – Did not attend

Texas – Did not attend

Washington State Report – 2004 Tim Murray & Xianming Chen

Acreage & Production estimates

Winter wheat - 1.80 million acres planted in 2004; 50,000 ac below 2003. Yield is estimated at 66 bu/ac; up from 65 in 2003. Total production is estimated at 112 million bushels; down from 117 in 2003.

Spring wheat - 560,000 acres planted in 2004; 10,000 ac over 2003. Yield is estimated at 50 bu/ac; up from 41 in 2003. Total production is estimated at 27.75 million bushels; up from 22.345 million in 2003.

Barley – estimated 290,000 ac in 2004; 30,000 below 2003. Yield is estimated at 65 bu/ac; up from 47 in 2003. Total production is estimated at 264 million bushels; down from 276 in 2003.

Growing Conditions

Overall the winter wheat crop is in good condition and yields are expected to be comparable to last year, but well below records. Dry early spring weather with warm temperatures provided good conditions for seeding and establishment of spring crops.

Fall 2003. Early fall was dry, but timely rains in October provided good seeding conditions for winter wheat. Rainfall was average in October. In the high-rainfall region, much winter wheat was sown into dry soil and emerged slowly and unevenly following rain in November. In the intermediate- and low-rainfall regions, seedbed moisture was greater and seeding and emergence occurred on time or delayed only slightly. Snow fell in early December and remained on the soil surface more or less uninterrupted through January. In north-central Washington, snow cover persisted for over 100 days. Overall winter survival was good throughout the state.

Spring 2004. Early spring weather was warm and dry. May was cooler than average with precipitation about 3" above average. Crop maturity was delayed about 7-10 days due to the cool May weather, but recent warm temperatures have accelerated crop development. Seasonal precipitation for most of the wheat-producing area is average to above-average, with Pullman being a notable exception at 51% of normal.

Disease problems

Soilborne pathogens

We have not heard reports of severe Cephalosporium stripe or Eyespot appearing in the state, although the cool May weather that delayed crop maturity has also delayed symptom appearance. Cephalosporium stripe is appearing in some areas, but it is not expected to be as serious as previous years due to the prolonged snow cover that limited root injury. Eyespot is present in fields that were sown early. Again, however, incidence is low due to the prolonged snow cover that limited disease development during winter

Pink snow mold was present in fields in the traditional snow mold area of north-central Washington, but not severe enough to cause significant damage. Speckled snow mold was also present, but not severe enough to cause significant damage.

Foliar Pathogens

Stripe rust was the major disease in 2004. The long period of dry condition in the fall of 2003 reduced rust inoculum for fall infection. The cold winter slowed stripe rust development. As a result, stripe rust did not appear until late April in south central Washington, which was much later than early March, 2003. However, the cool and wet weather in May accelerated stripe rust development. Because of the poor crop stand, growers did not use fungicides for a few thousands acres of susceptible hard red winter wheat. These winter wheat fields provided huge amount of inoculum for the major wheat-producing areas in the central and eastern Washington and northern Idaho. The majority of the winter wheat acreages were not significantly affected by stripe rust because of high-temperature, adult-plant resistance in the major cultivars. Most spring wheat fields grown with susceptible or moderately susceptible cultivars were sprayed at right time, and therefore, major yield losses were prevented at the cost of multimillion dollars spent on fungicide application.

Leaf rust and stem rust were not significant problems in 2004. These two rusts only occurred in a very few spots in late crop season. Because of the dry weather conditions and crops matured fast, leaf rust and stem rust did not spread, and did not cause yield losses.

Physiological leaf spot is a appearing again, although many growers now apply chloride, which limits development of this disorder.

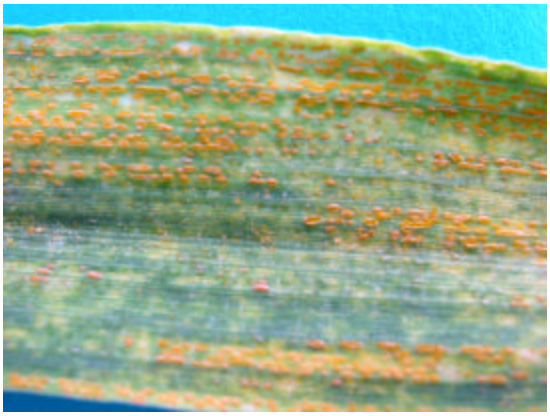
Personnel.

No changes to report this year.

Field trip photos

Kim Kidwell discussing the susceptibility of Zak to stripe rust two years after the initial release.

Alpowa is a new variety with high temperature adult plant resistance to stripe rust which expresses itself as leaf necrosis



Stripe rust pustules on Zak

Xianming Chen discussing the effect of foliar fungicides on development of stripe rust

Tim Murray discussing incorporation of resistance genes to Cephalosporium gramineum into new winter wheat cultivars

The tour ended with a stop at McGregor's research and technology division