2003

Yolo/Solano/Sacramento Wheat & Barley Production

Trial Results

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KB/kh
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INTRODUCTION

Kent L. Brittan and Lee Jackson[1]

Ideal wheat growing conditions for the 2002 to 2003 season were offset by the worst wheat stripe rust disease conditions on record. Severe crop losses occurred throughout the state, including sightings for the first time of the disease in Imperial Valley. Many varieties were lost this year to new strains of stripe rust. California is left with only one hard red wheat variety Summit, which has good resistance to the disease. There are 2 white wheat varieties with good resistance, Blanca Grande and Plata. Fungicide control is possible for moderately resistant and moderately susceptible varieties providing it is applied in a timely manner at early boot stage to protect the flag leaf.

Barley is a possible alternative to wheat though the market is not as good. We have UC933 as the better of the two UC lines with good stripe rust resistance and with out the lodging problem that UC937 has. I have included an over-years comparison of barley varieties to help with selection.

Below are lists describing the historical acreages of wheat and barley production for the region's three counties. The acreages are still slipping for wheat, however I see a trend for an increase in barley.

Yolo County Acreage's[2]

YEAR	WHEAT	BARLEY
2002	37,250	---
2001	43,774	---
2000	43,144	---
1999	37,657	---
1998	41,677	---
1997	54,836	---
1996	54,172	---
1995	42,857	739
1994	59,031	1,280
1993	53,676	1,931
1992	69,277	5,948
1991	59,681	4,540
1990	70,247	4,100
1989	80,800	4,100
1988	51,254	6,000
1987	55,294	7,000
1986	69,600	7,500
1985	74,300	12,350
1984	68,000	9,500
1983	59,000	4,700
1982	82,000	17,768
1981	114,000	14,000
1980	104,600	28,500

Solano County Acreage's

YEAR	WHEAT	BARLEY
2002	35,212	7,588
2001	44,369	5,626
2000	37,184	3,354
1999	37,005	5,778
1998	41,660	8,969
1997	48,765	15,356
1996	69,107	19,524
1995	46,790	16,500
1994	56,321	17,800
1993	55,760	20,000
1992	50,623	18,785
1991	38,394	15,272

Sacramento County Acreage's

YEAR	WHEAT	BARLEY
2002	9,730	343
2001	15,961	300
2000	15,018	303
1999	7,500	700
1998	3,519	623
1997	13,710	3,030
1996	22,200	1,250
1995	15,000	1,000
1994	22,000	1,300
1993	18,000	1,500
1992	23,000	1,000

1 Farm Advisor, Yolo, Solano & Sacramento Counties; and Extension Agronomist, UCD.

2 Acreage data from respective County Agricultural Commissioner's Crop & Livestock Report

Yolo County Average Rainfall
2002-2003 Weather Activity[1]

Month	Rainfall (in)	Maximum Relative Humidity <80% (days)	Maximum Ambient Temp >79°F (days)
October	0	15	11
November	2.77	3	0
December	8.13	0	0
January	1.85	0	0
February	1.34	2	0
March	2.65	1	0
April	2.58	0	0
May	0.75	4	17
June	0	6	27
Total	20.07	31	55

Yolo County's 30 year average rainfall is 17.3 inches.

Spring Frost Dates for Yolo County

Date 2003	Minimum Air Temperature[1]
February 10	30°F
Last frost event	

1. Weather data from CIMIS weather station on the UC Davis campus.

Weather data can be viewed at the UC IPM's web site: http://ipm.ucdavis.edu/

Weather data in the above tables are for ideal winter wheat and stripe rust growing conditions. Frequent light rains, high relative humidity (RH) and moderate temperatures are just what the disease needs. Note the lack of days in March and April that the max RH dropped below 80%. Also, we did not get a max day temp greater than 79°F until May and most of those were at the end of the month. Adequate rainfall allowed most growers to skip irrigations this season; all of my trials were non-irrigated this year.

On the following page is an overall summary of the five wheat variety trials conducted in Yolo, Solano and Sacramento Counties (Table 1). Soil moisture was adequate to marginal this year. Stripe rust was sever at all locations, so yields, % grain protein and bushel weights were reduced. Fungicide was applied to all locations, but not early enough to prevent yield quality losses.

Table 1. Variety Trial Yield Summary By Location. Yields expressed in Pounds per Acre.

Variety	Best Yield (lbs/ac)	Gill Yield (lbs/ac)	Hunn Merwin & Merwin Yield (lbs/ac)	Mello Yield (lbs/ac)	Rominger Yield (lbs/ac)	Average Yield (lbs/acre)	Duncan's Multiple Range Test
Summit	7043	7961	6747	7570	3840	6632	A
Trical 96	7179	6019	6837	5860	3985	5976	B
Stander	6228	6373	6117	6587	3625	5786	B
Plata	6477	7262	6696	6809	3498	6079	B
BZ998-256W	6146	6275	6730	6459	3715	5796	B
Blanca Grande	7068	6201	6368	6692	3182	5902	B
DA998-12	6351	3686	5903	6695	3324	5192	C
Winanza	5546	3566	6197	5077	2192	4515	D
Kern	5209	4141	4837	4198	2428	4321	D
Express	5565	3901	5072	4535	2839	4383	D
Anza	5768	4211	5935	4808	2062	4626	D
Yolo	4829	4463	4683	3186	1995	3965	E
Klasic	4733	3119	4435	4178	2749	3890	E
Bonus	3336	1930	2547	2838	1933	2497	F
Average	5653	4936	5650	5392	2998	4969	
C.V.%	12%	11	12	9	11	11	
L.S.D @5%	965	803	946	718	478	327	
		**		**	**	**	

** = significant 99% of the time

* = significant 95% of the time

Table 1. gives a nice look at how well each of the varieties are adapted to the southern Sacramento Valley region. These trials were located in the three surrounding counties I cover. The results show how new and standard varieties will perform under varied conditions. The Gill and Best locations are on the best inorganic soils and are usually a good indication of a variety's high yield potential, though they were non-irrigated this season. Hunn, Merwin and Merwin provide a location that is a true test of the varieties in difficult soil conditions. Mellow provides information about varieties grown on organic soils in the Delta under Johnson grass pressure. I have one no-till trial with the Romingers it is drilled into standing corn stalks. Frequent spring rains allowed all the trial growers to be non-irrigated and increased wheat stripe rust and leaf rust disease pressure.

Wheat Stripe Rust

This season wheat stripe rust appeared as early as mid January in southern Solano County and was sever throughout the state. It was seen for the first time in Imperial Valley with very light infections. Weather, more than disease adaptability, is likely to be the main reason the disease started in our area 6 weeks earlier than previous years. Early fall planting of highly susceptible forage wheats, like Dirkwin, provided over-wintering sites that combined with moderate winter weather and a cool moist spring created perfect conditions for the disease.

Stripe rust produces copious numbers of spores (urediospores) from the dark orange spots (uredia) linearly arranged on the leaf surfaces. There is a 10,000 times increase in spore production with every generation and a generation every 7 – 10 days under ideal weather conditions. Spores are fairly long living allowing for long distance spore dispersal by the wind. According to literature this disease requires

temperatures between 50 -60^{o}F, free moisture, dew or intermittent rain, for infection and spore production. Over the past two years researchers have noted that the upper temperature threshold has apparently raised suggesting adaptation to warmer and drier climates. Under these broader growing conditions this disease can create rapid overlapping disease cycles and can produce statewide epidemics.

California, as of the summer of 2003, has 14 active strains of stripe rust according to Lee Jackson's statewide sampling. There are approximately 100 active strains of wheat stripe rust in North America. These strains are differentiated by their ability to over-come certain genetic resistances to this disease. Individual wheat varieties like Express, identify a strain of stripe rust by it's ability to reproduce on it.

As the wheat plant matures stripe rust forms black (non-infective) teliospores on the leaf surface. It is thought that wheat stripe rust teliospores do no provide a source of infection for the following seasons. The major source of infection appears to be from living hosts such as volunteer wheat, summer-fall forage wheat and minimally for some grasses. There does not appear to be an alternative host as with other types of stripe rust, nor is the disease seed-born. Urediospores formed in the head of the wheat plant do not survive the harvest and cleaning process. There are no toxins associated with this disease.

Results in Table 2 show the effectiveness of various fungicide treatments. Both Tilt and Quadris, marketed by Syngenta, give excellent control when applied at the early boot stage. The wheat variety was Yolo, a stripe rust susceptible variety.

Table 2 Effectiveness of Various Fungicide Treatments Applied March 25, 2003

Fungicide Treatments	Infected Leaf Area (%)	Bushel Weight (lbs/bu)	Yield (lbs/acre)	Duncan's Means Separation
Tilt @ 4oz/ac	26.3	63.2	7235	A
Quadris @10.8oz +1% OIL	33.8	60.4	5367	B
Dithane/Quadris @ 5.4oz/ac	22.5	61.9	5028	BC
CONTROL	85.0	59.5	4338	CD
Dithane F-45 @ 2.1lbs/ac	72.5	58.5	3996	D
Average:	48.0	60.7	5193	
%CV	14.5	1.9	12	
LSD @5%	10.7	1.7	973	

Timing is critical to achieving good results with fungicide sprays. In a grower/PCA conducted test, one-half of a 60 acre block of Yolo wheat was sprayed by airplane with Quadris at 8oz/ac with 10 gal.water/ac. They then waited 15 days to do the second half at the same rate. At harvest I weighed two-0.65acre strips out of each half and compared the results. It cost the grower 2199 lbs/ac or 29% in yield and decreased the Bushel Weight by 3.2lbs/bu or 5% waiting those 15 days.

VARIETIES

Major changes in stripe rust susceptibility have reduced the number of public varieties suitable for production in the southern Sacramento Valley and Delta. After this publication I will remove all the stripe rust susceptible varieties listed this year for historic purposes. Other varieties may be as well suited for a given situation, but are not included due to lack of information or poor performance. Privately developed varieties of both wheat and barley are also available. Contact specific companies for information and recommendations. It is recommended that growers plant several varieties in order to reduce the risks of failer due to one variety's problem that might occur in a specific year.

KERN – Not Recommended

The newest wheat variety approved for certification and release by the University of California has been named Kern. Kern is a hard red spring wheat.

Height – Shorter than Express or RSI-5.
Maturity – Earlier than Express.
Straw Strength – Similar to Express, better than RSI-5
Shattering – More resistant than Express or RSI-5.
Bushel Weight – Higher than Express, RSI-5 or Anza.
Quality – Has intermediate grain protein content but excellent grain protein quality and overall good bread making quality.
Diseases – Susceptible to stripe rust, good resistance to leaf rust, and Septoria tritici blotch.

The major disadvantage of Kern for the Sacramento valley is the danger of spring frosts with early plantings such as occurred in 1999 and 2001.

YOLO – Not Recommended

Yolo has mostly been replaced by the private varieties Express and Summit. Our trial data shows that Yolo will either equal Anza or out-yield it in a majority of situations. This variety was released in 1981 and we have had it in strip trials for the past 20 years. Yolo is an Anza cross with about the same quality and protein as Anza. It is similar in height and maturity to Anza being about one inch taller and one day earlier in maturity. The seed is very similar to Anza in appearance. When grown next to Anza it is easily distinguished from Anza. We have found that Yolo does have three disadvantages from Anza. 1) It tends to lodge more; 2) it tends to shatter slightly more and 3) it is less tolerant of wet soil conditions. The high consistent yields of Yolo are due to the following characteristics.

1) Its medium-late heading habit tends to help it escape frost injury at heading time in the spring. This was very evident in 1999.

2) It is now highly susceptible to stripe rust. It shows some tolerance to yellow dwarf, leaf rust and septoria leaf blotch.

3) Yolo shows the tight glume characteristic of Anza which is important for shatter resistance. Yolo did shatter more than Anza in one of the four strip tests in 1984 and all of the 1998 strip tests where significant shattering occurred.

4) Yolo has good resistance to lodging, but slightly less than Anza.

ANZA – Not Recommended

This variety is mostly grown in areas subject to wet soil conditions and shattering winds. A considerable acreage of this variety will continue to be grown because of its long history of very dependable production. It is now susceptible to stripe rust. Its characteristics are very similar to Yolo. Anza has a poorer bread quality than Yolo.

SERRA – Not Recommended

This is a high quality variety for the Sacramento Valley. Its main problems are susceptibility to stripe rust and lodging. It has consistently performed very well in dryland situations where lodging is not a problem. We made a considerable improvement in Serra's performance by treating it with Cerone, which is an anti-lodging chemical. Another method to help reduce lodging in Serra would be to plant after December 15, since plant height and planting date are correlated, the later a variety is planted the shorter in height it develops. Combination plantings with the variety Yolo lodge less than pure stands of Serra.

Serra is a hard red spring wheat developed by the California Agricultural Experiment Station. Serra is a pure line selection from the cross Yecora Rojo "S"/Mexifen.

Serra has a spring growth habit and is medium short-statured with fair to poor lodging resistance (several inches taller than Anza, with more lodging) and medium-late maturity (heading date is about 1 day earlier than for Anza). Kernels are red, hard, midlong and ovate. The crease is shallow and midwide. Cheeks are rounded. Brushes are medium. Collars are lacking.

Serra is resistant to Barley yellow dwarf virus, and powdery mildew, and susceptible to stripe rust, leaf rust and Septoria tritici leaf blotch. It has excellent bread wheat quality characteristics and very good yield potential, particularly in the Sacramento and northern San Joaquin Valley areas. It is adapted for fall planting in those areas and in other areas of California where Anza and Yolo are now grown. Serra is mostly grown dryland. Livestock eat the straw of Serra better than other wheat varieties.

PRIVATE WHEAT VARIETIES

EXPRESS – Not Recommended

Express had replaced Yolo as the leading variety planted in the Sacramento Valley in 1994 and was the leading variety until 2003 due to its increased susceptibility to stripe rust. Express is a hard red spring wheat developed by Western Plant Breeders breeding program headed by Kim Shantz, tested as DA 984-034, and named in 1991. Express is a midseason maturing (heads about 4 days later than Yecora Rojo, 3-4 days earlier than Yolo) cultivar, a semidwarf with medium height (2-4 inches taller than Yecora Rojo, similar in height to Yolo), with good lodging resistance.

Express shatters more than Yolo, Anza or Serra. Express showed moderate susceptibility to stripe rust in 2002, with sever losses and reduced grain quality for some growers. Express showed variable infections from Septoria Tritici blotch in 1998. It has good resistance to leaf rust and is moderately susceptible to barley yellow dwarf virus. Express has good milling and baking quality, and grain protein content similar to Yecora Rojo. Among entries present in the UC regional wheat evaluation tests in the 3-year period 1989-91, Express ranked 6th of 15 entries in yield in the Sacramento Valley (98% of Yolo, 102% of Yecora Rojo), 7th of 15 in the San Joaquin Valley (97% of Yolo, 100% of Yecora Rojo), 6th of 15 in rainfed tests (120% of Yolo, 93% of Yecora Rojo), and 15th of 15 in the Imperial Valley (78% of Yolo, 73% of Yecora Rojo).

SUMMIT - Recommended

RSI (Resource Seeds, Inc.) 2 years ago released Summit, a high yielding, hard red wheat variety that is targeted for the Sacramento Valley. This is the 2nd year Summit is available for commercial production. In U.C. regional tests (entry # 1155) in the Sacramento Valley from 1998-2003 (18 locations/year) Summit has been one of the highest yielding varieties, averaging over 900#/acre, greater grain yield than the wheat variety Express. The good agronomics of this variety such as lodging and disease tolerance plus good test weight are instrumental in making this a variety with good yield stability, over years.

SUMMIT – Recommended (continued)

Maturity: Heads 1-2 days earlier than Express and 4-5 days earlier than Yolo and Anza.
Disease reaction: Resistant to leaf rust. For the period of 1998-2001 has showed only a slight amount of susceptibility to stripe rust. Moderate susceptibility to Septoria tritici blotch. Lightly susceptible to Barley Yellow Dwarf Virus.

Lodging and Shattering: Low susceptibility.

Quality: Better than Anza, and Yolo.

The following Table 3 was generated to better compare Summit to some of the more popular varieties grown in Sacramento Valley. Extracted from: 1998-2001 Regional Barley and Common and Durum Wheat Performance Tests In California by Lee Jackson, UC Davis Extension Agronomist.

Table 3. Over Years Comparison of Three Standard Hard Red Winter Wheat Varieties to the RSI Summit Variety

Year	Variety	Sacramento Valley Yield (lb/acre)	Stripe Rust	Leaf Rust	Septoria	Statewide Barley Yellow Dwarf Virus	Averages Lodging (Harvest)	Shatter	Grain Protein (12% Moisture)	Bread Texture	Bread Score
1998	Summit	4920	1.2	1.0	1.9		2.7	1.6	12.6	S	3
	Anza	3620	1.0	1.0	3.2		4.1	1.9	11.6	S	2
	Express	4270	2.8	1.0	2.2		4.2	2.1	13.1	S	4
1999	Summit	8150	1.6	1.1	1.3	1.2	1.0	1.3	12.0	S	4
	Anza	7460	1.1	1.3	1.9	1.2	1.0	1.9	11.2	U	1
	Express	6960	1.4	1.1	1.2	1.3	1.6	1.6	13.2	S	4
2000	Summit	6170	1.4	1.1	1.4	1.3	2.2		12.3	S	4
	Anza	5340	1.1	1.3	1.4	1.5	4.3		11.5	U	1
	Express	5240	1.8	1.0	1.3	1.8	4.7		13.1	S	5
2001	Summit	6100	1.4	1.1	1.0	1.0	2.0	1.0	12.7		3
	Anza	5490	1.0	1.6	1.0	2.0	5.8	1.0	12.3		
	Express	5210	1.7	1.3	1.0	1.8	3.0	1.0	13.8		

Rating scale for diseases (area of flag-1 leaf affected at soft dough stage) and lodging:
1=0-3%, 2=4-14%, 3=15-29%, 4=30-49%, 5=50-69%, 6=70-84%, 7=85-95%, 8=96-100%.
BYDV ratings (see scale above) were based on percentage of plants showing foliar symptoms.

STANDER Moderately Resistant to Stripe Rust

A hard red wheat variety from RSI (Resource Seeds, Inc.) cereal breeding program in Zamora, California. Stander has good yield potential for the Sacramento Valley and Delta, and has bread flour characteristics that are superior to those of the Anza/Yolo type wheats but less than Express. It averages three inches (3") shorter than Express, and is unique among currently available varieties for its excellent tolerance to lodging. It also has shown good resistance to grain shatter. It still has moderate resistance to stripe rust.

BARLEY

UC 933

A newly released variety, it is similar to UC 937. It is an earlier maturing variety with good stripe rust resistance. Better yield, lodging and shatter resistance than UC937 and Meltan. For fall-sown spring barley (Central Valley, south central intercoastal valleys, and southern California): UC 933 is a semidwarf, 6-row spring feed type mid-season barley with resistance to current races of stripe rust existing in the Central Valley. It has been yield tested for three years in regional tests.

UC 937

For fall-sown spring barley (Central Valley, south central intercoastal valleys, and southern California): UC 933 is a semidwarf, 6-row spring feed type mid-season barley with resistance to current races of stripe rust existing in the Central Valley. It has been yield tested for three years in regional tests. In the mini strip tests at UC Davis and at Corcoran (Kings County), where stripe rust pressure was high, UC 937 yielded 8000 and 7880 lb/acre compared to 2470 and 4880 lb/acre for the susceptible UC 337 at those two locations respectively. This variety is susceptible to shattering if not harvested in a timely manner.

UC 603

Released from the University of California, UC 603 is a pure line selection from the cross [[(Marie*Luther) * Trial] * Briggs] * Prato sib. The cross was designed to develop an early maturing, lodging resistant barley with a high level of tolerance to the major barley diseases in California.

UC 603 has shown good resistance to scald, net blotch, barley yellow dwarf, powdery mildew, leaf rust, and stripe rust..

Following preliminary yield tests on the University of California, Davis Agronomy Farm, in 1981-83, it was tested in statewide regional yield trials from 1984-88 involving 5-9 locations per year. In 31 station-yr of testing under medium rainfall and/or irrigated, grain yields of UC 603 95% of UC 337, 101% of UC 476 and 105% of Prato. In 11 station-yr tests in low rainfall, grain yields of UC 603 averaged 84, 91 and 94% of UC 337, Prato and UC 476, respectively.

Consequently, UC 603 is not recommended for low rainfall environments. It is approximately 2 days earlier in maturity than UC 337 and Prato, and 7 days earlier than UC 476.

UC 603 is adapted to all major barley producing areas in California where similar type cultivars are grown. It is not adaptable to the northern areas (Intermountain area, Tulelake basin) due to the stature being too short. There are other varieties out there that are better adapted. A new cultivar to replace
UC 603 is UC 969.

SOILS

Some acreage of small grains in Yolo County are grown in the dryland areas under a fallow-crop rotation. The main soil series in these areas are Sehorn, Balcom, Corning, Hillgate, Rincon, Tehama and Arbuckle. Sehorn, Balcom and Corning soils occur on gently rolling to steep hills while Rincon, Tehama, Arbuckle and Hillgate soils occur on level to 9% slopes. Small grains are widely grown as a rotation crop in the irrigated areas of the county.

Although small grains are better suited than most crops to shallow soils, yields are usually correlated with soil depth. The highest yields being obtained on the deep Class I soils and lowest on shallow Class IV soils.

Barley, wheat and oats differ in their ability to tolerate wet soil conditions. Wheat is considered by many to be the most tolerant to wet soils; oats second; and barley the least tolerant. Certain varieties are more tolerant to poor soil conditions than others.

Barley is most tolerant to alkali and boron relative to other small grains.

CROP ROTATION

Normally we prefer wheat and barley not be grown two or more years in succession, mainly due to the build up of diseases. The main disease problem with continuous wheat and barley are root and foot rots. Leaf diseases can also be serious, but are easier to prevent. Oats can be used as a rotation crop for wheat and barley. However, if a summer irrigated crop is grown as a double crop such as sorghum, corn or beans, wheat and barley can be grown continuously with good results.

If it is necessary or desirable to grow wheat or barley for two years, destroy the crop residue as much as possible by bailing the straw, burning, deep tillage and summer irrigation.

MINIMUM AND NO-TILLAGE PLANTING

For the past fourteen seasons, several hundred acres of dryland wheat and barley in Yolo County were planted with a no- till system. The results were generally successful and show that we can grow dryland wheat and barley no-till in Yolo County using the proper equipment. A major problem with no-till is the increased weed problems particularly the weed Ripgut brome. As with any new practice, there is still much to be learned. We have found that late plantings in wet soils was not desirable with the early conventional no-till drills; however, for the past four years a no-till air drill performed well with a late wet planting. This could be a significant improvement for no-till production. Minimum no-till and conservation tillage methods is the single most beneficial practice in controlling soil erosion on steep dryland grain fields.

SEEDBED PREPARATION

Dryland grain seedbed preparation usually consists of spring plowing followed by disking. The following fall, seedbeds are disked, springtoothed or harrowed prior to planting. Moldboard plowing is preferred for weed control and decomposition of plant residues. In irrigated areas, a seedbed is usually prepared by disking several times and harrowing. If considerable residue is present, plowing or other practices may be desirable. Plowing is recommended if long lasting herbicides were used on the previous crop.

It is more important to prepare smoother and finer seedbeds with presently grown wheat varieties in order to obtain an even planting depth for maximum production.

PLANTING DEPTH

Research has shown that planting depth is more critical with the new short-statured wheat varieties which we are now growing. The length of the emerging shoot (coleoptile) is correlated with final plant height. This means that these shorter plants will not emerge from as deep a depth as the old California varieties. Therefore, shallow planting is a necessity for our presently grown wheat varieties. This might also be true of barley varieties if we grew short types. Planting depth is not as important for oats because they have somewhat different method of emergence.

Trials have also shown that deep planted wheat and barley will have a reduced yield even if no stand reduction occurs. The best planting depth is about 1 inch and not more than 2 inches deep.

Crusting and moisture conditions after planting cause the optimum planting depth to vary. With crusting conditions, shallow planting is best for emergence. With dry conditions, often a little deeper planting produces the best stands because the shallow seeds dry out and die.

Growers need to pay particular attention to planting depth when planting on beds, sandy soils and dry beds are often planted too deep. Some drills can be equipped with depth control bands that are bolted onto the disk blades.

IRRIGATION AND DRAINAGE

With the introduction of short-statured, lodging-resistant wheat varieties, the interest in and benefits of irrigation have developed rapidly. A significant portion of the acreage is currently being irrigated. The water use for wheat is approximately 17-20 inches for a mid-November to December planting. Later plantings will normally have a higher consumptive use.

The yield increases from irrigating will vary with planting date, varieties and rainfall. The proper time to irrigate will vary from year to year. However, our observations for normal years indicate that the main moisture stresses occurred after the heading period on fall planted grain and before heading on spring plantings. A deep irrigation just prior to heading may carry through to maturity on deep soils. Irrigation in the dough stage may be too late for a significant benefit and late irrigations greatly increase the risk of lodging.

Many methods of irrigating are used on grain including sprinklers, furrow and flooding. In areas and on soils subject to excessive winter moisture or poor drainage, the benefits of bed planting and providing drainage have been dramatic in many cases. Many growers use bedding to provide winter drainage and to facilitate irrigation. Beds from 30 to 60 inches are used. Fields with crooked, narrow beds are hard on harvesters. The 60- inch beds are working quite well and are preferred by most growers over narrower beds. Furrow irrigated grain on beds tends to lodge less than flood irrigated using strip checks.

FERTILIZER
Dryland Class III and IV Soils

"Sehorn, Balcom, Corning and Hillgate Soil Series"

The most important fertilizer elements needed for these soils in Yolo County are nitrogen and phosphorus. Most of these soils are phosphorus deficient and when nitrogen is used without phosphorus, it usually produces a marginal yield response. Extensive trials conducted for several years have shown that broadcast applications of phosphorus are often marginal or uneconomical. However, excellent responses and economical returns have been demonstrated by drilling a nitrogen-phosphorus fertilizer with the seed at planting time, using a grain drill. Drilled phosphorus is more efficient than broadcast applications because it supplies the seedling demands and helps maintain the phosphorus in an available form. Phosphorus can be fixed in alkaline and acid soils such as these Class III and IV soils.

Nitrogen Rates

With normal summer fallowed land, use 10 to 50 pounds per acre of nitrogen at planting time. Topdress as plants show deficiency symptoms. For topdress applications, use 15 to 40 pounds of nitrogen per acre. The preferred material for topdressing is NH_4NO_3 (ammonium nitrate) because of its fast action and efficiency. Other materials used are NH_4SO_4 (ammonium sulfate) and Urea.

Phosphorus

Phosphorus needs should be determined by soil tests and field experience. When phosphorus is needed, use 15 to 50 pounds P_2O_5 drilled with or near seed at planting time. It is very important that phosphorus is close to plants in seedling stage. Small grains are poor foragers for phosphorus. Any placement from seed level to one inch below the seed is satisfactory. Do not place above the seed level.

High rates of fertilizer placed directly with the seeds can cause seed burn which can reduce stands. Phosphorus is relatively safe, whereas nitrogen and potassium are hazardous materials in regard to seed burn. Urea nitrogen is the most hazardous form of nitrogen to drill with the seed. In our trials, we have not seen a serious problem with rates of 100 pounds of material per acre, using a 8-inch row spacing. Application rates that exceed 150 pounds of total chemical per acre are considered hazardous. If soil moisture is low, rates of application as low as 100 pounds per acre may injure the seed or seedling plants. We have had fairly serious

stand losses and stunting with 200 pounds of 16-20-0 per acre drilled with the seed using an 8-inch row spacing in some trials.

Broadcast phosphorus is not generally recommended due to poor efficiency and often a poor return for the investment. Trial data shows that from 2 to 5 times more phosphorus is usually required when broadcasting as compared to drilling. Drilling a nitrogen-phosphorus fertilizer with the seed improves the ability of small grains to compete with weeds over broadcast methods.

Sulfur

Most of the dry land areas are low in sulfur. We recommend using fertilizers that contain sulfur.

Zinc

The Balcom soil series is low in zinc. Yield increases have been obtained in wheat and barley. As little as 1 pound of zinc chelate per acre did give a response in one barley trial. However, we would suggest using from 2 to 8 pounds of actual zinc per acre. Zinc sulfate needs to be thoroughly incorporated in the seedbed prior to planting.

Class I And II Soils

"Irrigated Row Crops Areas"

In most cases, only nitrogen is required on Class I and Class II soils. Phosphorus needs should be determined by soil tests and field experience. Soil analysis: less than 6 ppm -- highly responsive; 6 - 15 ppm -- probably responsive; and above 15 ppm -- mostly not responsive with $NaHCO_3$ test. In 60 trials conducted with wheat over a 20 year period we only obtained a significant yield increase in one trial where soil analysis was above 15.2 ppm phosphorus. Where phosphorus is needed, use 15-50 pounds P_2O_5 drilled with or near seed at planting time.

Table 4. SUMMARY OF 60 WHEAT PHOSPHORUS TRIALS

Soil Analysis ppm P	Total Number of Trials	Number of Trials with a Significant Yield Increase @ 5% Level	% of Trials With Significant Yield Increase
< 6.5	6	4	67%
<10.5	20	15	75%
<12.0	20	20	69%
<15.0	40	23	58%
>15.2	16	1	7%

The amount of nitrogen required varies greatly depending on previous crop, fertilizer history, rainfall, de-nitrification, leaching and irrigation practices. On soils subject to de-nitrification and leaching, split applications are more efficient and therefore, recommended.

Recommended Nitrogen Rates:

Use 0 to 150 pounds of nitrogen at planting time, and if necessary, up to 60 pounds of nitrogen as topdress application. With irrigation, higher nitrogen rates will not adversely affect the stiff-strawed wheat varieties. The preferred materials for topdressing is NH_4NO_3 because of fast action and efficiency. Other materials used are NH_4SO_4 and Urea.

PLANTING DATES

Planting dates are generally made rather specific for each variety in order to minimize diseases and frost injury at heading time. Fall plantings under dry-farmed conditions make the best use of natural rainfall and cool temperatures for maximum yields.

Late spring planted grain may complete the growth cycle so rapidly that plants do not have time to obtain optimum size for maximum production. Small grains are generally planted from late October to February 15th.

Delaying planting until December will reduce net blotch and scald on barley and septoria on the wheat varieties.

PLANTING RATES AND METHODS

The two methods of planting are broadcasting and drilling. When drilling, seed rates of 100 to 125 pounds per acre are usually recommended. Use 20% more seed when broadcasting. 100 pounds of seed per acre is equivalent to about 25 seeds per square foot or four pounds per acre is equivalent to one seed per square foot. Drilling usually results in more uniform stands than broadcasting. Late planted grain has a short tillering period, so slightly higher seeding rates, 10 to 20%, are suggested. While trials have shown that seeding rates of 100 to 125 pounds per acre are usually not needed for maximum yields with most varieties, these rates are recommended to aid in weed control.

OUR SUGGESTED SEEDING RATES FOR FALL DRILLED PLANTINGS WITH OLDER TALL VARIETIES

Wheat	Barley
100-125	100

Seeding rate trials with a new shorter variety, Kern, showed the optimum seeding rate was in range of 120-150 lbs. per acre.

ROW SPACING

Any row spacing up to 12 inches would be satisfactory for maximum production. However, closer rows would give faster ground cover and help in weed competition. The closer rowed drills present a problem when drilling in large clods. Seven and eight-inch spaced drills will plant better in large clods than a six-inch drill.

UC IPM PEST MANAGEMENT GUIDELINES - SMALL GRAINS

The IPM Pest Management Guidelines were updated in January 2002. You may contact the Cooperative Extension office for a copy or go online at http://www.ipm.ucdavis.edu/PDF/PMG/pmgsmallgrains.pdf

The Pest Management Guidelines were updated in September 2003. Don't forget to get your copy!

Table 5. GRADES AND GRADE REQUIREMENTS FOR BARLEY

Revised November 1, 1976. Grades and grade requirements for the subclasses Six-rowed Barley, Two-rowed Barley and the class Barley. (There are separate standards for subclasses of malting barley.)

	Minimum Limits of:		Maximum Limits of:					
					Defects		Barley of Other Classes	
Grade	Test Wt. Per Bu.	Sound Barley	Damaged Kernels[1]	Heat Damaged Kernels (Major)	Foreign Material	Broken Kernels	Thin Barley	Black Barley[2]
	Pounds	%	%	%	%	%	%	%
US #1	47.0	97.0	2.0	0.2	1.0	4.0	10.0	0.5
US #2	45.0	94.0	4.0	0.3	2.0	8.0	15.0	1.0
US #3	43.0	90.0	6.0	0.5	3.0	12.0	25.0	2.0
US #4[3]	40.0	85.0	8.0	1.0	4.0	18.0	35.0	5.0
US #5	36.0	75.0	10.0	3.0	5.0	28.0	75.0	10.0

US SAMPLE GRADE:

US Sample Grade shall be barley which does not meet the requirements for the grades of US # 1 to US # 5, inclusive, or which contains quantity of smut so great that one or more of the grade requirements cannot be determined accurately; or which contains more than 7 stones or more than 2 crotalaria seeds (Crotolaria sp.) per 1,000 grams of barley; or has a musty, sour or commercially objectionable foreign odor; or contains the seeds of wild brome grasses; or is heating or otherwise of distinctly low quality.

[1] Includes heat-damaged kernels (major). Frost-damaged kernels (minor) and mold damaged kernels (minor) shall not be considered as damaged kernels.

[2] These limits do not apply to the class Barley.

[3] Barley that is badly stained or materially weathered shall be graded not higher than US #4.

Table 6. GRADES AND GRADE REQUIREMENTS FOR WHEAT

Subpart L - United States Standards for Wheat

810.2201 Definition of wheat.

Grain that, before the removal of dockage, consists of 50 percent or more common wheat (Triticum aestivum L.), club wheat (T. compactum Host.), and durum wheat (T. durum Desf.) and not more than 10 percent of other grains for which standards have been established under the United States Grain Standards Act and that, after the removal of the dockage, contains 50 percent or more of whole kernels of one or more of these wheats.

810.2202 Definition of other terms.

(a.) Classes. There are eight classes for wheat: Durum wheat, Hard Red Spring wheat, Hard Red Winter wheat, Soft Red Winter wheat, Hard White wheat, Soft White wheat, Unclassed wheat, and Mixed wheat.

(1) Durum wheat. All varieties of white (amber) durum wheat. This class is divided into the following three subclasses:

(i) Hard Amber Durum wheat. Durum wheat with 75 percent or more of hard and vitreous kernels of amber color.

(ii) Amber Durum wheat. Durum wheat with 60 percent or more but less than 75 percent of hard and vitreous kernels of amber color.

(iii) Durum wheat. Durum wheat with less than 60 percent of hard and vitreous kernels of amber color.

(2) Hard Red Spring wheat. All varieties of Hard Red Spring wheat. This class is divided into the following three subclasses:

(i) Dark Northern Spring wheat. Hard Red Spring wheat with 75 percent or more of dark, hard, and vitreous kernels.

(ii) Northern Spring wheat. Hard Red Spring wheat with 25 percent or more but less than 75 percent of dark, hard, and vitreous kernels.

(iii) Red Spring wheat. Hard Red Spring wheat with less than 25 percent of dark, hard, and vitreous kernels.

(3) Hard Red Winter wheat. All varieties of Hard Red Winter wheat. There are no subclasses in this class.

(4) Soft Red Winter wheat. All varieties of Soft Red Winter wheat. There are no subclasses in this class.

(5) Hard White wheat. All hard endosperm white wheat varieties. There are no subclasses in this class.

(6) Soft White wheat. All soft endosperm white wheat varieties. This class is divided into the following three subclasses:

(i) Soft White wheat. Soft endosperm white wheat varieties which contain not more than 10 percent of white club wheat.

(ii) White Club wheat. Soft endosperm white club wheat varieties containing not more than 10 percent of other soft white wheats.

(iii) Western White wheat. Soft White wheat containing more than 10 percent of white club wheat and more than 10 percent of other soft white wheats.

(7) Unclassed wheat. Any variety of wheat that is not classifiable under other criteria provided in the wheat standards. There are no subclasses in this class. This class includes:
(i) Red durum wheat.

(ii) Any wheat which is other than red or white in color.

(8) Mixed wheat. Any mixture of wheat that consists of less than 90 percent of one class and more than 10 percent of one other class, or a combination of classes that meet the definition of wheat.

(b) Contrasting classes. Contrasting classes are:

(1) Durum wheat, Hard White wheat, Soft White wheat, and Unclassed wheat in the classes Hard Red Spring wheat and Hard Red Winter wheat.

(2) Hard Red Spring wheat, Hard Red Winter wheat, Hard White wheat, Soft Red Winter wheat, Soft White wheat, and unclassed wheat in the class Durum wheat.

(3) Durum wheat and Unclassed wheat in the class Soft Red Winter wheat.

(4) Durum wheat, Hard Red Spring wheat, Hard Red Winter wheat, Soft Red Winter wheat, and Unclassed wheat, in the classes Hard White wheat and Soft White wheat.

(c) Damaged kernels. Kernels, pieces of wheat kernels, and other grains that are badly ground-damaged, badly weather- damaged, diseased, frost-damaged, germ-damaged, heat-damaged, insect-bored, mold-damaged, sprout-damaged, or otherwise materially damaged.

(d) Defects. Damaged kernels, foreign material, and shrunken and broken kernels. The sum of these three factors may not exceed the limit for the factor defects for each numerical grade.

(e) Dockage. All matter other than wheat that can be removed from the original sample by use of an approved device according to procedures prescribed in FGIS instructions. Also, underdeveloped, shriveled, and small pieces of wheat kernels removed in properly separating the material other than wheat and that cannot be recovered by properly rescreening or recleaning.

(f) Foreign material All material other than wheat that remains in the sample after the removal of dockage and shrunken and broken kernels.

(g) Heat-damaged kernels. Kernels, pieces of wheat kernels, and other grains that are materially discolored and damaged by heat which remain in the sample after the removal of dockage and shrunken and broken kernels.

(h) Other grains. Barley, corn, cultivated buckwheat, einkorn, emmer, flaxseed, guar, hull-less barley, nongrain sorghum, oats, Polish wheat, popcorn, poulard wheat, rice, rye, safflower, sorghum, soybeans, spelt, sunflower seed, sweet corn, triticale, and wild oats.

(i) Shrunken and broken kernels. All matter that passes through a 0.064 x 3/8 oblong-hole sieve after sieving according to procedures prescribed in the FGIS instructions.

(j) Sieve - 0.064 x 3/8 oblong-hole sieve. A metal sieve 0.032 inch thick with oblong perforations 0.064 inch by 0.375 (3/8) inch.

Principles Governing the Application of Standards

810.2203 Basis of Determination.

Each determination of heat-damaged kernels, damaged kernels, foreign material, wheat of other classes, contrasting classes, and subclasses is made on the basis of the grain when free from dockage and shrunken and broken kernels. Other determinations not specifically provided for under the general provisions are made on the basis of the grain when free from dockage, except the determination of odor is made on either the basis of the grain as a whole or the grain when free from dockage.

(b) Grades and grade requirements for Mixed wheat. Mixed wheat is graded according to the U.S. numerical and U.S. Sample grade requirements of the class of wheat that predominates in the mixture, except that the factor wheat of other classes is disregarded.

Special Grades and Special Grade Requirements

810.2205 Special grades and special grade requirements.

(a) Ergoty wheat. Wheat that contains more than 0.30 percent of ergot.

(b) Garlicky wheat. Wheat that contains in a 1,000 gram portion more than two green garlic bulblets or an equivalent quantity of dry or partly dry bulblets.

(c) Light smutty wheat. Wheat that has an unmistakable odor of smut, or which contains in a 250 gram portion, smut balls, portions of smut balls, or spores of smut in excess of a quantity equal to 14 smut balls, but not in excess of a quantity equal to 30 smut balls of average size.

(d) Smutty wheat. Wheat that contains, in a 250 gram portion, smut balls, portions of smut balls, or spores of smut in excess of a quantity equal to 30 smut balls of average size.

(e) Treated wheat. Wheat that has been scoured, limed, washed, sulfured, or treated in such a manner that the true quality is not reflected by either the numerical grades or the U.S. Sample grade designation alone.

2002 – 2003 FARM ADVISOR WHEAT VARIETY TRIAL RESULTS

This year's three county-based wheat variety trials are presented in Tables 7 –12. At no location was frost damage heavy. An over-locations analysis, Table 7, is provided to give an indication of regional "fitness" for the varieties. All locations were non-irrigated this season. Even though all fields were treated for stripe rust most yields reflect the degree of resistance to the disease rather than sutiability. Anza lodged a bit following the winds well before harvest. This was a particularly good growing season for wheat during the winter months. Leaf rust and Septoria were found on only those varieties that were not over-whelmed by stripe rust.

Table 7. Summary of 2002 – 2003 Wheat and Triticale Variety Trials Located in Yolo, Solano and Sacramento Counties. Conducted by Kent Brittan and Mark Kochi, UC Cooperative Extension.

Cooperators: Dan Best Jr., Roy Gill, Larry and Pete Hunn, Steve Mello, and Charley Rominger
Experimenters: Kent Brittan, Jorge Dubcovsky, Lee Jackson, Mark Kochi
Planting Dates: 11/5/2002 to 12/3/02 Harvest Dates: 6/20/2003 to 7/2/03
Planting Method: 120 Lbs/Acre Replications: 4
Length of Plots: 95 – 100 feet Plot Width: 10 feet (14 rows)
Previous Crops: 2002 – Safflower, Corn or Tomatoes
Locations: 3 trials in Yolo County, 1 Solano County, 1 Sacramento CountyCharley Rominger's

2003 Wheat Variety Trials - Over Five Locations

Cooperators: Dan Best, Roy Gill, Larry Hunn, Steve Mello and Charlie Rominger

1000ft^2/plot 4 reps/location

Variety	Days to Heading	Plant Height (in)	Lodging (%)	% Leaf Rust	% Stripe Rust	% BYDV	% Septoria Blotch	% Protein	Bushel Wt (lbs/bu)	Yeild (lbs/acre)	Duncan's Multiple Range Test
Summit	141	34	0	3	4	3	11	12.0	62.6	6632	A
Plata	140	36	0	2	5	2	3	11.9	63.6	6079	B
Trical 96	130	34	0	0	57	0	2	11.1	59.7	5976	B
Blanca Grande	137	36	1	0	6	3	3	12.7	63.3	5902	B
BZ998-256W	137	31	0	0	32	10	2	12.3	63.2	5796	B
Stander	140	32	0	0	25	2	3	11.9	62.0	5786	B
DA998-12	141	39	12	0	18	2	3	12.0	61.3	5192	C
Anza	146	36	13	0	61	1	2	11.4	60.5	4626	D
Winanza	146	37	12	0	43	3	3	11.6	60.5	4515	D
Express	141	35	2	0	59	1	1	12.7	60.3	4383	D
Kern	140	30	1	0	82	0	2	11.9	61.7	4321	D
Yolo	143	35	3	0	84	0	0	11.2	59.6	3965	E
Klasic	137	29	6	0	97	0	8	12.1	60.4	3890	E
Bonus	138	29	2	0	98	0	0	12.6	55.3	2497	F
Average	140	34	4	0	48	2	3	12.0	61.0	4969	
C.V.%	1	3			12			3.5	1.9	11	
L.S.D @5%	1	1	NS		3	NS	NS	0.3	0.7	327	
	**	**			**			**	**	**	

** = significant 99% of the time
* = significant 95% of the time

Table 8. BEST WHEAT VARIETY TRIAL - HARVEST YEAR 2003

Cooperators: Dan Best Jr.
Experimenters: Brittan, Dubcovsky, Jackson, Kochi
Soil Type: Reiff very fine sandy loam, Class I
Planting Date: 11/15/02
Planting Method: Drilled with 10ft wide 8" single disk grain drill on 5 ft. beds
Planting Rate: 120 Lbs/Acre
Length of Plots: 120 feet
Plot Width: 10 feet (14 rows)
Previous Crop: 2002 – Tomatoes
Fertilizer: 400 lbs. N as $NH_4 SO_4$ postplant broadcast
Location: Knights Landing area, west 0.5mile of County Rd. 101, and County Rd. 14, plot located south side of road opposite Best's Headquarters

Irrigations: None
Harvest Date: 06/23/03
Replications: 4
Fungicide: Quadris 8oz/ac
Application Date: 4/18/2003

2002 to 2003 Best Wheat Variety Trial Summary Sorted by Yield

Variety	Days to Heading	Plant Height (in)	Shatter %	Leaf Rust (%)	Stripe Rust (%)	Septoria (%)	Protein (%)	Bushel Weight (lbs/bu)	Yield (lbs/ac)	Duncan's Means Separation
Trical 96	131	36	0	0	54	0	10.2	60.6	7179	A
Blanca Grande	139	38	0	0	0	13	11.2	64.7	7068	A
Summit	139	35	0	0	0	8	10.7	63.2	7043	A
UCD 1361 White	139	36	0	0	43	0	10.7	63.9	6521	AB
Plata	139	38	0	0	5	2	10.4	64.6	6477	AB
DA998-12	140	40	0	0	18	9	10.5	62.9	6351	AB
Stander	139	34	0	0	29	9	10.4	62.3	6228	ABC
BZ998-256W	139	33	0	0	61	1	11.1	63.5	6146	ABCD
Anza	147	37	0	0	60	0	10.1	62.0	5768	BCDE
Express	139	36	0	0	33	0	11.0	62.8	5565	BCDE
Winanza	146	39	0	0	58	4	10.2	61.2	5546	BCDE
99WY51394	141	39	0	0	8	2	10.4	63.0	5240	CDE
Kern	139	33	0	0	75	0	10.9	61.6	5209	CDE
UCD 1358 Red	139	33	0	0	83	0	10.7	62.6	5090	DE
Yolo	140	36	0	0	86	0	9.6	61.1	4829	E
Klasic	139	29	0	0	95	0	11.0	61.4	4733	E
RSI 11808 HR	139	36	0	0	75	0	11.8	54.8	3432	F
Bonus	139	32	0	0	96	0	11.3	54.7	3336	F
Average	140	35	0	0	49	3	10.7	61.7	5653	
C.V.	0.2%	3%			6%		4.8	2%	12%	
L.S.D @5%	0.5	1			4		0.7	1.6	965	
	**	**			**		**	**	**	

** = significant 99% of the time

Table 9. GILL WHEAT VARIETY TRIAL - HARVEST YEAR 2003

Cooperators: R.C. Gill and Son
Experimenters: Brittan, Dubcovsky, Jackson, Kochi
Soil Type: Brentwood clay loam, Class I — Irrigations: None
Planting Date: 11/05/02 — Harvest Date: 6/20/03
Planting Method: Drilled with 10ft wide 8" single disk grain drill on 5 ft. beds Replications: 4
Planting Rate: 120 Lbs/Acre
Length of Plots: 140 feet — Fungicide: Quadris, 8oz/ac
Plot Width: 10 feet (14 rows) on 5ft. Beds — Application Date: 4/18/2003
Previous Crop: Alfalfa – 2002
Fertilizer: 80 lbs. N as NH_4 NO_3 preplant, 150 lbsN as Urea by air
Location: Dixon, east side of Pedrick Road, one-quater mile north of E.Dixon Ave. south of sod farm.

2002 to 2003 Gill Wheat Variety Trial Summary Sorted by Yield

Variety	Days to Heading	Height (in)	Lodging (%)	Leaf Rust (%)	Stripe Rust (%)	Septoria (%)	Protein (%)	Bushel Weight (lbs/bu)	Yield (lbs/ac)	Duncan's Means Separation
Summit	150	38	0	0	3	15	13.2	62.3	7961	A
Plata	150	37	0	0	6	1	13.0	63.4	7262	A
Stander	150	34	0	0	28	0	13.7	61.3	6373	B
BZ998-256W	141	34	0	0	40	1	14.0	62.7	6275	B
Blanca Grande	141	38	0	0	20	0	14.2	63.3	6201	B
Trical 96	134	37	0	0	70	0	11.6	58.6	6019	B
Yolo	150	36	8	0	70	0	11.9	57.9	4463	C
Anza	151	36	45	0	38	1	12.3	58.9	4211	C
Kern	150	33	0	0	80	0	12.7	61.4	4141	C
Express	150	37	6	0	55	0	14.2	57.5	3901	CD
DA998-12	150	41	56	0	33	0	13.5	58.6	3686	CD
Winanza	151	38	58	0	11	0	12.6	59.0	3566	CD
Klasic	141	32	1	0	97	0	13.6	56.0	3119	D
Bonus	143	32	1	0	99	0	14.1	49.9	1930	E
Average	147	36	12	0	46	1	13.2	59.3	4936	
C.V.%	0.8	3			13		1.4	1.7	11	
L.S.D @5%	1.7	2			8		0.3	1.5	803	
	**	**			**		**	**	**	

** = significant 99% of the time

Stripe rust hit this field in late February showing up first in Bonus and later as interveinal clearing in Express. Lodging was a serious problem in Anza, Winanza and DA998-12 of Western Plant Breeders.

Table 10. HUNN & MERWIN & MERWIN WHEAT VARIETY TRIAL - HARVEST YEAR 2003

Cooperators: Pete and Larry Hunn, Hunn Merwin & Merwin
Experimenters: Brittan, Dubcovsky, Jackson, Kochi
Soil Type: Sacramento clay, Class III
Irrigations: None
Planting Date: 11/06/02
Harvest Date: 6/26/2003
Planting Method: Drilled with 10ft wide 8" single disk grain drill planted flat
Replications: 4
Planting Rate: 120 Lbs/Acre
Length of Plots: 100 feet
Plot Width: 14 rows, 10 feet.
Previous Crop: 2002 - Safflower
Fertilizer: 125 units nitrogen preplant as Aqua
Location: Clarksburg, northwest of the cornner of North Courtland Road and Widgeon Road. One-half mile east of the Deep Water Channel.

2002 to 2003 Hunn, Merwin & Merwin Wheat Variety Trial Summary Sorted by Yield

Variety	Days to Heading	Height (in)	BYDV (%)	Leaf Rust (%)	Stripe Rust (%)	Protein (%)	Weight (lbs/bu)	Bushel Yeid (lbs/ac)	Duncan's Means Separation
Trical 96	131	33	0	0	29	11.8	61.7	6837	A
Summit	146	33	2	0	10	13.3	63.2	6747	A
BZ998-256W	142	29	10	0	33	12.9	63.6	6730	AB
Plata	146	35	2	0	11	12.9	63.8	6696	AB
Blanca Grande	142	32	3	0	8	12.5	63.0	6368	AB
Winanza	147	37	1	0	25	12.5	63.0	6197	AB
Stander	146	31	4	0	20	12.5	62.8	6117	AB
Anza	146	35	2	0	55	12.2	62.9	5935	ABC
DA998-12	146	35	5	0	25	12.3	61.8	5903	ABC
Express	146	33	1	0	68	12.6	62.8	5072	BCD
Kern	146	28	1	0	83	11.2	63.4	4837	BCD
Yolo	146	32	1	0	78	11.5	61.4	4683	CD
Klasic	142	26	0	0	98	12.6	61.0	4435	D
Bonus	144	26	0	0	95	12.3	60.5	2547	E
Average	144	32	2	0	45	12.3	62.5	5650	
C.V.%	1.5	3			8.7	4.5	1.5	12	
L.S.D @5%	3.0	2			5.7	0.8	1.4	946	
	**	**			**	**	**	**	

** = significant 99% of the time

In tough soil conditions and no irrigations both 96 Triticale and Summit gave good yields. High protein levels and low yields is a good indication of stressful growing conditions. Leaf rust and stripe rust came in at soft dough stage.

Table 11. MELLO WHEAT VARIETY TRIAL - HARVEST YEAR 2003

Cooperator: Steve Mello
Experimenters: Brittan, Dubcovsky, Jackson, Kochi
Soil Type: Rindge mucky silt loam, Storie index 57, Class III
Planting Date: 12/3/02
Planting Method: Drilled with 10ft wide 8" single disk grain drill planted flat.
Planting Rate: 160 lbs/acre
Length of Plots: 110 feet
Plot Width: 10ft
Previous Crop: 2002 Corn
Fertilizer: 100 lbs. 11-50-2 drilled with seed
Location: Tyler Island, Sacramento County

Spud Ditch Irrigations: 0
Harvest Date: 6/30/2003
Replications: 4

2002 to 2003 Mello Wheat Variety Trial Summary Sorted by Yield

Variety	Days to Heading	Height (in)	Loose Smut (%)	Leaf Rust (%)	Stripe Rust (%)	BYDV (%)	Septoria (%)	Protein (%)	Bushel Weight (lbs/bu)	Yield (lbs/ac)	Duncan's Means Separation
Summit	129	33	0	13	4	2	10	12.9	61.1	7570	A
Plata	128	36	0	10	2	2	15	13.0	63.0	6809	B
99WY51394	130	37	0	0	3	2	0	13.2	59.0	6695	B
DA998-12	130	41	0	0	10	1	5	12.8	61.3	6695	B
Blanca Grande	129	37	0	0	0	1	2	13.8	61.9	6692	B
Stander	129	32	0	0	10	2	5	12.8	61.1	6587	BC
BZ998-256W	128	31	0	0	6	25	10	13.0	61.3	6459	BC
UCD 1361 White	129	35	0	0	40	1	15	12.5	61.2	6268	BC
Trical 96	123	36	0	1	75	1	10	12.2	58.6	5860	C
Winanza	136	38	0	0	50	3	10	13.3	58.9	5077	D
Anza	136	37	0	0	59	3	8	12.6	58.0	4808	DE
UCD 1358 Red	128	31	0	0	95	0	0	12.5	60.4	4762	DE
Express	128	38	0	0	66	3	5	14.1	57.0	4535	DE
Kern	129	31	0	0	95	0	10	12.9	59.2	4198	E
Klasic	128	30	2	0	100	0	40	12.8	61.7	4178	E
RSI 11808	126	36	0	0	85	2	28	13.1	57.0	4112	E
Yolo	136	37	0	0	100	0	0	12.2	58.2	3186	F
Bonus	129	30	2	0	100	0	0	13.3	55.8	2838	F
Average	130	35	0	1	50	3	10	12.9	60	5407	
C.V.%	0.7	3			4.1	18.4	20.6	3.1	2.7	9	
L.S.D @5%	1.3	1			2.9	0.7	2.8	0.6	2.3	718	
	**	**			**	**	**	**	**	**	

** = significant 99% of the time

Grower applied Quadris twice in this field and still the disease pressure was sever. There was no lodging in this field.

Table 12. ROMINGER WHEAT VARIETY TRIAL – HARVEST YEAR 2003

Cooperators: Charlie Rominger
Experimenters: Brittan, Dubcovsky, Jackson, Kochi
Soil Type: Rincon silty clay loam, Class Iis
Planting Date: 11/26/02
Planting Method: John Deere 752 15ft No-till drill, planted on 5ft beds into standing corn stubble.
Planting Rate: 160 lbs/acre, 20 seed rows planted
Length of Plots: 100 ft
Plot Width: 12 ft
Previous Crop: 2002 Corn no-till
Fertilizer: 100 lbs 16-20-0 drilled with seed
Location: Winters, East of I-505, west of Co. Rd. 90A, just south of Co. Rd. 29

Irrigations: None
Harvest Date 7/2/03
Replication: 4

2002 to 2003 Rominger Wheat Variety Trial Summary Sorted by Yield

Variety	Days to Heading	Height (in)	Smut (%)	Loose Rust (%)	Leaf Rust (%)	Stripe BYDV (%)	Septoria (%)	Protein (%)	Weight (lbs/bu)	Bushel Yield (lbs/ac)	Duncan's Means Separation
Trical 96	129	31	0	0	55	0	0	10.2	59.1	3985	A
Summit	140	30	0	1	2	2	10	10.8	63.3	3840	AB
BZ998-256W	137	27	0	0	20	4	0	11.0	64.6	3715	ABC
Stander	137	31	0	0	36	1	0	10.5	62.5	3625	ABC
99WY51394	146	32	0	0	58	0	0	10.3	62.5	3596	ABC
Plata	136	33	0	1	2	0	0	10.8	63.1	3498	ABC
DA998-12	139	37	0	0	4	0	0	10.6	62.0	3324	BCD
Blanca Grande	134	33	0	0	1.5	0	0	11.0	63.8	3182	CDE
Express	140	32	0	0	75	1	0	11.6	61.3	2839	DEF
Klasic	136	27	3	0	97	0	0	10.8	61.9	2749	EF
Kern	139	27	0	0	75	0	0	10.7	63.0	2428	FG
Winanza	149	33	0	0	73	0	0	10.4	60.5	2192	G
Anza	149	33	0	0	95	0	0	10.3	60.7	2062	G
Yolo	144	32	0	0	88	0	0	9.9	59.3	1995	G
Bonus	136	26	1	0	100	0	0	11.5	55.9	1933	G
Average	139	31	0	0	52	0	1	10.7	61.6	2998	
C.V.%	0.7	5			17.5			3.4	1.6	11	
L.S.D @5%	1.3	2				13.0			0.5	1.4	478
	**	**				**			**	**	**

** = significant 99% of the time

This is no-till wheat planted into standing corn stalks. Poor planter spring tension and heavy December rains that flooded the furrows reduced significant amounts of the stand within the furrows. There was a correlation between stand counts and yield. High rust disease took its toll on Bonus here.

2003 Wheat Protein Enhancement Trial Over 3 Locations

Locations: 1=Best, 2=Gill, 3=Rominger

Variety	Fertilizer Treatment	Bushel Weight(lbs/bu)	Plant Height (in)	Protein (%)	Duncan's Multiple Range Test	Yield (lbs/acre)	Duncan's Multiple Range Test
Summit	60 lbs N	62.5	34	12.5	B	6333	A
Summit	30 lbs N	62.7	34	12.1	C	6089	AB
Summit	Control	62.6	34	11.8	D	5771	B
Express	60 lbs N	60.3	35	13.1	A	3878	C
Express	30 lbs N	60.2	35	13.0	A	3660	C
Express	Control	60.4	35	12.3	BC	3597	C
	Average	61.5	35	12.4		4888	
	C.V.%	1.1	3	3.0		11	
	L.S.D @5%	0.6	1	0.3		459	
	Variety	**	**	**		**	
	Fertilizer	NS	NS	**		*	
	Variety x Fert	NS	NS	NS		NS	

It has been demonstrated that nitrogen applied at heading can boost the grain protein in wheat in select varieties. As new varieties like Summit are introduced, a study is conducted to determine the effect of this nitrogen application. This past season three locations were suitable for this test: Best, Gill, Rominger. Even though no irrigation was applied Following the nitrogen application an irrigation is normally recommended to incorporate the fertilizer. This season a light rain accomplished the task. Significant increases in protein and yield occurred in response to the nitrogen application for both varieties. It appears that Summit will gain 0.71% protein with a 60lb/ac N application.

2003 Regional Barley, Common and Durum Wheat, Triticale, and Oat Performance Tests in California – Excerpts from the local regional tests follow.

Agronomy Progress Report by Lee Jackson, Specialist UC Davis Agronomy and Range Department

The entire report will be posted at the following web address:http://agronomy.ucdavis.edu/agronomy/

2003 UC Davis Common Wheat Test

Entry	Name	Yield (lbs/acre)		Test Wt (lbs/bu)	1000 Kernel Wt (g)	Shatter	Plant Ht (in)	Lodging (harvest)	Days to Head - Mature (from 3/1)		BYDV	Stripe Rust 3/24	Stripe Rust 4/18
CULTIVARS													
20	ANZA	2420	(19)	48.4	23.5	1.3	37	3.3	26	88	1.0	3.3	5.3
112	YECORA ROJO	980	(31)	44.6	23.3	1.0	31	4.3	11	79	1.0	4.0	8.0
353	YOLO	1630	(28)	43.5	18.8	1.0	39	4.8	26	83	1.0	4.3	8.0
415	KLASIC	1670	(27)	44.9	22.8	1.0	32	6.0	16	80	1.0	6.3	8.0
638	SERRA	2730	(17)	49.4	32.0	1.0	37	4.5	27	88	1.0	2.8	5.5
788	EXPRESS	3350	(16)	51.7	32.0	1.3	36	5.0	26	83	1.0	2.5	2.8
827	CAVALIER	740	(33)	38.6	18.5	1.3	33	5.5	14	79	1.0	5.8	8.0
901	BROOKS	440	(37)	40.0	22.0	1.0	35	3.0	19	79	1.0	8.0	8.0
1020	BONUS	670	(34)	38.6	20.3	1.0	29	4.5	21	79	1.0	5.5	8.0
1036	KERN	2290	(22)	48.5	24.8	1.0	34	4.0	24	83	1.0	3.8	8.0
1124	ELDON	840	(32)	40.5	21.8	1.0	36	5.8	17	81	1.0	5.3	7.5
1130	STANDER	5540	(6)	57.4	38.8	1.0	36	1.8	25	87	1.0	1.5	1.3
1155	SUMMIT	6260	(2)	59.8	43.0	1.3	37	4.0	25	86	1.0	1.3	1.8
1156	BLANCA GRANDE	6040	(3)	61.1	41.0	1.5	35	4.8	15	88	1.0	1.0	1.5
1255	PLATA	6260	(1)	62.2	39.5	1.3	40	3.8	25	85	1.0	1.3	1.0
1258	BET HASHITA	4700	(10)	57.6	37.5	1.0	34	4.5	16	85	1.3	1.0	2.0
1260	DARIEL	1320	(29)	42.1	21.3	1.0	37	3.8	28	87	1.0	5.5	7.8
1261	KAMA	1730	(25)	46.1	31.0	1.0	38	1.0	26	88	1.0	4.3	4.8
1413	WINCAL 14	3430	(15)	52.4	30.5	1.0	35	2.5	31	88	1.0	2.8	4.3
ADVANCED LINES													
1288	BZ 998-256W	5890	(4)	62.0	40.5	1.5	33	4.5	20	84	1.3	1.5	2.0
1289	BZ 998-247W	2080	(24)	51.0	28.3	1.0	38	6.3	13	79	1.0	4.5	7.8
1333	UC 1333	2100	(23)	51.8	28.5	1.0	34	5.0	14	80	1.0	4.0	8.0
1341	DA 998-12	4620	(11)	57.8	39.0	1.3	36	5.0	28	88	1.0	1.3	2.0
1343	YU 995-231W	470	(36)	45.3	27.5	1.0	33	2.0	11	78	1.0	7.3	8.0
1344	BZ 9M99-1031	1670	(26)	41.0	22.8	1.0	35	4.3	23	82	1.0	3.3	6.0
1352	RSI 98WV11808	1280	(30)	48.1	26.0	1.0	34	3.3	23	82	1.0	5.8	7.3
1358	UCD 000370049	2350	(21)	46.9	22.0	1.0	34	4.3	23	83	1.0	3.5	7.8
1361	UCD 990370078	4370	(12)	55.6	36.5	1.0	38	4.0	19	83	1.3	1.0	2.5
1391	DA 998-101	4810	(8)	56.2	37.3	1.3	34	3.3	27	85	1.0	2.0	3.3
1392	DA 900-229	5260	(7)	60.8	38.5	1.0	35	5.3	25	85	1.0	1.5	2.0
1393	YU 999-111	3920	(14)	56.2	35.3	1.0	34	4.8	22	87	1.3	2.0	3.3
1394	RSI 99WY51394	5610	(5)	59.0	46.8	1.3	41	4.3	30	88	1.0	1.3	1.3
1395	UCD 010390598	4740	(9)	62.3	38.3	1.3	39	5.8	22	83	1.0	1.3	1.3
1396	UCD 010390601	4310	(13)	60.6	35.8	1.0	41	7.0	23	82	1.3	1.3	1.8
1397	UCD 000370020	2370	(20)	44.5	26.5	1.0	37	3.5	22	81	1.0	4.0	4.8
1398	APB W99OD-773	570	(35)	42.3	23.5	1.0	36	5.5	5	77	1.0	7.3	8.0
1399	WWW BR4779	410	(38)	56.2	25.0	1.0	38	4.5	18	79	1.0	7.0	8.0
1400	WWW BR5874	2460	(18)	56.4	34.8	1.0	41	4.0	26	88	1.0	6.0	8.0
	MEAN	2960		51.2	30.4	1.1	36	4.3	21	83	1.0	3.6	5.1
	CV	10.8		2.9	7.1	25.4	5.6	18.6	9.5	2	17.7	22.1	12.3
	LSD (.05)	450		3.0	4.4	-	4	1.1	4	3	-	1.1	0.9

Rating scale for diseases (area of flag-1 leaf affected), lodging and shatter:

1 = 0-3%, 2 = 4-14%, 3 = 15-29%, 4 = 30-49%, 5 = 50-69%, 6 = 70-84%, 7 = 85-95%, 8 = 96-100%.

BYDV ratings (see scale above) were based on percentage of plants showing foliar symptoms.

Numbers in parentheses indicate relative rank in column.

2003 SAC/SJ DELTA COMMON WHEAT TEST - Lee Jackson

Entry	Name	Yield (lbs/acre)		Test Wt (lbs/bu)	1000 Kernel Wt (g)	Plant Ht (in)	Lodging (harvest)	Leaf Rust	Stripe Rust 3/28	Stripe Rust 4/15
CULTIVARS										
20	ANZA	3510	(16)	54.0	29.8	37	1.0	1.0	2.8	3.0
112	YECORA ROJO	360	(32)	46.8	24.3	30	3.0	1.0	5.8	7.8
353	YOLO	2120	(25)	51.2	21.3	34	1.0	1.0	5.0	6.5
415	KLASIC	2450	(22)	53.0	31.3	29	2.3	1.0	5.3	6.3
638	SERRA	2530	(21)	50.8	35.8	40	1.5	2.8	4.0	3.8
788	EXPRESS	3200	(17)	51.3	32.8	40	1.0	1.3	2.5	3.0
827	CAVALIER	320	(33)	-	23.3	29	2.8	1.0	6.5	8.0
901	BROOKS	270	(35)	-	28.3	30	3.0	1.0	7.8	8.0
1020	BONUS	610	(30)	44.2	26.3	31	1.3	1.0	5.0	5.8
1036	KERN	2900	(18)	53.6	28.8	33	1.0	1.0	3.5	5.3
1124	ELDON	600	(31)	44.9	27.8	33	1.0	1.0	7.0	7.3
1130	STANDER	5980	(9)	61.4	41.8	33	1.0	3.5	1.0	1.0
1155	SUMMIT	7310	(1)	63.2	48.0	36	1.0	1.8	1.3	1.3
1156	BLANCA GRANDE	6540	(7)	64.9	45.8	38	2.5	6.0	1.0	1.0
1255	PLATA	6890	(4)	64.5	44.8	37	1.0	7.0	1.0	1.0
1258	BET HASHITA	5720	(10)	62.2	44.5	32	1.0	4.8	1.0	1.0
1260	DARIEL	300	(34)	-	24.5	37	1.0	1.0	6.8	7.5
1261	KAMA	790	(29)	42.6	25.8	36	1.0	2.3	4.0	4.3
1413	WINCAL 14	3880	(15)	58.7	33.0	38	1.0	1.5	3.0	3.5
ADVANCED LINES										
1288	BZ 998-256W	6460	(8)	63.7	43.8	33	2.5	2.3	1.3	1.3
1289	BZ 998-247W	2420	(23)	56.9	34.3	32	1.0	1.8	5.3	5.5
1333	UC 1333	1550	(27)	49.7	26.5	34	1.0	1.0	6.5	8.0
1341	DA 998-12	5370	(11)	59.3	41.0	38	1.5	5.3	1.5	2.3
1343	YU 995-231W	120	(37)	-	28.3	26	1.0	1.0	8.0	8.0
1344	BZ 9M99-1031	1720	(26)	46.0	26.3	35	1.0	1.0	3.5	4.0
1352	RSI 98WV11808	1230	(28)	53.0	30.5	33	1.3	1.0	7.0	7.3
1358	UCD 000370049	2670	(20)	52.2	26.8	33	1.0	1.0	4.5	5.5
1361	UCD 990370078	5160	(13)	61.0	39.8	35	1.0	2.3	1.5	2.0
1391	DA 998-101	4030	(14)	55.5	36.5	36	1.0	1.3	1.5	1.5
1392	DA 900-229	6730	(5)	63.9	44.0	32	1.0	7.0	1.5	1.3
1393	YU 999-111	5240	(12)	61.6	43.0	32	1.0	2.5	1.5	2.3
1394	RSI 99WY51394	7250	(2)	62.1	50.5	39	1.3	6.8	1.0	1.0
1395	UCD 010390598	6690	(6)	64.5	43.3	39	1.0	6.3	1.0	1.0
1396	UCD 010390601	6960	(3)	64.7	42.3	42	1.5	6.3	1.0	1.0
1397	UCD 000370020	2240	(24)	49.2	29.8	35	1.0	1.3	4.5	4.5
1398	APB W99OD-773	100	(38)	-	22.0	32	3.8	1.0	8.0	8.0
1399	WWW BR4779	170	(36)	-	34.5	31	1.0	1.0	7.3	8.0
1400	WWW BR5874	2820	(19)	60.4	40.5	40	1.0	4.3	6.0	6.8
	MEAN	3300		56.3	34.2	34	1.4	2.5	3.9	4.3
	CV	6.8		1.7	5.4	4.4	40.1	29.6	14.1	11.5
	LSD (.05)	310		2.0	3.8	3	0.8	1.0	0.8	0.7

Rating scale for diseases (area of flag-1 leaf affected) and lodging:

1 = 0-3%, 2 = 4-14%, 3 = 15-29%, 4 = 30-49%, 5 = 50-69%, 6 = 70-84%, 7 = 85-95%, 8 = 96-100%.

Numbers in parentheses indicate relative rank in column.

2002 UC Davis Barley Trial by Lee Jackson, J. Dubcovsky, L. Gallagher, H. Vogt, K. Gibbs, and D. Prato-Mayo

Entry	Name	Yield (lbs/acre)	Test Wt (lbs/bu)	1000 Kernel Wt. (g)	Shatter	Plant Ht (in)	Lodging (harvest)	Days to Mature from 3/1	BYDV	Leaf Rust	Stripe Rust
	CULTIVARS										
476	UC 476	3930 (11)	47.3	35.4	1.0	33	1.0	97	1.0	1.0	5.3
603	UC 603	4630 (07)	49.5	36.0	1.0	31	1.0	100	2.8	1.0	3.3
816	MAX	60 (25)	-	27.5	1.0	23	3.0	102	1.0	1.0	8.0
885	PATTI	3390 (14)	45.8	34.5	1.0	24	1.0	101	1.8	1.8	3.3
933	UC 933	5060 (03)	49.7	41.4	1.0	31	1.5	102	2.0	1.0	1.0
937	UC 937	4260 (09)	47.5	37.7	1.0	31	2.5	102	2.0	1.0	1.3
951	MELTAN	2220 (18)	50.6	35.5	1.0	25	1.0	95	7.0	1.0	1.0
969	UC 969	3970 (10)	50.1	37.3	1.0	30	1.0	99	1.8	1.0	3.5
1084	LEGACY	1170 (21)	48.1	30.8	1.3	30	3.0	95	5.5	1.0	7.5
1085	COMMANDER	220 (23)	-	22.9	1.0	20	2.8	101	1.3	1.0	7.5
	ADVANCED LINES										
1032	UCD 97-4286	3500 (13)	47.2	32.1	1.5	31	2.5	96	5.0	1.0	1.0
1047	UCD PYT99 A-13	5120 (02)	45.9	35.3	1.0	28	1.3	101	1.0	1.0	4.5
1050	UCD PYT99 C-3	3770 (12)	42.4	34.1	1.0	30	1.0	102	1.0	1.0	4.3
1052	WWW BA8017	120 (24)	-	23.6	1.0	22	2.0	102	1.0	1.0	6.3
1083	6B95-2482	1170 (22)	48.1	29.8	1.8	30	1.8	95	4.8	1.0	5.8
1086	6B95-2482#1	1210 (20)	48.4	30.3	2.0	34	2.5	94	4.8	1.0	8.0
1087	6B95-2482#4	1220 (19)	47.7	27.5	2.3	36	2.8	94	4.8	1.0	6.8
1088	UCD PYT01 C15	4870 (04)	47.9	35.1	1.0	31	1.8	99	2.5	1.0	1.0
1089	UCD 99-3230	2660 (17)	43.7	31.0	1.0	30	2.5	98	4.8	1.0	1.0
1090	UCD PYT01 C6	3360 (15)	42.3	29.3	1.0	24	1.0	100	4.3	1.0	1.8
1091	UCD PYT01 C2	2970 (16)	44.7	28.7	1.0	25	1.0	100	2.8	1.0	2.8
1092	UCD PYT01 C39	4870 (05)	46.3	34.2	1.0	26	1.0	102	2.3	1.0	1.5
1093	UCD PYT01 C34	4560 (08)	46.3	31.8	1.0	35	1.8	101	2.3	1.0	3.0
1094	UCD PYT01 A50	5580 (01)	51.9	39.7	1.0	39	1.0	102	1.3	1.0	3.5
1095	23IBYT 7	4770 (06)	46.2	33.7	1.0	29	1.3	102	1.3	1.0	3.3
	MEAN	3150	47.2	32.6	1.2	29	1.7	99	2.8	1.0	3.8
	CV	21.0	2.4	5.1	17.7	7.9	40.3	1.1	17	9.7	19.6
	LSD (.05)	930	2.4	3.4	0.3	5	1	1	0.7	0.1	1.1

Rating scale for diseases (area of flag-1 leaf affected), lodging and shatter, : 1 = 0-3%, 2 = 4-14%, 3 = 15-29%, 4 = 30-49%, 5 = 50-69%, 6 = 70-84%, 7 = 85-95%, 8 = 96-100%.

BYDV ratings (see scale above) were based on percentage of plants showing foliar symptoms.

Numbers in parentheses indicate relative rank in column.

Barley

Doug Munier, UCCE Farm Advisor - Butt County

Irrigated Barley

Barley is not commonly grown in the Sacramento Valley. Barley is not affected by wheat stripe rust, but has a new disease of its own, barley stripe rust. This disease first appeared in the late 1990's and eliminated many barley varieties as choices for growers. Yield decreases from barley stripe rust have decreased the barley acreage statewide.

However, there are two new barley varieties, UC 937 and UC 933, which have good resistance to barley stripe rust. They also have resistance to scald and net blotch, diseases that are at least partially responsible for barley not commonly being grown in the Sacramento Valley. As long as this disease resistance lasts, it makes barley an option in the Sacramento Valley. Table 5 is a yield summary of six trials over a three year period for several barley varieties.

UC 937 had severe shattering losses in the Butte 2002 trial resulting in a much lower yield than UC 933. UC 937 has a weakness of losing the entire head if strong winds occur after the grain is mature. Harvesting UC 937 as soon as it is mature will be important if windy weather occurs. UC 933 is a newer variety and seed is limited. More UC 933 seed should be available this year. UC 937 is capable of very similar yields to UC 933, but must be managed carefully to hopefully avoid severe shattering losses.

Rain Fed Barley

There was only one rain fed barley trial in the Sacramento Valley in 2003, so the results of several trials from the southern part of the state are included in Table 6. The good growing conditions in the Glenn County trial and the extended wet spring resulted in yields similar to irrigated conditions.

Summary

There are fewer choices of both wheat and barley varieties for the 2004 crop, but there are several good ones of both wheat and barley. However, in this rapidly changing disease situation, consider planting more than one variety to decrease your risk of severe losses from any varietals characteristic effecting wheat and barley yields and quality.

Table 14: 2000-2003 Sacramento Valley **irrigated** barley yield summary.
Yields are in pounds per acre and the numbers in parentheses indicate the relative rank in the column.

Variety	Average 2001-03 6 Loc/Yr	Butte 2003	Butte 2002		Butte 2001		UC Davis 2003	UC Davis 2002		UC Davis 2001	
UC 603	4740	4880	4070	(07)	4040	(11)	6250	4630	(03)	4570	(09)
PATTI	5438	6760	5450	(04)	5010	(05)	7600	3390	(09)	4420	(10)
UC 933	6207	6620	6090	(01)	5280	(04)	8570	5060	(02)	5620	(02)
UC 937	5532	6690	3750	(08)	5370	(02)	7670	4260	(04)	5450	(05)
MELTAN	4198	4960	3210	(10)	4250	(10)	5420	2220	(10)	5130	(06)
UC 969	4970	6470	3380	(09)	4390	(08)	6980	3970	(05)	4630	(08)
CV		7.3	19.8		11.8		8.3	21		8.3	
LSD (.05)		710	1130		760		920	930		570	

Table 15: 2000-2003 Sacramento Valley **rainfed** barley yield summary.
Yields are in pounds per acre and the numbers in parentheses indicate the relative rank in the column.

Variety	Average 2001-03 (7 loc/yr)	Glenn 2003	San Luis Obispo 2001	San Luis Obispo 2002	San Luis Obispo 2003	Tulare 2001	Tulare 2002	Tulare 2003
UC 603	2510 (6)	5650	2010	4460	920	380	1940	2190
MAX	2090 (8)	5040	1010	3980	1200	670	1420	1320
PATTI	2310 (7)	5200	1710	3790	900	550	1900	2110
UC 933	3050 (1)	6870	3010	5360	770	930	1930	2450
UC 937	2840 (4)	6530	2040	4240	1340	800	2370	2580
MELTAN	2890 (2)	5320	2790	5080	1180	1120	2240	2500
UC 969	2540 (5)	6020	2660	3410	810	500	2220	2170
CV	19.2	13.0	23.7	14.2	45.7	41.3	15.3	11.0
$LSD_{(.05)}$	270	1140	790	890	690	510	430	340