



2002

YOLO/SOLANO/SACRAMENTO
WHEAT & BARLEY PRODUCTION
TRIAL RESULTS



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INTRODUCTION

Kent L. Brittan and Lee Jackson¹

This year's wheat crop yield was slightly below average due to low rain fall and many growers choosing to not irrigate, rust diseases and early spring warm temperatures. The 2001 fall season started out with good planting conditions and germinating rains on November 28th. The last frost occurred March 19th for the Davis area. Some early fields were frost damaged lightly in the northern part of Yolo County. Very little frost damage was observed in the test plots this season. A new strain of stripe rust significantly reduced the yields of the red wheat variety Bonus throughout the region. Leaf rust was also a problem in many varieties. Good disease results in this year's trials should be considered true indications of potential resistance for the varieties studied. Wheat stripe rust is producing new strains within about a three year period in varieties that are grown in large acreages.

Below are lists describing the historical acreages of wheat and barley production for the region's three counties.

Yolo County Acreage's²

<u>YEAR</u>	<u>WHEAT</u>	<u>BARLEY</u>
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

<u>YEAR</u>	<u>WHEAT</u>	<u>BARLEY</u>
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

<u>YEAR</u>	<u>WHEAT</u>	<u>BARLEY</u>
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
1991	17,500	1,700
1990	26,000	900

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's average rainfall is 17.3 inches.

2001-2002 Rainfall Distribution¹

July	0.00
August	0.00
September	0.00
October	0.00
November	2.75
December	6.16
January	2.17
February	0.73
March	1.53
April	0.09
May	0.54
June	0.00

Total	13.97

Spring Frost Dates for Yolo County

<u>Date 2001</u>	<u>Minimum Air Temperature¹</u>
March 8	30°F
March 9	32°F
March 16	31°F
March 19	32 °F

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/>

On the following page is an overall summary of the five wheat variety trials conducted in Yolo, Solano and Sacramento Counties (Table 1). This year 3 sites were rainfed (non-irrigated): Best, Gill, and Hunn, Merwin & Merwin. Soil moisture ran out this year at these three locations, so yields, % grain protein and bushel weights were reduced.

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

Variety	Best*	Gill*	Hunn, Merwin & Merwin*	Mello	Rominger	Average	
96 Triticale	7760	8944	7410	6503	7447	7584	A
Summit	7503	7395	6309	4617	7377	6607	B
Plata	6817	6324	5463	4189	7080	5984	C
Stander	6762	6953	4645	3844	7452	5924	CD
Kern	6881	6202	5553	3674	6802	5850	CD
Yolo	6382	6001	3960	4514	6920	5632	DE
Anza	6521	5693	5313	3147	6739	5478	EF
Kama	6353	5342	5297	3354	6624	5413	EF
Winanza	6378	6131	4882	2482	6194	5177	FG
Bonus	6225	5850	4189	2201	6706	5053	G
Express	6231	3184	5340	3325	7007	5038	G
Average	6710	6184	5303	3805	6941	5795	
C. V. (%)	4	5	8	14	8	8	
LSD @5%	428	405	607	779	910	322	

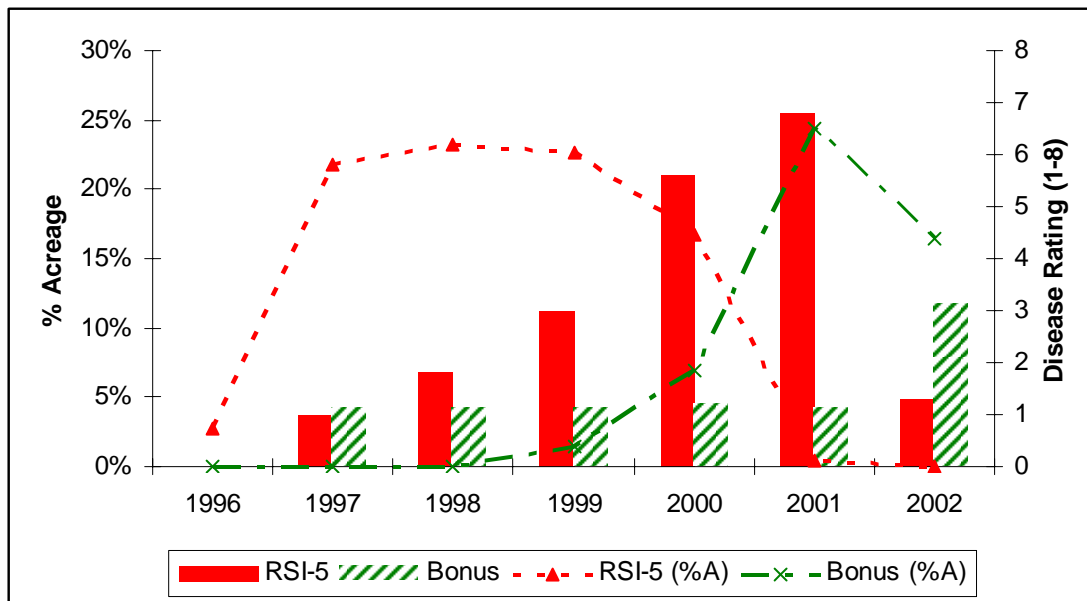
* Non-irrigated locations.

Table 1. gives a nice look at how well each of the varieties are adapted to the entire south Sacramento Valley region. These trials were located around the three counties I cover to give an indication as to 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. Lack of adequate spring rains for the non-irrigated areas and wheat stripe rust and leaf rust reduced yields.

Wheat Stripe Rust Problem

Especially effected by strip rust was the red wheat variety Bonus. This relatively new variety started showing severe symptoms of stripe rust this season indicating that the disease has developed a new strain that over-comes the genetic resistance incorporated in this variety. Three seasons ago strip rust caused crop losses with the Resource Seeds Inc. variety RSI-5 in a similar fashion. In examining the acreages planted to each of the varieties through the state (data courtesy of the California Wheat Commission) and the relative degree of severity that the stripe rust disease is being found by Lee Jackson in his statewide trials you can see a relationship. Figure 1. describes the increase in use of RSI -5 (Resource Seeds Inc.) over the past years, indicated by a dashed line(---), and the increase in severity of strip rust found on RSI-5 in the Statewide Variety Trials, shown as a solid bar. Also, I've included the same information for the variety Bonus (dash-dot line for acreage, striped bar for disease rating), which is showing a similar pattern. In 2001 we stopped growing RSI-5 commercially and by 2002 the severity of the disease has diminished. Does that mean we can now use RSI-5 again, that's a good question we do not really know the answer too. The pattern is being repeated with the Bonus variety, as the acreage increases to a point

Figure 1. Comparison of 2 Red Wheat Varieties and Disease Susceptibility to Wheat Stripe Rust.



the disease creates a new strain and we lose another variety. Based on the similarities between the two varieties and the increase in disease sensitivity to strip rust, I can no longer recommend planting Bonus. It takes breeders 8 to 10 years to create a commercially viable variety. This disease is adapting to new popular varieties in 3 to 4 years time. To solve this problem we are going to have to increase the complexity of the strip rust resistance and we need to reduce the acres planted to any one variety. How many acres for any one variety? This very preliminary look at this problem suggests keeping the planted acreages for any variety below 20% to avoid providing strip rust enough material to adapt to.

VARIETIES

The following public varieties are recommended for Yolo County. 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 failure due to one varieties problems that might occur in a specific year.

WHEAT

KERN

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 – Adequate levels of resistance to leaf rust, stripe 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

Yolo has mostly been replaced by the private varieties Express and Bonus. Our trial data shows that Yolo will either equal Anza or out-yeild 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) Its overall disease resistance is good. It has good resistance to stripe rust and 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

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. Its characteristics are very similar to Yolo. Anza has a poorer bread quality than Yolo.

SERRA

This is a high quality variety for the Sacramento Valley. Its main problem is 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, stripe rust, and powdery mildew, and susceptible to 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

Express replaced Yolo as the leading variety planted in the Sacramento Valley in 1994 and was the leading variety in 2001. 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 some susceptibility to stripe rust in 1999, 2000 and 2001. 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

RSI (Resource Seeds, Inc.) recently released Summit, a high yielding, hard red wheat variety that is targeted for the Sacramento Valley. This is the first year Summit is available for commercial production. In U.C. regional tests (entry # 1155) in the Sacramento Valley from 1998-2001 (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.

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. Low susceptibility to Septoria Tritici blotch. Lightly susceptible to Barley Yellow Dwarf Virus.

Lodging and Shattering: Low susceptibility.

Quality: Better than Anza, RSI5 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 New RSI Summit Variety

Year Variety	Sacramento Valley Yield (lb/acre)	Statewide Averages								
		Stripe Rust	Leaf Rust	Septoria	Barley Yellow Dwarf Virus	Lodging (Harvest)	Shatter	Grain Protein (12% Moisture)	Bread Texture	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
RSI 5	4630	1.8	1.0	1.8		4.3	2.2	11.1	U	1
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
RSI 5	7450	3.0	1.1	1.5	1.1	1.5	1.8	11.1	U	1
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
RSI 5	5590	5.6	1.1	1.8	1.3	3.6		10.9	S-Q	2
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		
RSI 5	4570	6.8	1.0	1.0	1.0	2.8	1.5	11.3		

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.

BONUS

A new hard red wheat variety from RSI (Resource Seeds, Inc.) cereal breeding program in Zamora, California. Bonus is an early flowering, early maturing variety that achieves its highest yield potential if planted after November 15. Earlier planting increases the risk of frost damage. Bonus is a good choice for double cropping. Bonus is four to six inches (4" to 6") shorter than the predominant wheat varieties now grown in the Sacramento Valley, and has shown good resistance to stripe rust and grain shatter. Its grain has been well received by the California milling industry.

STANDER

A new 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. It averages six inches (6") shorter than RSI-5, and is unique among currently available varieties for its excellent tolerance to lodging. It also has shown good resistance to stripe rust and grain shatter. Expect significant increase in acreage this year.

BARLEY

UC 937

For fall-sown spring barley (Central Valley, south central intercoastal valleys, and southern California): UC 937 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. A 3-location "mini-strip test" also was conducted in '97. 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.

UC 933

A newly released variety, it is similar to UC 937. It is an earlier maturing variety with stripe rust resistance.

UC 476

Released from the barley breeding program at the University of California. UC 476 is a selection from the cross Sutter/Briggs/Prato sib. made by Charlie Schaller in 1971. The cross was designed to develop a later maturing Prato type with increased disease resistance and improve straw quality. The new cultivar is slightly taller than Prato, has stronger straw (less lodging) and matures about three days later. UC 476 is a 6-rowed spring feed barley with a semi-erect spike and semi-smooth awns. Test weight and kernel size are superior to Prato. It is tolerant to scald and net blotch and contains the Yd2 gene for tolerance to Barley yellow dwarf. In Regional and barley screening nurseries grown from 1980 to 1984, UC 476 averaged 172, 132, 100, 112, 111, 122, 91 and 105% of Prato's yields in Butte, Sutter, UC Davis, Yolo, Fresno, Kings, Kern and San Luis Obispo County tests, respectively.

UC 476 is adapted to all areas where barley is grown in California. It has better tolerance to wet conditions than Prato. The relatively high level of tolerance to the major foliar diseases should be sufficient to provide adequate protection under most conditions. UC 476 has fair tolerance to stripe rust.

UC 603

Released from the University of California, UC 603 is a pure line selection from the cross [(Marie*Luther) * Trail] * 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, Tulalake 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.

NEBULA

A medium to late maturing variety. It is moderately resistant to scald, moderately susceptible to Net blotch, Barley dwarf yellow and Leaf rust and susceptible to Stripe Rust.

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 dryland area is 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 www.imp.ucdavis.edu.

The Pest Management Guidelines were updated in January 2002. Don't forget to get your copy!



The banner features a background image of a rural landscape with mountains and a field. The text "UC IPM Online" is prominently displayed in a large, serif font. To the right is the UC IPM logo, which consists of the letters "UC" and "IPM" flanking a green leaf icon above a black outline of the state of California. Below the main text is a black navigation bar with the title "UNIVERSITY OF CALIFORNIA STATEWIDE INTEGRATED PEST MANAGEMENT PROJECT" in white. The bar contains six columns, each with a representative image and a text label: "ABOUT UC IPM" (yellow flowers), "HOW TO MANAGE PESTS" (green apples), "PESTICIDES: EDUCATION & DATABASES" (a person in a white protective suit), "PUBLICATIONS, OTHER RESOURCES" (a yellow book cover titled "PESTS OF THE GARDEN AND SMALL FARM"), "UC IPM FUNDED PROJECTS" (a close-up of a corn cob with a beetle), and "WHAT'S NEW?" (cotton bolls).

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.)

Grade	Minimum Limits of:				Maximum Limits of:			
	Test Wt. Per Bu. Pounds	Sound Barley %	Damaged Kernels ¹ %	Heat Damaged Kernels (Major) %	Foreign Material %	Defects Broken Kernels %	Barley of Other Classes Thin Barley %	Black Barley ² %
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 (*Crotalaria* 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 unclassified 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.

2001 – 2002 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. This year an over-locations analysis, Table 7, is provided to give an indication of regional "fitness" for the varieties, Best, Gill, Hunn and Merwin and Merwin, were non-irrigated trials. Anza lodged a bit following the high winds just before harvest. This is a bit unusual for Anza; it was a particularly good growing season for it during the winter months which encouraged excessive tillering. There were a few fields that lodged in February, fortunately some of those recovered. Shattering from high winds prior to harvest caused some significant losses to the white wheat variety Plata and should be a major consideration before choosing this variety. Leaf rust was found on all the varieties and exacerbated the stripe rust problem in Bonus.

Table 7. Summary of 2001 – 2002 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: 11/9/2001 to 1/23/02 Harvest Dates: 6/17/2002 to 7/12/02
 Planting Method: 120 Lbs/Acre
 Length of Plots: 95 – 100 feet Plot Width: 10 feet (14 rows) or 5 feet at Hunn and Mello
 Replications: Usually 4, 3 reps at Rominger, so analysis is on the 1st 3 reps for over locations
 Previous Crops: 2001 – Safflower, Corn or Tomatoes
 Locations: 3 trials in Yolo County, 1 Solano County, 1 Sacramento County

Variety	Plant Days to Heading	Plant Height (in)	Leaf Lodged (%)	Stripe Shatter (%)	BY Rust (%)	BY Rust (%)	BY DV (%)	Protein (%)	Bushel Wt. (lb/bu)	Yield (lb/ac)	Duncan's Mean Separation
96 Triticale	128	32	0	0	15	0	1	10.9	55.0	7584	A
Summit	137	32	1	1	5	0	2	12.2	57.1	6607	B
Plata	135	34	1	10	26	0	2	12.1	58.3	5984	C
Stander	137	30	0	1	26	0	3	11.7	58.4	5924	CD
Kern	137	29	1	0	12	1	7	11.8	59.4	5850	CD
Yolo	137	35	1	3	40	1	4	10.9	56.9	5632	DE
Anza	137	35	12	1	12	0	2	11.5	56.3	5487	EF
Kama	136	33	0	4	22	1	2	11.9	57.7	5413	EF
Winanza	138	36	1	2	2	1	3	11.2	57.3	5177	FG
Bonus	134	29	0	1	66	14	5	12.1	55.8	5033	G
Express	137	35	5	13	8	0	5	12.6	57.5	5038	G
Average	136	33	2	3	21	2	3	11.7	57.3	5795	
C. V. (%)	1	4						4.4	4.8	8	
LSD @5%	1	1						0.4	2.0	322	

Table 8. BEST WHEAT VARIETY TRIAL - HARVEST YEAR 2002

Cooperators: Dan Best Jr.
Experimenters: Brittan, Dubcovsky, Jackson, Kochi
Soil Type: Reiff very fine sandy loam, Class I
Planting Date: 11/28/01
Planting Method: Drilled with 8" single disk grain drill on 5 ft. beds
Planting Rate: 120 Lbs/Acre
Length of Plots: 95 feet
Plot Width: 10 feet (14 rows)
Previous Crop: 2001 – Safflower
Fertilizer: 500 lbs. N as (NH₄)₂SO₄ preplant
Location: Knights Landing area, southeast corner of County Rd. 14, and County Rd. 101, plot located at northeast end of Weider Field, 13th row from east side

Irrigations: None
Harvest Date: 06/21/02
Replications: 4

2001 to 2002 Best Wheat Variety Trial Summary Sorted by Yield

Variety	Days to Heading	Height (in)	Shatter (seed/ft ²)	Leaf Rust (%)	Stripe Rust (%)	Frost (%)	Protein (%)	Bushel Weight (lbs/bu)	Yield (lbs/ac)	Duncan's Means Separation
96 Triticale	131	30	0	1	0	0	10.0	60.5	7760	A
Summit	134	29	3	0	0	0	10.9	63.9	7503	A
Kern	134	27	1	1	3	0	10.5	65.6	6881	B
Plata	134	32	21	1	0	0	10.3	65.2	6817	BC
Stander	134	28	2	1	0	0	10.1	62.9	6762	BC
Anza	136	36	3	1	0	0	10.2	64.6	6521	BCD
Yolo	134	34	3	5	5	0	9.3	64.0	6382	CD
Winanza	135	36	3	1	3	0	9.4	64.5	6378	CD
Kama	134	32	8	4	4	0	10.9	64.8	6353	CD
Express	134	33	12	1	0	0	11.7	64.4	6231	D
Bonus	133	27	2	33	20	0	10.6	63.1	6225	D
Average	134	31	5	4	3	0	10.3	64.0	6710	
C.V.%	0.7	3					3.35	0.5	4	
L.S.D @5%	1.3	1					0.51	0.4	428	

Protein content is low for this local and is a result of non-irrigation and not top dressing nitrogen in this sandy loam field. Strong winds prior to harvest caused shatter in Plata and Express. Leaf rust and strip rust also contributed to the problem. Despite these conditions, Summit yielded well.

Table 9. GILL WHEAT VARIETY TRIAL - HARVEST YEAR 2002

<u>Cooperators:</u>	R.C. Gill and Son	<u>Irrigations:</u>	<u>None</u>
<u>Experimenters:</u>	Brittan, Dubcovsky, Jackson, Kochi	<u>Harvest Date:</u>	<u>6/27/02</u>
<u>Soil Type:</u>	Yolo silty clay loam, Class I	<u>Replications:</u>	<u>4</u>
<u>Planting Date:</u>	11/09/01		
<u>Planting Method:</u>	Drilled with 8" single disk grain drill		
<u>Planting Rate:</u>	120 Lbs/Acre		
<u>Length of Plots:</u>	110 feet		
<u>Plot Width:</u>	10 feet (14 rows)		
<u>Previous Crop:</u>	Tomatoes – 2001		
<u>Fertilizer:</u>	0 lbs. N as NH ₄ NO ₃ preplant, 150 lbsN as Urea by air		
<u>Location:</u>	Dixon, one-quarter mile southwest of E.Dixon Ave. and Pedrick Road` plot located at northeast end of Weider Field, 13th row from east side		

2001 to 2002 Gill Wheat Variety Trial Summary Sorted by Yield

Variety	Days to Heading	Height (in)	Shatter (%)	Leaf Rust (%)	Stripe Rust (%)	Frost (%)	Protein (%)	Bushel Weight (lbs/bu)	Yield (lbs/ac)	Duncan's Means Separation
96 Triticale	137	36	0	21	0	4	10.3	61.6	8944	A
Summit	153	38	2	7	0	0	11.6	63.8	7395	B
Stander	153	35	2	45	0	0	11.1	62.8	6953	C
Plata	151	38	21	46	0	0	11.7	65.5	6324	D
Kern	153	35	1	19	0	0	11.4	65.7	6202	DE
Winanza	153	42	2	9	0	0	10.3	63.4	6131	DEF
Yolo	153	39	3	65	0	0	9.8	63.1	6001	DEF
Bonus	150	33	3	78	7	1	11.4	62.0	5850	EF
Anza	153	40	1	18	0	0	10.8	63.9	5693	FG
Kama	151	36	6	36	0	0	11.5	64.4	5342	G
Express	153	39	45	23	0	1	12.3	62.9	3184	H
Average	151	37	8	33	1	1	11.1	63.5	6184	
C.V.%	0.6	2					3.0	0.4	5	
L.S.D @5%	1.2	1					0.5	0.4	405	

The white wheat variety Plata lost yield to shattering and leaf rust. Note Summit's ability to resist leaf rust under high disease pressure. Express lost its yield to shatter in a very dry field.

Table 10. HUNN & MERWIN & MERWIN WHEAT VARIETY TRIAL - HARVEST YEAR 2002

<u>Cooperators:</u>	Pete and Larry Hunn	<u>Irrigations:</u>	<u>None</u>
<u>Experimenters:</u>	Brittan, Dubcovsky, Jackson, Kochi	<u>Harvest Date:</u>	<u>6/17/02</u>
<u>Soil Type:</u>	Sacramento clay, Class III	<u>Replications:</u>	<u>4</u>
<u>Planting Date:</u>	11/9/2001		
<u>Planting Method:</u>	Drilled with 7 ² single disk grain drill planted flat		
<u>Planting Rate:</u>	120 Lbs/Acre		
<u>Length of Plots:</u>	100 feet		
<u>Plot Width:</u>	10 rows, 6 feet.		
<u>Previous Crop:</u>	2001 - Safflower		
<u>Fertilizer:</u>	138 lbs nitrogen preplant as urea		
<u>Location:</u>	Southeast corner of North Courtland Road and Widgeon Road. One-half mile east of the Deep Water Channel, southwest of Courtland, CA.		

2001 to 2002 Hunn, Merwin & Merwin Wheat Variety Trial Summary Sorted by Yield

Variety	Days to Heading	Height (in)	BYDV (%)	Leaf Rust (%)	Stripe Rust (%)	Frost (%)	Protein (%)	Bushel Weight (lbs/bu)	Yield (lbs/ac)	Duncan's Means Separation
96 Triticale	139	34	1	17	0	1	11.6	30.9	7410	A
Summit	152	34	4	16	0	0	12.9	32.6	6309	B
Kern	152	31	31	75	13	0	12.3	36.1	5553	C
Plata	149	35	4	21	0	0	13.2	34.0	5436	C
Express	152	36	21	34	0	0	13.0	33.4	5340	C
Anza	152	36	2	16	0	0	12.2	32.8	5313	C
Kama	152	36	3	38	0	0	13.4	31.5	5297	C
Winanza	152	37	7	34	0	0	12.2	32.7	4882	CD
Stander	152	33	9	1	0	0	12.8	30.0	4645	DE
Bonus	145	30	15	7	0	1	13.6	31.3	4189	EF
Yolo	152	36	10	56	0	0	12.3	31.0	3960	F
Average	150	34	10	29	1	0	12.7	32.4	5303	
C.V.%	0.2	3					2.3	3.2	8	
L.S.D @5%	0.4	1					0.4	1.5	607	

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. Shatter was not a problem at this location and is not reported to provide space for reporting Barley Yellow Dwarf Virus (BYDV).

Table 11. MELLO WHEAT VARIETY TRIAL - HARVEST YEAR 2002

<u>Cooperator:</u>	Steve Mello	
<u>Experimenters:</u>	Brittan, Kearney, Dubcovsky, Jackson, Kochi	
<u>Soil Type:</u>	Rindge mucky silt loam, Storie index 57, Class III	
<u>Planting Date:</u>	1/23/02	<u>Spud Ditch Irrigation:</u> 5/7-13/02
<u>Planting Method:</u>	Drilled with 7" single disk grain drill.	<u>Harvest Date:</u> 7/12/02
<u>Planting Rate:</u>	160 lbs/acre	<u>Replications:</u> 4
<u>Length of Plots:</u>	110 feet	
<u>Plot Width:</u>	10 rows, 8 ft	
<u>Previous Crop:</u>	2001 Corn	
<u>Fertilizer:</u>	100 lbs. 11-50-2 drilled with seed	
<u>Location:</u>	Brunk Road off Tyler Island Road, south 1/4 mi	

2001 to 2002 Mello Wheat Variety Trial Summary Sorted by Yield

Variety	Days to Heading	Height (in)	Shatter (%)	Leaf Rust (%)	Stripe Rust (%)	Septoria (%)	Protein (%)	Bushel Weight (lbs/bu)	Yield (lbs/ac)	Duncan's Means Separation
96 Triticale	99	31	0	19	0	1	11.3	59.4	6503	A
Summit	106	30	0	6	0	1	13.1	61.9	4617	B
Yolo	106	32	1	61	0	1	11.3	61.9	4514	BC
Plata	102	32	1	44	0	1	12.7	63.0	4189	BCD
Stander	107	28	0	36	0	6	12.5	69.0	3844	BCDE
Kern	104	26	1	18	0	2	12.7	63.8	3674	CDE
Kama	102	32	2	36	0	1	11.3	62.0	3354	DE
Express	107	32	3	23	0	0	13.4	62.4	3325	E
Anza	108	33	0	16	0	16	11.9	62.2	3147	EF
Winanza	108	32	1	7	0	9	12.1	61.5	2482	FG
Bonus	101	27	0	75	10	1	12.7	59.1	2201	G
Average	104	30	1	31	1	3	12.3	62.4	3805	
C.V.%	0.9	3					2.1	7.3	14	
L.S.D @5%	1.3	1					0.4	6.5	779	

Very low yields this season are due to high Johnson grass pressure and my 40 year-old harvester giving up its last gasp. What is important to note is the high protein levels on organic soils. It is my hope that Summit will be a good replacement for Anza in this region. I feel that after five years we have answered that question, I highly recommend Summit for this area.

Table 12. ROMINGER WHEAT VARIETY TRIAL - HARVEST YEAR 2002

<u>Cooperators:</u>	Charlie Rominger	
<u>Experimenters:</u>	Brittan, Dubcovsky, Jackson, Kochi	
<u>Soil Type:</u>	Brentwood silty clay loam, Class I	<u>Irrigations:</u> 4/12/02
<u>Planting Date:</u>	11/19/01	<u>Harvest Date:</u> 6/20/02
<u>Planting Method:</u>	Drilled with 8 ² single disk grain drill	<u>Replications:</u> 3
<u>Planting Rate:</u>	120 Lbs/Acre	
<u>Length of Plots:</u>	100 feet	
<u>Plot Width:</u>	10 feet (14 rows)	
<u>Previous Crop:</u>	2000 - Fallow	
<u>Fertilizer:</u>	100 lbs. 16-20-0 starter, 500lbs. NH ₄ SO ₄ preplant, 120lbs. NH ₄ NO ₃ top dress	
<u>Location:</u>	Winters, west of Co. Rd. 89, just south of Co. Rd. 29	

2001 to 2002 Rominger Wheat Variety Trial Summary Sorted by Yield

Variety	Days to Heading	Height (in)	Shatter (%)	Leaf Rust (%)	Stripe Rust (%)	BYDV (%)	Protein (%)	Bushel Weight (lbs/bu)	Yield (lbs/ac)	Duncan's Means Separation
Stander	142	27	1	1	0	1	11.5	63.9	7452	A
96 Triticale	136	32	0	1	0	1	11.1	62.1	7447	A
Summit	142	29	1	7	0	1	12.1	63.7	7377	A
Plata	139	32	7	1	0	1	12.4	63.9	7080	AB
Express	142	32	10	1	0	2	12.5	64.2	7007	AB
Yolo	142	33	6	3	1	1	11.8	64.8	6920	AB
Kern	142	28	0	1	3	1	12.4	65.6	6802	AB
Anza	142	33	1	1	0	1	12.0	58.5	6739	AB
Bonus	142	29	1	58	20	2	11.9	63.5	6706	AB
Kama	142	31	4	3	2	1	12.2	65.2	6624	AB
Winanza	142	33	4	1	3	1	11.6	65.1	6194	B
Average	141	31	3	7	3	1	11.9	63.7	6941	
C.V.%	1.8	6					NS	5.2	8	
L.S.D @5%	4.3	3						5.7	910	

Stander tops the list for yield in this trial with three replications and little separation between yield means. This location is one of only two that received in-season irrigations. High rust disease took its toll on Bonus here. Shatter also took its toll on Express and Plata.

Wheat Quality Enhancement Fertilizer Applications

It is common practice for certain wheat varieties to topdress nitrogen at the boot stage to enhance protein content. Two new varieties Bonus and Summit demonstrated the potential to achieve 13% protein levels at harvest if topdressed. This season I put out fertility trials at all 5 wheat strip trial locations to ascertain if either of these varieties could achieve this quality level. Unfortunately, several of the locations that usually irrigate during the growing season did not, so the results are not as clear cut as I would have liked. Over-location results are summarized in Table 13 for 4 locations. Three boot topdress fertilizer rates of Urea were used to evaluate Bonus and Summit: Control (none added), 30lbs N/ac, and 60lbs N/ac.

Variety	Fertilizer Rate	Yield (lbs/ac)	Bushel Weight (lbs/bu)	Protein (%)
Bonus	Control	5352	53.8	12.3
Bonus	30lbs N/ac	5330	54.5	12.6
Bonus	60lbs N/ac	5644	54.6	13.2
Summit	Control	6924	55.7	12.2
Summit	30lbs N/ac	6744	55.7	12.6
Summit	60lbs N/ac	6485	55.5	13.1
Average		6080	54.9	12.7
C.V.%		NS	NS	5.1
LSD@5%				0.5

Despite the lack of in season irrigation at three locations, protein can be increased by 0.9% when 60lbs N/ac is applied at the boot stage (prior to irrigation). My harvester could not harvest the final two plots of the fertilizer trial at Mello's due to Johnson grass so it was omitted. No trend in yield was due to the lack of irrigation at most sites.

2002 UC Davis Common Wheat 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)	Shatter	Plant Ht (in)	Lodging (harvest)	BYDV	Septoria	Leaf Rust	Stripe Rust	Frost Damage
<u>CULTIVARS</u>											
20	ANZA	4470 (16)	63.3	1.0	36	3.0	1.3	1.0	1.0	1.0	1.0
112	YECORA ROJO	3660 (29)	63.3	1.3	32	1.0	1.0	1.8	4.0	1.8	2.0
353	YOLO	4070 (24)	62.1	1.8	35	3.0	1.0	1.0	3.3	1.3	1.3
415	KLASIC	4380 (17)	63.6	1.0	32	1.0	1.3	1.3	4.3	2.5	2.8
638	SERRA	4700 (11)	62.8	1.0	40	1.8	1.3	1.0	3.8	1.8	1.0
788	EXPRESS	1790 (43)	63.3	4.5	39	2.5	1.0	1.0	1.0	1.0	1.3
827	CAVALIER	3140 (35)	61.9	1.0	30	1.3	1.8	1.0	4.5	2.8	3.5
901	BROOKS	4340 (18)	61.9	1.0	35	1.0	1.3	1.8	4.8	5.0	1.3
970	CUYAMA	4030 (25)	61.3	1.0	35	1.0	1.3	1.3	2.5	2.3	1.5
1020	BONUS	4270 (19)	62.3	1.0	31	1.0	1.8	1.0	4.0	2.8	1.8
1036	KERN	3890 (28)	65.1	3.0	34	1.5	1.0	1.0	1.0	1.0	1.0
1124	ELDON	3000 (36)	62.9	1.8	35	2.3	1.8	1.0	2.5	1.8	2.8
1130	STANDER	5650 (01)	62.1	1.0	34	1.0	1.0	1.5	1.8	1.0	1.5
1155	SUMMIT	4120 (22)	63.3	2.5	35	1.3	1.0	1.0	1.0	1.0	1.8
1156	BLANCA GRANDE	4140 (21)	64.6	1.0	36	1.8	1.3	1.0	1.5	1.0	1.3
1255	PLATA	2900 (40)	64.4	4.0	38	1.0	1.0	1.0	1.5	1.0	1.3
1256	NEKEV	3440 (32)	62.7	1.8	36	2.8	1.0	1.0	1.3	1.0	2.5
1258	BETH HASHITA	2280 (42)	60.6	1.8	32	1.3	3.0	1.0	1.0	1.0	3.5
1260	DARIEL	2930 (39)	61.5	3.0	39	2.5	1.0	1.0	1.0	1.3	1.3
1261	KAMA	4690 (12)	64.2	1.8	35	1.0	1.3	1.0	1.0	1.3	1.0
<u>ADVANCED LINES</u>											
1240	WWW BR 2238R	4730 (10)	62.1	1.5	40	1.0	1.3	1.0	2.5	3.5	1.3
1291	DA 998-50	3970 (26)	62.0	1.3	36	2.5	2.0	1.0	1.5	1.0	1.0
1292	DA 998-15	4560 (13)	62.0	1.8	34	1.3	1.0	1.8	1.0	1.3	1.0
1293	BZ 998-181	5130 (05)	62.1	1.3	33	1.0	1.5	1.0	3.0	2.0	1.0
1294	WWW COI957-3	2940 (38)	62.6	3.3	37	4.5	1.0	2.0	1.8	1.0	1.0
1296	UC 1296	4210 (20)	63.3	2.3	40	2.8	1.0	1.0	1.0	1.0	1.0
1322	RSI 99WY50413	5160 (04)	62.0	1.3	32	1.0	1.0	1.0	1.5	1.0	1.3
1325	RSI 96WY50815C-2	4080 (23)	61.8	3.3	36	1.3	1.0	1.0	1.0	1.0	1.3
1340	WWW BR 3677	2760 (41)	62.0	3.3	43	1.3	3.0	1.0	1.3	1.0	1.5
1341	DA 998-12	3500 (31)	62.4	2.5	40	2.8	1.0	1.0	1.0	1.0	1.0
1342	DA 999-38W	4790 (08)	60.7	1.3	31	1.0	1.0	1.0	1.5	1.3	1.3
1345	RSI 96WY51419C2	5340 (02)	61.4	1.8	37	1.0	1.0	1.0	1.5	1.0	1.5
1346	RSI 97WY63614	4490 (15)	64.7	1.8	36	1.0	1.3	1.0	1.0	1.3	1.0
1347	RSI 98WV12714	4860 (07)	62.3	2.8	38	1.0	1.0	1.0	1.8	1.3	1.5
1348	RSI 99WY51137	4790 (09)	61.5	2.0	35	1.0	1.0	1.0	1.8	1.5	1.3
1349	RSI 99WY51503	3000 (37)	63.3	2.8	34	2.0	1.0	1.0	1.8	1.0	1.5
1350	RSI 99WY51207	5070 (06)	60.9	1.0	27	1.0	1.0	1.0	1.0	1.0	1.0
1357	UCD 980380870	5200 (03)	62.0	1.5	33	1.0	1.8	1.0	3.3	1.0	1.3
1358	UCD 000370049	4530 (14)	65.1	2.3	34	1.0	1.0	1.5	1.0	1.0	1.3
1359	UCD 000390131	3170 (34)	62.9	2.5	42	2.8	1.0	1.0	2.3	1.0	1.0
1360	UCD 980380661	3920 (27)	64.3	2.0	36	1.0	1.0	1.3	2.8	1.0	2.3
1361	UCD 990370078	3420 (33)	63.0	2.0	38	1.8	1.3	1.0	1.3	1.0	1.5
1362	UCD 990370061	3520 (30)	63.4	2.8	43	1.0	1.0	1.0	1.8	1.0	1.0
1363	APB W99OD-877	960 (44)	62.6	3.0	30	1.8	2.3	1.3	3.0	2.0	4.0
	MEAN	3950	62.7	2.0	35	1.6	1.3	1.1	2.0	1.4	1.5
	CV	10.7	0.7	27.8	4.0	31.8	37.4	38.9	29.7	31.9	29.1
	LSD (.05)	590	0.9	0.8	3	0.7	0.7	-	0.8	0.6	0.63

2002 Delta Trial – Mello Farms by Lee Jackson, J. Dubcovsky, L. Gallagher, H. Vogt, K. Gibbs, and D. Prato-Mayo

Entry	Name	Yield (lbs/acre)	Test Wt (lbs/bu)	Shatter	Plant Ht (in)	BYDV	Stripe Rust
<u>CULTIVARS</u>							
20	ANZA	4040 (22)	61.4	1.5	34	2.3	2.5
112	YECORA ROJO	3390 (45)	62.4	1.5	29	1.3	3.5
353	YOLO	3810 (30)	61.3	1.3	35	1.8	2.0
415	KLASIC	4420 (04)	63.3	1.0	31	2.3	4.3
638	SERRA	3520 (40)	61.5	1.0	36	1.3	2.0
788	EXPRESS	3460 (42)	61.1	1.8	35	2.3	1.3
827	CAVALIER	4270 (07)	61.3	1.0	30	1.5	5.3
901	BROOKS	3320 (49)	60.7	1.0	32	1.5	5.8
970	CUYAMA	4360 (06)	59.2	1.0	35	1.3	4.0
1020	BONUS	3770 (35)	59.7	1.0	29	2.3	4.3
1036	KERN	4050 (21)	63.2	1.5	29	2.3	1.8
1124	ELDON	3270 (50)	60.3	1.8	34	3.0	3.0
1130	STANDER	3780 (33)	61.1	1.0	30	2.3	1.0
1155	SUMMIT	4030 (23)	61.1	1.0	32	3.0	1.0
1156	BLANCA GRANDE	4180 (14)	64.3	1.5	36	1.3	1.3
1255	PLATA	4070 (18)	63.0	1.0	32	1.8	1.0
1256	NEKEV	2960 (55)	60.4	1.3	35	2.8	1.0
1258	BETH HASHITA	2600 (57)	61.5	1.8	31	2.5	1.0
1260	DARIEL	3360 (47)	56.8	1.0	36	2.3	3.0
1261	KAMA	3650 (36)	60.8	1.0	34	1.8	2.5
<u>ADVANCED LINES</u>							
1240	WWW BR 2238R	3150 (53)	59.4	1.0	36	2.0	3.8
1288	BZ 998-256W	4070 (19)	62.6	1.3	29	2.0	1.3
1289	BZ 998-247W	3570 (38)	61.1	1.3	30	1.8	3.5
1291	DA 998-50	4690 (01)	61.9	1.0	33	1.5	1.0
1292	DA 998-15	3520 (39)	59.1	1.3	27	3.3	3.3
1293	BZ 998-181	3400 (44)	58.8	1.0	29	2.0	4.5
1294	WWW COI957-3	3990 (24)	62.3	1.5	35	2.0	1.0
1296	UC 1296	3590 (37)	61.4	1.5	36	2.0	1.0
1322	RSI 99WY50413	3980 (25)	59.0	1.0	29	2.3	2.0
1325	RSI 96WY50815C-2	4090 (17)	59.6	1.0	32	3.0	1.0
1331	RSI 99WY51362	3430 (43)	60.4	1.0	30	2.3	1.0
1332	RSI 99WY51462	4210 (10)	62.0	1.5	33	1.3	1.0
1340	WWW BR 3677	2660 (56)	59.4	1.0	37	3.3	1.0
1341	DA 998-12	3260 (51)	59.6	1.5	37	2.8	1.0
1342	DA 999-38W	4200 (11)	59.3	1.0	29	1.5	2.8
1343	YU 995-231W	4180 (12)	61.2	1.0	27	1.8	4.0
1344	BZ 9M99-1031	3890 (27)	61.6	1.5	34	2.8	2.5
1345	RSI 96WY51419C2	4260 (08)	59.3	1.0	32	2.3	1.3
1346	RSI 97WY63614	4130 (16)	62.6	1.0	31	1.5	3.0
1347	RSI 98WV12714	3220 (52)	58.3	1.0	32	2.8	1.0
1348	RSI 99WY51137	3480 (41)	59.7	1.0	29	2.5	2.0
1349	RSI 99WY51503	4240 (09)	62.3	1.5	34	1.8	1.0
1350	RSI 99WY51207	3130 (54)	56.4	1.0	25	3.3	1.0
1351	RSI 96WV52303A	4060 (20)	63.5	1.5	32	2.3	1.0
1352	RSI 98WV11808	4530 (02)	62.7	1.0	36	2.0	1.0
1353	RSI 98WV12103	3900 (26)	61.5	1.3	31	1.8	1.3
1354	RSI 99WY51305	3840 (28)	59.3	1.0	35	2.0	1.0
1355	RSI 99WY50417	4130 (15)	60.9	1.0	32	1.8	5.0

1356	RSI 98WV11213	3380	(46)	58.1	1.0	33	3.0	1.0
1357	UCD 980380870	4390	(05)	61.3	1.0	29	2.3	1.3
1358	UCD 000370049	4480	(03)	64.5	1.0	29	2.5	2.0
1359	UCD 000390131	3330	(48)	61.1	2.0	38	3.0	1.5
1360	UCD 980380661	3790	(31)	63.4	1.0	33	1.0	1.0
1361	UCD 990370078	4180	(13)	63.3	1.3	34	2.0	1.0
1362	UCD 990370061	3830	(29)	60.6	1.0	38	4.8	1.0
1363	APB W99OD-877	2190	(59)	62.1	3.3	30	1.8	2.3
1364	APB W98-275	3780	(34)	61.9	1.5	29	1.8	4.3
1365	APB W98-232	2440	(58)	63.2	3.8	37	1.5	1.0
1366	APB W99OD-890	3790	(32)	59.5	1.0	28	2.3	2.5
	MEAN	3740		61.0	1.3	32	2.2	2.1
	CV	14.8		1.4	33.0	4.1	33.1	29.6
	LSD (.05)	770		1.7	0.6	3	1.0	0.9

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

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		Plant Ht (in)	Lodging (harvest)	Days to		Leaf Rust	Stripe Rust
				Kernel Wt. (g)	Shatter			Mature from 3/1	BYDV		
<u>CULTIVARS</u>											
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
<u>ADVANCED LINES</u>											
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	WW 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.

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

Entry Name	Yield (lbs/acre)	Test Wt (lbs/bu)	Shatter	Black Point	Plant Height (in)	Lodging (harvest)	Days to Mature (from 3/1)	BYDV	Leaf Rust	Stripe Rust	Frost Damage
CULTIVARS											
112 YECORA ROJO	4060	63.2	1.8	1.0	33	1.0	89	1.0	5.0	1.0	2.5
878 DURAKING	7100	63.7	1.8	1.0	38	2.3	93	1.0	1.0	1.0	1.3
947 KOFA	5340	61.9	1.5	1.5	36	4.3	93	1.5	1.0	1.8	1.5
951 KRONOS	5180	62.5	1.3	1.0	35	4.5	92	1.3	1.0	1.0	1.8
983 RIA	6060	62.7	2.0	1.5	39	1.5	93	1.5	1.0	1.3	1.3
1024 MOHAWK	5820	62.0	1.8	1.5	36	4.5	92	1.0	1.0	1.0	1.0
1057 TACNA	4230	61.9	1.5	1.5	35	1.3	91	1.0	1.0	1.3	2.0
1103 DELUXE	6030	62.8	1.5	2.0	36	3.0	94	1.3	1.0	1.3	1.0
1166 CROWN	6070	60.9	1.0	2.5	38	2.8	94	1.5	1.0	1.0	1.0
1179 MATT	5310	62.4	1.0	1.0	36	5.8	92	1.3	1.0	1.0	1.3
1210 PLATINUM	5750	63.5	1.0	1.0	33	5.8	92	1.5	1.0	1.0	1.3
1211 TOPPER	6670	64.1	1.8	1.5	41	1.0	96	1.5	1.0	1.0	1.3
1215 ORITA	6380	62.6	1.8	1.0	40	1.5	93	1.5	1.0	1.8	1.3
MEAN	5650	62.9	1.6	1.4	37	3.2	93	1.3	1.1	1.3	1.4
CV	7.7	0.6	29.2	33.4	2.6	29.9	1.5	38.1	7.4	36.4	37.7
LSD (.05)	610	0.8	0.6	0.9	2	1.4	2	-	0.1	0.7	0.7

Rating scale for diseases (area of flag-1 leaf affected), lodging, shatter, blackpoint, and frost damage: 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 Trial Results

Barley was a major cereal grain produced throughout the Central Valley of California until barley stripe rust became a major disease in the region. There are now resistant varieties to the disease, but barley has not returned as a major crop. Economics is the major reason barley is not being planted. This past season I planted a no-till barley variety strip trial with Richard Cushman. This grower is in a permanent no-till non-irrigated program with wheat, safflower and barley. Soil tilth has improved and weeds are kept in check with a minimum amount of herbicides. Table 14 shows the results of this 3 replicate strip trial.

Table 14 2002 Cushman No-till Barley Trial Results

Cooperators:	Richard Cushman	
Experimenters:	Kent Brittan, Mark Kochi	
Planting Date:	11/20/2001	Harvest Dates: 6/11/2002
Planting Method:	Drilled with 15' Great Plains no-till drill	
Seeding Rates:	90 Lbs/Acre	
Seed Depth:	$\frac{3}{4}$ inch	
Length of Plots:	75feet	
Plot Width:	15 feet	Replications: 3reps
Previous Crops:	2001 – Wheat Variety Testing	
Fertilizer:	90 lbs. 16-20-0 N as preplant, Top dresses with Urea	
Irrigations:	None	

2001 to 2002 Cushman No-till Barley Variety Trial Summary Sorted by Yield

Variety	Height (in)	Lodging (%)	Shatter (%)	Net Blotch (%)	Leaf Rust (%)	Stripe Rust (%)	BYDV (%)	Bushel Weight (lbs/bu)	Yield (lbs/ac)	Duncan's Means Separation
UC 603	36	9	5	17	0	0	0	50.1	5148	A
UC 937	33	86	13	0	0	0	0	48.1	4658	B
UC 337	43	27	7	0	25	0	0	48.4	4048	C
UC 969	42	2	13	0	0	12	0	51.5	3948	CD
Meltan	31	8	15	40	7	0	17	52.2	3525	D
Average	37	26	11	11	6	2	3	50.1	4266	
C.V.%	4.9							2.1	6	
L.S.D @5%	3.4							2.0	466	

When conducting variety trials it is impossible to hit optimum conditions for each of the varieties. Such was the case with this barley trial when UC937 needed to be harvested. This high yielding variety needs to be harvested when its ready. Unfortunately, while I had to wait a strong wind came up causing lodging and shatter. This variety exhibited excellent disease resistance under significant pressure. UC969 was planted to demonstrate what it would be like without barley strip rust resistance. Meltan suffered from its high susceptibility to net blotch and BYDV. There are two new UC barley varieties I hope to test this next season.

To simplify information, when trade names have been used, no endorsement of products named is intended, nor is criticism implied of products which are not mentioned.

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