TABLE 5. ALTERNATE SUPPLY AND DEMAND PROJECTIONS, CALIFORNIA GRAPE CRUSH, 1976.

Shipments	Projected 1977 Shipments (1,000 gal) Alternative A*	Alternative B*
Still wine (under 14%)	281,884	250,772
Less		
Non grape wine (25%)	70,461	62,693
Net grape wine (under 14%)	211,383	188,079
Sparkling wine	11,482	25,332
Still wine (over 14%)	51,428	67,523
Brandy	16,738	14,250
Total	361,492	357,877
	Crush for 1976 (tons)	
Grape equiv. of 1977 shipments*	2,224,000	2,283,000
Grape equiv. of 1977 estimated inventory adjustment*	370,000	287,000
Total crush demand	2,594,000	2,570,000
"Normal" crush supply†	2,717,000	2,717,000
Surplus or (deficit) supply	123,000	147,000
Percent surplus or (deficit) of total requirement	4.7%	5.7%

* Relevant assumptions are as follows:

Wine Type	Percentage Annual Growth Rates A	B	Conversion Gallons per Ton	Inventory Sales Ratio
Still, Less than 14%	12.6	10.0	170	1.6
Sparkling	-6.1	10.0	170	1.6
Still, More than 14%	-5.3	0.0	95	1.3
Brandy	10.5	7.0	45	5.0
Overall Wine Growth	7.6	7.5		
Wine and Brandy Growth	7.7	7.5		

† Crush supply based on no change in table and raisin grape bearing acreage, slightly increased yields, and 1971 percentage crush allocation; 261,570 bearing acres of wine grapes, 5.42 tons per acre yield, and 97 per cent allocation to crush.

Wine grape crush 1,403,000 tons
Other grape crush 1,314,000 tons

Estimated "normal" 1976 crush 2,717,000 tons

the conversion rate used for table wines. Similarly, a larger share for nongrape wines, assumed at 25%, would alter results. In both cases, increased growth rates would be required to absorb the potential crush supply.

Inventory-to-sales ratios are subject to some management control. It is assumed that they will equal past average levels. Adjustments in this ratio will permit use of the potential crush supply.

Small amounts of crush are used for non-wine and brandy uses. It has been assumed that the crush allocated to inventory adjustment is sufficient to meet these needs.

The use of average yields is necessary if point estimates for 1976 results are to be made. It is apparent that realized yields in 1976 can vary significantly from the projected average. However, in the longer run the average results are meaningful.

Kirby S. Moulton is Economist, Agricultural Extension and Giannini Foundation of Agricultural Economics, University of California, Berkeley.

Effects of NITROGEN *and* IRRIGATION *on* YIELD *of* FEED BARLEY

Y. PAUL PURI · K. G. BAGHOTT

Wocus-type feed barleys showed greatest economical yield response to nitrogen fertilization at rates of up to 140 lbs per acre in the Tulelake Basin. Irrigation before planting and during the tillering stage was necessary for maximum yields. Additional irrigation at the boot stage resulted in increased yields one year and decreased yields another year. Wocus 71, which is 3 to 4 inches shorter in height than Wocus, yielded 8% more grain per acre.

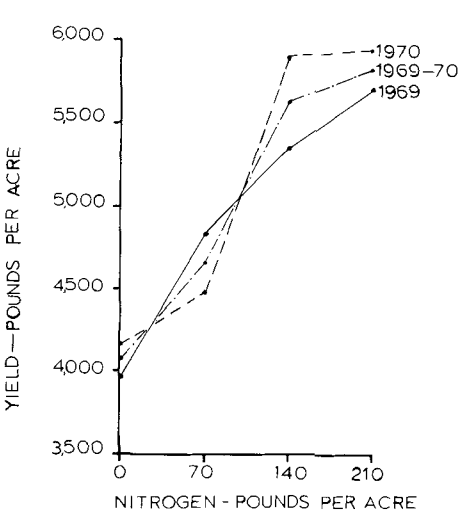
FEED BARLEY is widely grown in the Tulelake Basin of Northern California, and the Klamath Basin of Oregon. The acreage devoted to feed varieties of barley is rapidly increasing. Yields vary greatly from year to year and field to field, ranging from 3,000 to 6,000 lbs per acre. These fluctuations can be attributed to various cultural practices including planting time, seeding rate, fertilization, and irrigation. Wocus barley has been widely grown in the Tulelake and Klamath basins because it generally produces high yields compared with other barley varieties. The research reported here was needed to establish proper irrigation and fertilization practices for maximum yield and stable performance.

Previous barley fertilization experiments conducted in the Tulelake Basin showed the greatest response of barley nitrogen applications. There was a change in the yield ranking of varieties, Traill, Larker, and Wocus at the 84-lb-per-acre nitrogen application rate. At this nitrogen level, yields of Traill, Larker, and Wocus were equal, and all were significantly better than Firlbecks III. The question was raised as to whether the 84-lb-per-acre application rate would result in a maximum yield of the variety, Wocus.

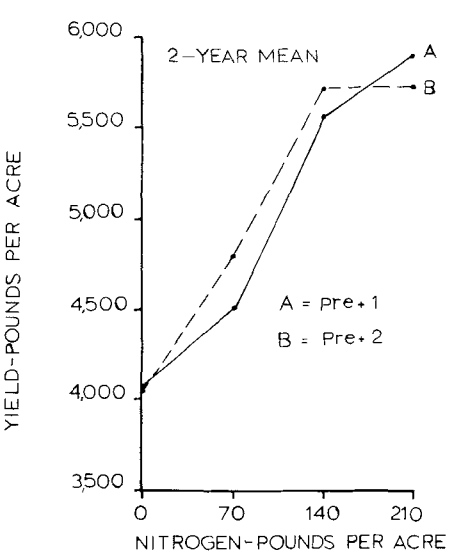
Wocus-types

Experimental plots were established on organic soil (14%) at the Tulelake Field Station in 1969 and 1970. The experimental area was uniformly cropped to wheat for the two previous years with no fertilizer applied. The experimental design was split-plot with four replications. This experiment consisted of two irrigation levels as the main plots and three

GRAPH 1. RESPONSE OF BARLEY (WOCUS-TYPE) TO NITROGEN LEVELS, 1969–1970.



GRAPH 2. RESPONSE OF BARLEY (WOCUS-TYPE) TO NITROGEN LEVELS AT TWO IRRIGATION LEVELS.



varieties (Wocus 71, Wocus Selection 68-2772, and Wocus) and four nitrogen levels as the sub plots. The four nitrogen levels included were 0, 70, 140, and 210 lbs per acre of actual nitrogen obtained from ammonium sulfate. The plot size was 24 × 50 ft. The seed was drilled at a rate of 100 lbs per acre.

The experimental area was sub-divided into two main plots (A and B) to maintain two irrigation levels. Three varieties and four nitrogen levels in all possible combinations as sub-plots were superimposed at random on the main (irrigation) plots. Both irrigation plots were irrigated prior to planting and when the plants were about six inches tall. The other irrigation plot (B) received an additional flood irrigation at the boot stage. The area harvested by a combine harvester was 16 × 50 ft.

TABLE 1. EFFECT OF IRRIGATION ON THE YIELD OF THREE WOCUS-TYPE BARLEYS

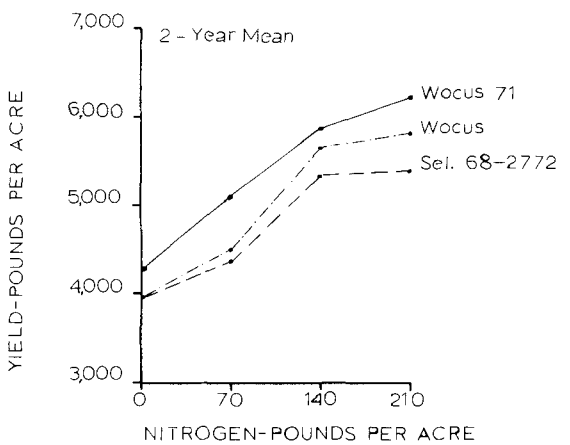
Variety	Year	No. of Irrigations Applied A Pre +1	B Pre +2	Diff.
		Yield—pounds per acre		
Wocus 71	1969	5630	4944	-686
	1970	5005	5919	914
	Mean	5318	5432	114
Sel. 68-2772	1969	4754	4443	-311
	1970	4748	5118	370
	Mean	4751	4781	30
Wocus	1969	4982	5048	66
	1970	4922	4988	66
	Mean	4952	5018	66
Average of All Varieties	1969	5122	4812	-310
	1970*	4892	5342	450
	Mean	5007	5077	70

* L. S. D. .05 = 449

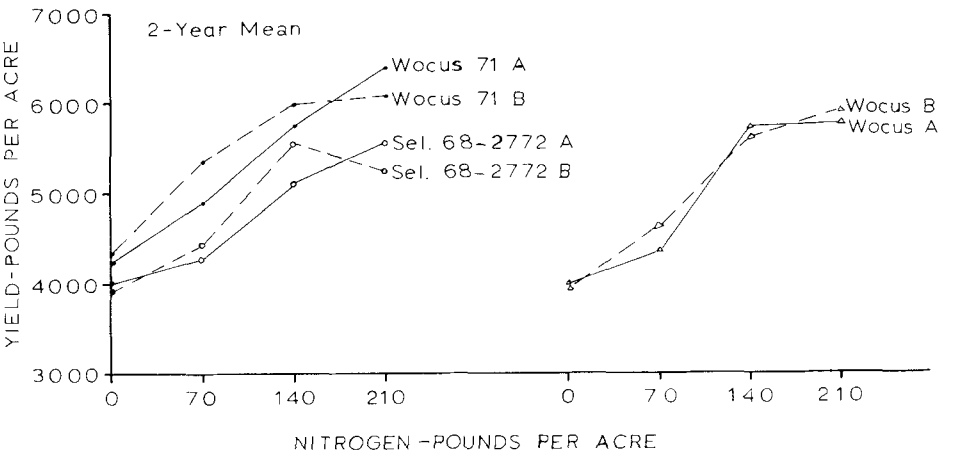
TABLE 2. COMPARATIVE PERFORMANCE OF THREE BARLEY VARIETIES, 1969 AND 1970. Average yield of all treatments

Variety	1969	1970	Avg.	Wocus
	pounds per acre			
Sel. 68-2772	4599	4933	4766	96
Wocus 71	5287	5462	5375	108
Wocus	5015	4955	4985	100
L.S.D. .05	242	287	188	

GRAPH 3. RESPONSE OF (WOCUS-TYPE) BARLEYS TO NITROGEN LEVELS.



GRAPH 4. RESPONSE OF (WOCUS-TYPE) BARLEYS TO NITROGEN LEVELS AT TWO IRRIGATION LEVELS



Irrigation response

As shown in table 1, no significant differences in yield were found after applying additional irrigation at the boot stage in 1969. The yield of varieties increased significantly in 1970 when additional irrigation was applied at the boot stage.

Combined analysis over the two years revealed that the response to additional irrigation at the boot stage depended on the environmental conditions each year.

There were significant response differences to irrigation levels among the varieties in both years (variety times irrigation reaction). The interaction of nitrogen levels with irrigation levels was also significant in 1969 and 1970. The three-way interaction (varieties, irrigation, and nitrogen levels) was not significant in both years, or in the combined analysis.

The Wocus 71 and Sel. 68-2772 were selected from the commercially grown variety Wocus. These selections possess different agronomic characteristics but their response to two irrigation levels appeared to be similar. Both selections responded negatively in 1969 and positively in 1970 to additional irrigation. The variety Wocus did not show any considerable change in yield due to additional irrigation in either year.

Nitrogen response

Response of barley to four nitrogen levels is shown in graph 1. The response of nitrogen applications was highly significant in both years. The yield of barley increased significantly with each increment of nitrogen up to 140 lbs. Increase in yield at the 210-lb-acre nitrogen level was less pronounced and was not significant. The relationship between the yield and nitrogen levels appeared to be curvilinear and was highly significant in both years. Barley lodged severely at the 240-lb level, which made the combining difficult. The optimum level of nitrogen appeared to be 140 lb per acre.

Response of barley to four nitrogen levels when plots were maintained at two moisture levels over two years is shown in graph 2. Maximum yield potential of barley under high fertility conditions could be achieved by maintaining proper soil moisture as indicated by a significant interaction of nitrogen with irrigation in both years.

Wocus 71 out-yielded Sel. 68-2772 and Wocus at all nitrogen levels (graph 3) but all responses to nitrogen fertilization levels were similar.

Varietal performance

Significant differences were found between the yield of the two Wocus selections and Wocus tested for two years. As shown in table 2, Wocus 71 outyielded Wocus and Sel. 68-2772 in 1969 and 1970. Based on the average of all treatments the new selection Wocus 71 was 8% higher in yield than the local variety Wocus and Sel. 68-2772. Wocus 71 was selected from Wocus at Tulelake for higher yield, stiffer straw and shorter height as compared with two other Wocus types tested. Wocus 71 responded better to soil moisture changes (graph 4), and yield differences were more pronounced. Wocus 71 has recently been released and seed stocks will be available for commercial production in 1974.

Y. Paul Puri is Associate Specialist and Superintendent of the Tulelake Field Station; and K. G. Baghott is Farm Advisor, Tulelake.