indicating the possibility that the major causative agents may differ between the two counties. Tissue or fecal samples for microbiologic study were not collected during the survey, but such a study should probably be made.

Calving site important

One of the most important factors related to diarrhea in calves in these counties appeared to be the site of calving. Farms on which calving usually occurred in a corral seemed to have higher losses than farms on which cattle dropped their calves in pastures or calving occurred in maternity stalls. The high risk of loss when calving occurs in a corral may reflect unsanitary conditions in the corral, such as dust in summer, mud in winter, concentration of cattle resulting in concentration of feces and urine in the corral, close proximity of other (possibly infected or carrier) animals, and contamination of soils by possibly infected birth fluids and waste.

A number of difficulties were encountered in conducting this small survey. A relatively poor response was obtained in Tulare County, at 11 randomly selected farms it was impossible to complete interviews. As in any retrospective study, the ability of the interviewee to recall events that occurred as long as a year ago is highly questionable. However, in this pilot study, in which we sought clues to additional factors which may be related to calf scours, we accepted the risk of memory errors. A prospective, follow-up study would have been more desirable, but was far too expensive to be considered seriously. The data collected have been subjected to factor analysis, however, and the results are being reported separately.

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Effects of Irrigation and Fertilizer on INIA 66 WHEAT

. . . yields, protein, and bushel weights

H. YAMADA • J. ST. ANDRE • R. M. HOOVER

Application of phosphorus and properly timed irrigation appreciably increased yields of late planted wheat. However, phosphorus applications reduced the bushel weights. Higher protein content was obtained by increasing nitrogen rates and by timely irrigation.

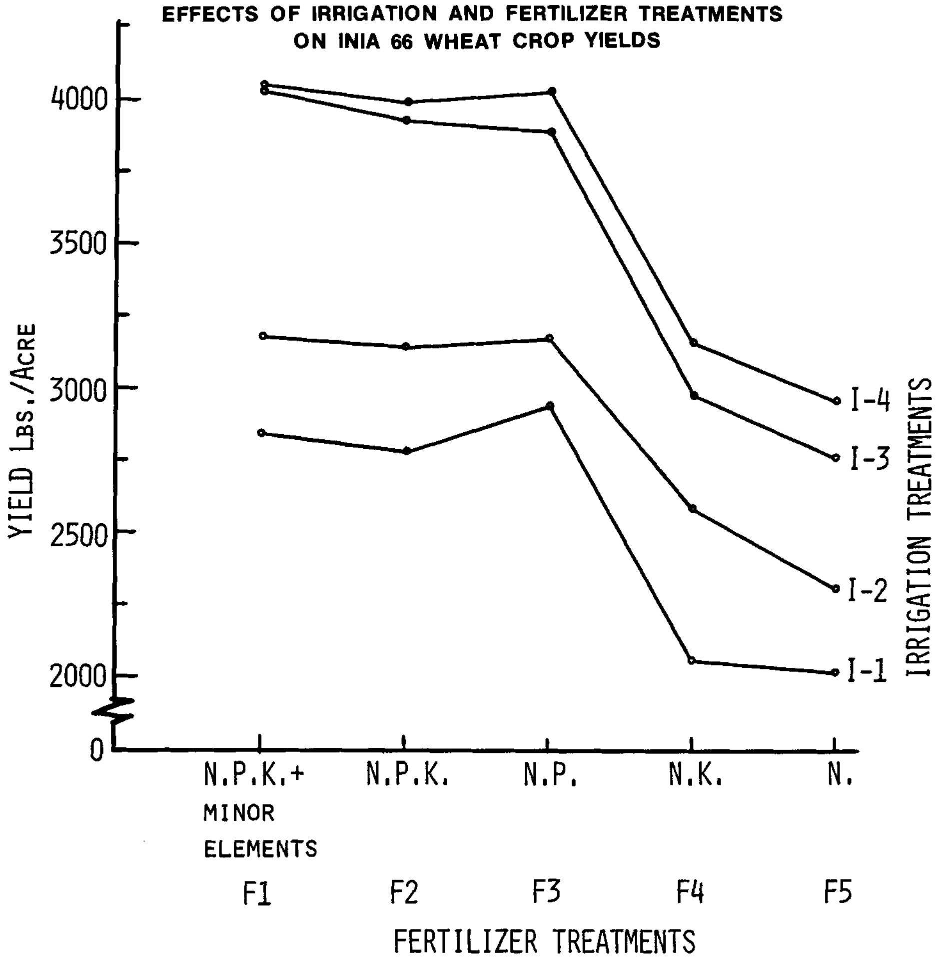
THE SOUTHERN SAN JOAQUIN valley has traditionally been a barley region. With the introduction of Mexican wheat varieties in the past few years, additional cultural information was needed so the full yield potential of these varieties and their competitive status could be determined. Fertilizers and irrigation variables appropriate to conditions in Fresno County's west side were selected to test a single promising variety which represented these genotypes.

Variety INIA 66 was planted on January 21, 1971 at a seed rate of 135 lbs per acre on a Panoche clay loam soil that had been pre-irrigated with 21 inches of water. Soil moisture samples indicated that moisture was available to the 6 ft depth. Fertilizer treatments were (in lbs per acre): (for the F-1 plot) 200N, 160P, 130K, 1.3Zn, 1.3Fe, 0.88Mg, and 0.08Mn; (F-2) 200N, 160P, and 130K; (F-3) 200N and 160P; (F-4) 200N and 130K; and (F-5) 100N. The stage of growth and the amount of water for plots at the time of irrigation was: (I-1) secondary root stage—5.4 inches; (I-2) secondary root—5.4 inches and late boot stages—5.9 inches; (I-3) early boot 6.9 inches and heading stages—5.1 inches; (I-4) secondary root—5.4 inches early boot—5.1 inches late boot—4.2 inches and milk stage—7.9 inches. Fertilizer and irrigation treatments were combined factorially for a 20-treatment total.

TABLE 1. INIA 66 WHEAT YIELD IN LBS. PER ACRE UNDER VARIOUS IRRIGATION AND FERTILIZER TREATMENTS

Irrigation treatments	Fertilizer treatments F1	F2	F3	F4	F5	Irrigation means	DMR* 1%
	Pounds per acre						
1	2841	2776	2936	2057	2013	2525	a
2	3172	3132	3175	2592	2316	2877	b
3	4029	3925	3894	2980	2798	3525	c
4	4035	3998	4037	3162	2961	3639	d
Fert. mean		3458	3511	2698	2522		
DMR 1%	c	c	c	b	a		

*Duncan Multiple Range Test. Coefficient of variation (C.V.) 3.9%



The experiment was conducted in a randomized complete block unit with four replicates. Individual plots (20 ft X 140 ft) were harvested June 29, 1972. The yield, bushel weight, and protein data were determined.

Application of phosphorus resulted in pronounced yield increases for all irrigation management systems (see graph). The addition of potassium and minor elements did not influence yields. Yield responses to fertilizer treatments were essentially constant at all irrigation levels. The mean yield (table 1) for treatments containing phosphorus (F-1, F-2, and F-3) was 3,496 lbs per acre, whereas, mean yield for treatments without phosphorus (F-4 and F-5) was only 2,610 lbs per acre; a difference of nearly 900 lbs per acre.

Yield differences significant at the 1% probability level were noted between all irrigation means. Although I-2 and I-3 plots received essentially the same amount of water, a difference of 648 lbs per acre was observed. The I-2 irrigation treatment was irrigated during the early stages of growth when the water requirements of plants was low. Irrigation water applied during the early stage of growth percolated beyond the depth of rooting and became unavailable to plants. Prior to application of the I-3 treatment, which was applied during the later stages of growth, some soil moisture had been utilized and subsequent crop irrigations replenished the soil moisture rather than percolating beyond the depth of rooting. It would appear from the data that an early crop irrigation is not required following adequate pre-irrigation.

Fertilizer

Fertilizer treatments containing higher rates of nitrogen were significantly higher in protein while phosphorus and potassium had no influence on protein levels (table 2). The greatest difference in protein (2.10%) was between fertilizer treatment F-3 and F-5; whereas, the extreme in the irrigation treatments, I-1 and I-2, resulted in protein content difference of only 0.79%. Protein concentration of grain was influenced primarily by nitrogen addition, but, timely irrigation was of some benefit.

The bushel weight was significantly increased by the I-4 wet treatment (table 3). The other irrigation treatments were the same. Fertilizer treatments containing phosphorus (F-1, F-2, and F-3) suppressed bushel weights appreciably. Nitrogen had less affect on the bushel weight than phosphorus. Treatments containing potassium and minor elements did not materially influence the bushel weight. The bushel weights were all above the normal range for wheat and none of the treatments resulted in an inferior grain.

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TABLE 2. INIA 66 PROTEIN PERCENTAGE BY WEIGHT (DRY BASIS)

Irrigation treatments	Fertilizer treatments F1	F2	F3	F4	F5	Irrigation means	DMR 1%
	Percentage by weight						
1	14.32	14.98	15.14	15.09	12.93	14.49	a
2	14.88	15.84	16.42	15.43	13.81	15.28	b
3	14.63	15.57	15.79	15.45	13.30	14.95	b a
4	14.41	14.93	14.59	15.33	13.48	14.55	a
Fert. mean	14.56	15.33	15.48	15.33	13.38		
DMR 1%	b	c	c	c	a		

C.V. 4.5%

TABLE 3. INIA 66 WHEAT BUSHEL WEIGHT

Irrigation treatments	Fertilizer treatments F1	F2	F3	F4	F5	Irrigation means	DMR 1%
	Pounds per bushel						
1	62.0	61.5	62.0	62.9	63.0	62.3	a
2	61.8	62.4	61.6	62.6	62.8	62.2	a
3	62.0	61.5	61.3	62.4	62.8	62.0	a
4	62.3	62.4	61.9	63.8	63.5	62.8	b
Fert. mean	62.0	61.9	61.7	62.9	63.1		
DMR 1%	a	a	a	b	b		

C.V. .8%