Managing Barley For Maximum Profit

*by James F. Armstrong**

Objective

The objective of the tests reported here was to evaluate the profitabliity of barley using restricted inputs.

Introduction

For several years barley has been considered a "marginal" or "break-even" crop. It was grown, primarily, because it fit into a rotation where other crops did not. It seemed logical that methods to improve the profitability of this crop needed further exploration. Improved, higher yielding varieties had not appreciably changed the profit picture up to this point.

The approach used in this testing program was that of limiting inputs, thereby reducing costs. The limits were determined by careful consideration of knowledge already generated in its various forms.

1968-69

Table 1. Yields in Response to Amount of Nitrogen and Planting Method

Pounds of Nitrogen	*Solid Drill*[1] *pounds per acre*	*Rows on Bed*[1] *pounds per acre*
0	**3584 c**	**3007 b**
100	**5056 a**	**4776 a**
200	**4351 b**	**4816 a**

[1] *Yields followed by same letter do not differ significantly at 5% level.*

Planted: December 1, 1968
Harvested: May 22, 1969
Soil Type: Silty Loam
Previous Crop: Sorghum

Seeding Rate: Rows on bed — 25 lbs.
Solid drill — 90 lbs.
Total Water: Rows on bed — 18.8 inches
Solid drill — 25.1 inches
Variety: Arimar

Table 2. Yields by Variety (2 Rows on Bed)

Variety	*Yields per Acre*[1] *pounds*	*Field Loss pounds per acre*	*Potential Yield pounds per acre*
Arivat	**4185 a**	**293**	**4478**
Hembar	**3730 a**	**1036**	**4766**
Arimar	**3695 a**	**293**	**3988**
Az 6251	**2880 b**	**126**	**3006**

[1] *Yields followed by same letter do not differ significantly at 5% level.*

Planted: December 1, 1968
Harvested: May 22, 1969
Soil Type: Silty Loam
Previous Crop: Sorghum

Total Water: 18.8 inches
Fertilizer: 100 lbs. N, 95 lbs. P_2O_5
Seeding Rate: 25 lbs. per Acre
Planting Method: 2 rows on bed 12" apart with 40 inch centers

A new system of growing barley (rows on beds) had recently been introduced, which showed much promise of fitting the input control system. Optimum planting date, rate of seeding and method of planting were products of previous work. Reduction in amount of water used to grow barley became a primary consideration. It was concluded that amount of water supplied would be keyed closely to plant need.

The following tables present results of three years testing under this restricted input system.

Summary

The following discussion deals with the results of all the testing generally and does not consider each test separately in any detail.

The results of one or more tests supports the conclusions which are listed below and generally support the limited input system as an economic approach to barley production.

Suggestions for planting under this system are:

- Plant two rows on top of the bed 10-14 inches apart.
- Use 20-25 pounds of seed per acre.

[1] *Pima County Agricultral Agent, Cooperative Extension Service. The work reported in this article was spearheaded by the author, who served as project leader. This research was conducted on the University of Arizona Marana Branch Experimental Farm, Marana, Arizona. A team approach was used to accomplish the project objectives. The team consisted of Allan D. Halderman, Extension Irrigation Specialist; Walter W. Hinz, Extension Machinery Specialist; Dr. Robert E. Dennis, Extension Agronomist; Dr. Martin D. Openshaw, Extension Soils Specialist; Dr. Arden D. Day, Agronomist, and Rex Thompson, Research Associate in Agronomy, all of the University of Arizona.*

1969-70

Table 3. Yields by Variety (3 Rows on Bed)

Variety	*Average Yield pounds/Acre*[1]	*Field Loss pounds/Acre*	*Potential Yield pounds/Acre*
Briggs	**5525 a**	**315**	**5840**
Arivat	**5085 ab**	**305**	**5390**
Arimar	**4790 b**	**425**	**5215**

[1] *Yields followed by same letter do not differ significantly at 5% level.*

Planted: December 12, 1969
Harvested: May 23, 1970
Soil Type: Silty Loam
Previous Crop: Sorghum
Total Water: 18.5 inches
Fertilizer: 112 lbs. N. and 115 lbs. P_2O_5/A
Seeding Rate: 22 lbs. per acre
Planting Method: 2 rows on bed 12" apart with 40 inch centers

Table 4. Yields by Variety (Solid Planting)

Variety	*Average Yield*[1] *pounds/Acre*	*Field Loss pounds/Acre*	*Potential Yield pounds/Acre*
Briggs	**6570 a**	**95**	**6665**
Arimar	**6175 ab**	**195**	**6370**
Arivat	**5960 b**	**395**	**6355**

[1] *Yields followed by same letter do not differ significantly at 5% level.*

Planted: December 13, 1969
Harvested: May 23, 1970
Soil Type: Silty Loam
Previous Crop: Sorghum
Total Water: 27.2 inches
Fertilizer: 124 lbs. N and 115 lbs. P_2O_5/A
Seeding Rate: 90 lbs. per Acre
Planting Method: Solid drill over beds

Briggs variety has consistently produced more than the other varieties tested and has been the most lodge resistant.

- Plant dry and irrigate up, December 1-15.
- Use 250 pounds of 16-20-0 fertilizer preplant (or other material which will supply approximately 40 pounds Nitrogen and 50 pounds P^2O^5).
- Add approximately 40 pounds of nitrogen in the water at two different times (usually early to mid-March and mid-April).
- Irrigate only as needed by the plants.
- Eliminate January and February irrigation and fertilization.

o rows on the bed — This practice has several advantages. First, it permits better water control. Secondly, it allows growers to take advantage of the profuse tillering ability of some barley varieties. Thirdly, it allows for a reduction in seeding rate by some 4 or 5 times. A fourth advantage is that harvesting is easier by this practice even when lodging occurs. Another advantage is that if weed control becomes necessary it can be accomplished by cultivation. In general, two rows on the bed contributes greatly towards improving efficiency.

Twenty to 25 pounds of seed — This rate allows for the reduction of seed cost appreciably and results in yields of 4000 to 6000 pounds per acre.

Plant dry and irrigate up — It is easier to establish a good seedbed in dry soil and compaction is minimized. This practice is where water control really begins. Usually a satisfactory job of thoroughly wetting the beds can be done with less than 8 inches of water (where good water control is possible). This is considerably less water than is normally applied for pre-irrigation. A planting date of December 1-15 is optimum. It allows plants to become established and attain a stage of growth which is least affected by cold weather (thru mid-March). It is also a time when weed competition with stand establishment is minimal.

Fertilizer — Excellent results have been obtained from applying 250 pounds of 16-20-0 preplant and then supplying 40 pounds of nitrogen in two equal split applications in the water. These applications usually come in early to mid-March and in mid-April. They are keyed directly to irrigation based on plant needs and stage of plant growth. Phosphate is not mobile in water, so it must be applied preplant and incorporated in the soil to the desired depth to be effective. The use of Uran 32 or similar material in the water is more desirable than NH_3.

Irrigation — After irrigating up, water should only be applied as needed by the plant. A soil probe and observing plant appearance are the tools used in determining when water should be applied. It has never been necessary to apply water in January and February when planting was made in early December. Prevailing weather conditions should also be considered in deciding when to irrigate. Don't irrigate if rainfall is predicted.

Rows on beds require about 25% less water than solid planting. Total applied water for rows on beds has averaged 16.3 inches per acre per season, including the irrigating-up. When rainfall is added to applied water the total has never exceeded 21 inches of water per season.

Eliminate January and February irrigations — By eliminating this practice and any accompanying fertilization lodging is minimized and frost damage is greatly reduced. Freeze damage has never been identified in the test fields, but considerable damage has been observed in nearby fields that were irrigated (in most cases also fretilized) in January and February.

The savings accrued by this system when compared to conventional planting are listed below.

- Normally about 3½ acre feet of water per acre are used to pro-

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duce barley — thus approximately 1½ acre feet are saved, plus the labor necessary for its application. Under local conditions this amounts to over $15 per acre.

- The usual seeding rate varies from 90-125 pounds per acre. A savings of 75% in seed cost is possible. Certified seed costs about $8 cwt. (depending on type & variety) thus about $6 is saved (75% x $8).

- Common practice is to apply at least 200 pounds of nitrogen per acre per season. This system utilizes only 120 pounds. This savings amounts to about $4 per acre (depending on form of nitrogen and method of application).

- In many cases field loss has been reduced some 350-500 pounds. At $50/ton this could increase returns by $8.75 to $12.50 per acre.

The yields of solid plantings have exceeded the yields of rows on bed by up to 1000 pounds per acre. Assuming a $50 per ton value of barley, rows on bed will return more net profit per acre ($10-$20) than conventional planting.

There are other considerations worthy of mention. Under the restricted input system the rate of return on investment is much higher. Thus, a grower would not only realize higher profit per acre but also a much greater rate of return on his investment.

Should this approach, or similar ones, to production become universally accepted it could greatly influence the price and profitability picture.

CAUTION

This system of production is only recommended for the production of barley varieties. It is not recommended for the production of hybrid barley or Mexican wheat. All the work reported in this article was done in Marana and may or may not apply to other production areas.

Table 5. Barley Yields Per Acre — Field D-4 (2 Rows on Bed)

	With Winter irrigation and fertilization			*Without Winter irrigation and fertilization*		
Variety	*Yield*[2]	**Field Loss*	**Potential Yield*	*Yield*[2]	**Field Loss*	*Potential Yield*
Briggs	**5550 a**	**580**	**6130**	**5273 a**	**160**	**5433**
Az 6260	**4479 b**	**1010**	**5489**	**5067 a**	**640**	**5707**
Amy	**3275 c**	**1470**	**4745**	**3091 b**	**800**	**3891**
Arivat	**3236 c**	**720**	**3956**	**5217 a**	**700**	**5917**

[1] *Consisted of 2.7 inches water and 23 pounds N/A applied January 25, 1971.*
[2] *Yields followed by same letter are not significantly different at 5% level.*

Planted: December 2, 1970
Harvested: June 1, 1971
Soil Type: Silty Loam
Previous Crop: Sorghum
Planting Method: 2 rows on bed 12" apart with 40 inch centers

Total Water: with Jan. application 23.36"
without Jan. application 20.66"
Fertilizer: with Jan. application 137#N and 50#P_2O_5/A
without Jan. application 114# N and 50# P_2O_5/A
Seeding Rate: Amy — 35 lbs./A, all others — 30#/A

Table 6. Barley Yields Per Acre — Field A-4 (2 Rows on Bed)

Variety	*Average Yield*[1] *pounds/Acre*	*Field Loss pounds/Acre*	*Potential Yield pounds/Acre*
Briggs	**5281 a**	**100**	**5381**
Arivat	**4960 a**	**158**	**5118**
Az 6210	**4590 a**	**192**	**4782**
CM 67	**4382 a**	**339**	**4721**
Amy	**4293 a**	**1580**	**5873**

[1] *Yields followed by same letter do not differ significantly at 5% level.*

Planted: December 1, 1970
Harvested: June 1, 1971
Soil Type: Silty Loam
Previous Crop: Fallow

Total Water: 20.21 inches
Fertilizer: 117# N and 50# P_2O_5/A
Planting Method: 2 rows on bed 12" apart with 40" centers
Seeding Rate: Amy-35#, CM67-30#, all others 25#/A

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