

# One-Irrigation Barley Observations in Graham and Cochise Counties, 1987

*Lee Clark, Deborah Young and Eric Schwennesen*

## ABSTRACT

*A series of experimental plots was planted because ranchers, conservationists, farmers and homeowners in southeastern Arizona were interested in knowing more about one-irrigation barleys. The results of these observations are contained in this paper.*

## INTRODUCTION

Much interest has been generated in diverse segments of the agricultural community about one-irrigation barley. Press releases, information presented at the Thirteenth Annual Arizona Forage and Grain Symposium, and an article in the Forage and Grain Report (1) kindled enthusiasm. Ranchers can always use more forage for their animals; conservationists seek wildlife habitat and erosion control. Some farmers and homeowners have parcels of land with limited water; they want to grow a forage or grain crop. Many small plots were planted to see how the one-irrigation barley responded to different management practices. Rates of seeding were observed at many of the sites.

## MATERIALS AND METHODS

Two varieties of one-irrigation barley (*Hordeum vulgare*), Seco (early) and 2-22-9 (late) were obtained from Tom Ramage, Plant Sciences Department, University of Arizona, and from the Soil Conservation Service Plant Materials Center, Tucson. The seeding was done with a Kincaid Precision drill with double disc openers on 6-inch centers; the depth of seeding varied with each site, depending on the seed bed.

## SITE A

Two locations on the Hackberry Ranch east of Safford in Graham county were selected. One was about 12 miles south of Highway 70 on Haekel road in an area referred to as the "seeded pasture". This location was in the middle of a long concave slope where no moisture would accumulate. The native vegetation included annual grasses, four-winged saltbush and yucca. The ground was not prepared, but the vegetation was so sparse the drill was able to penetrate the ground. The seeding depth was about 0.5 inches.

The other location was about 3 miles north of the plot noted above, in a flat area adjacent to a major drainage way (west of the Posey Well Wildlife reserve) where moisture would accumulate after a rain storm. The native

vegetation was four-winged saltbush, annual grasses, purslane and salt cedar. There was no ground preparation in this location, either, but even with the increased vegetation, the seed was placed about 0.5 inches deep.

This site was planted October 3, 1986; cattle were grazing in both locations.

Table 1. Temperature and Rainfall for Safford Agricultural Center, the Official Weather Station in Graham County.

Month	Ave Min Temp (deg F)		Ave Monthly Rainfall (in)	
	1986-7	1951-80 (2)	1986-7	1951-80
October	45.5	46.5	1.23	.86
November	38.4	34.8	2.39	.40
December	32.3	28.4	.73	.76
January	26.5	27.9	.33	.63
February	32.2	30.7	1.57	.55
March	35.3	35.9	.52	.56
April	45.7	42.1	.17	.18
May	52.8	49.8	.41	.12

## SITE B

This site was on the catchment area behind the retention dam constructed on the San Simon river, about three miles south of the Agricultural Inspection Station, east of Safford on highway 70. The BLM was managing this area, trying to establish ground cover and feed for native wildlife. The topography was flat, and the soil was a recently deposited silt. The soil was very friable, with good moisture in the profile below 1 to 1.5 inches. No vegetation was growing on the area to be seeded. The seeds were planted into moisture on February 3, 1987.

## SITE C

Site C was a small triangle of farmland adjacent to the Gila river, north of Safford in Graham county, owned by Russell Lundell. When the Gila river raises, it encroaches on this piece of ground, making it of marginal value for planting cotton. The ground was prepared, rowed off and the barley seed planted to a depth of about 1.5 inches. The field was then irrigated to germinate the seed. The seed was planted at 6.3, 12.8, 18, 49 and 62 pounds per acre. No fertilizer was used on this plot. The barley was planted on January 10, 1987.

## SITE D

Located in San Simon, this site was about 3 miles south of Interstate 10 and 1 mile east of Portal road, on land owned by John Chapman. The plot was too small to be farmed commercially and had been used as a garden site. The ground was level and very fine textured. The ground was prepared, rowed off and the seed was planted to a depth of about 1.5 inches on January 13, 1987. The plot was irrigated to germinate the seeds. No fertilizer was used. This plot received one additional irrigation of 6 to 8 acre-inches.

## SITE E

This site was located at a homeowner's property; he wanted to see if a forage crop could be grown with a minimal use of water. It was situated about 4 miles south and west of the town of Cochise, on property owned by Ron Orozco. The soil was very sandy; the native vegetation consisted of annual grasses, yucca and mesquite. Barley seed was planted on December 5, 1986. There were two locations at this site. At the first, the ground was disced, dragged and sprinkle-irrigated with approximately 2.5 acre-inches of water. Seed was planted at 1-inch depth into the prepared bed. One section (north) received 2 additional irrigations, with a total of 5 acre-inches of water. The other section (east) received 5 additional irrigations, with a total of 12 acre-inches of water. The second location was not disced prior to planting. The seed was planted 0.25 to 0.5 inches deep. This location received only rainfall.

Table 2. Temperature and Rainfall for Willcox, Cochise County.

Month	Ave Min Temp (deg F)		Ave Monthly Rainfall (in)	
	1986-7 (2)	1899-57 (3)	1986-7	1899-57
October	41.7	40.8	2.18	.65
November	34.8	30.2	1.42	.73
December	30.1	25.4	1.58	.94
January	24.5	24.9	.22	.87
February	28.9	27.5	1.13	.90
March	30.8	31.7	.14	.73
April	42.0	36.8	1.41	.26
May	47.0	43.3	.73	.22

## RESULTS AND DISCUSSION

### SITE A

Greater than average rainfall in October and November (Table 1) sprouted the seeds in both locations; as the plants grew, rabbits and cattle grazed them down. January was much drier than normal and the coldest in the last ten years. When the plots were checked on February 2, no plants were surviving on the "seeded pasture"; the only surviving plants at the other location were those that had germinated under old plant debris, which had sheltered them from the animals and had provided shade to conserve moisture. No data were taken on how much forage might have been produced by the barley, but the observations would indicate that one-irrigation barley will not compete with the native annual grasses to provide forage in a non-irrigated range situation, even where extra rainfall is collected.

### SITE B

Since it was planted into moisture, the barley had uniform emergence. Seeding rates were 6.3, 18, 49, 62 and 87 pounds per acre. Rabbits grazed the plots quite heavily, but the plot was large enough to sustain the loss and still survive. On April 10, the 62 and 87 pound plots had good stands; the others were somewhat sparse, but tumbleweed was germinating in all plots. By June 16, the barley and the tumbleweeds were about 2 feet tall, and

the barley that had not been crowded out had matured. It was not possible to get yield data, but the plot was considered a qualified success; it provided forage for the animals and grain for the birds. The final chapter will not be written on site B until the spring of 1988, when it will be ascertained if enough grain was produced to reseed and to provide forage and seed for another year.

### SITE C

The barley got off to a very slow start because the weather was abnormally cold in January (Table 1). In April and May, warmer than normal temperatures caused moisture stress in the barley. Animals and birds living along the river further reduced the already diminished yields. The results are shown in Figure 1, below. The yields are too low to be considered for commercial planting. However, a small strip through the field that had more moisture (perhaps from subbing from the river) produced beautiful, big barley heads. It is interesting to note that yields increased with seeding rate up to the highest rate; probably the optimal seeding rate would be much higher than the scope of this experiment. This site was harvested June 1, 1987.

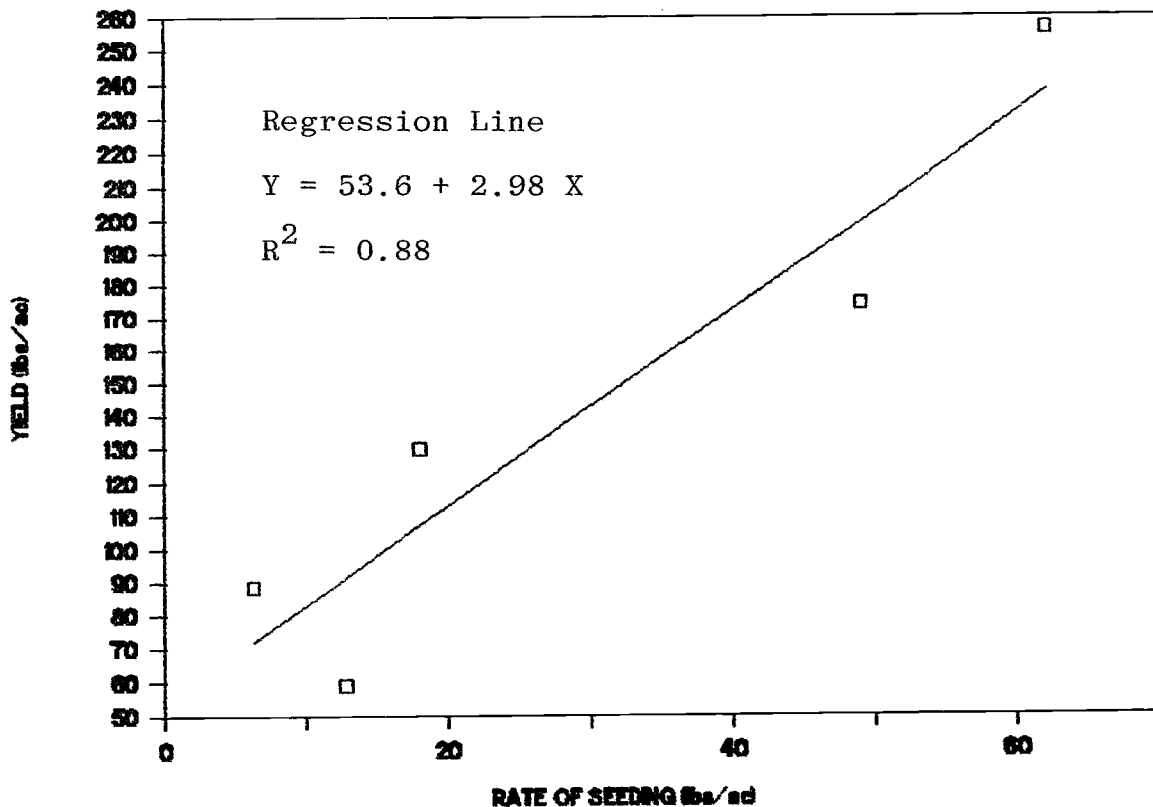


Figure 1. One-Irrigation Barley Yields vs. Rate of Planting on Russell Lundell Farm, Safford, Graham County 1987.

### SITE D

The temperature at this site should be quite close to the pattern seen in Table 1, since it is in the same air drainage system as Safford, though perhaps 2 to 5 degrees cooler because of the 1,000 foot difference in elevation.

Stands were established with both barley varieties at all rates of planting. Different rates of planting were achieved with the same drill settings for the two varieties because the late variety had a larger size seed.

The results of yields vs seeding rates are seen in Figures 2 and 3 for the early and late varieties, respectively. The highest yield for the early barley (Seco) was 1,843 pounds per acre at a seeding rate of 49 pounds per acre, after which the yields dropped off significantly. With the late barley (2-22-9), the yield went up to 1,462 pounds at a seeding rate of 26.1 pounds per acre: then it stayed about the same to the maximum seed rate of 43.5 pounds per acre. Under these conditions the two barley varieties had different yield potentials and different optimal seeding rates. The yields are too low for commercial production, but could probably be increased with proper fertilization. This site was harvested June 11, 1987.

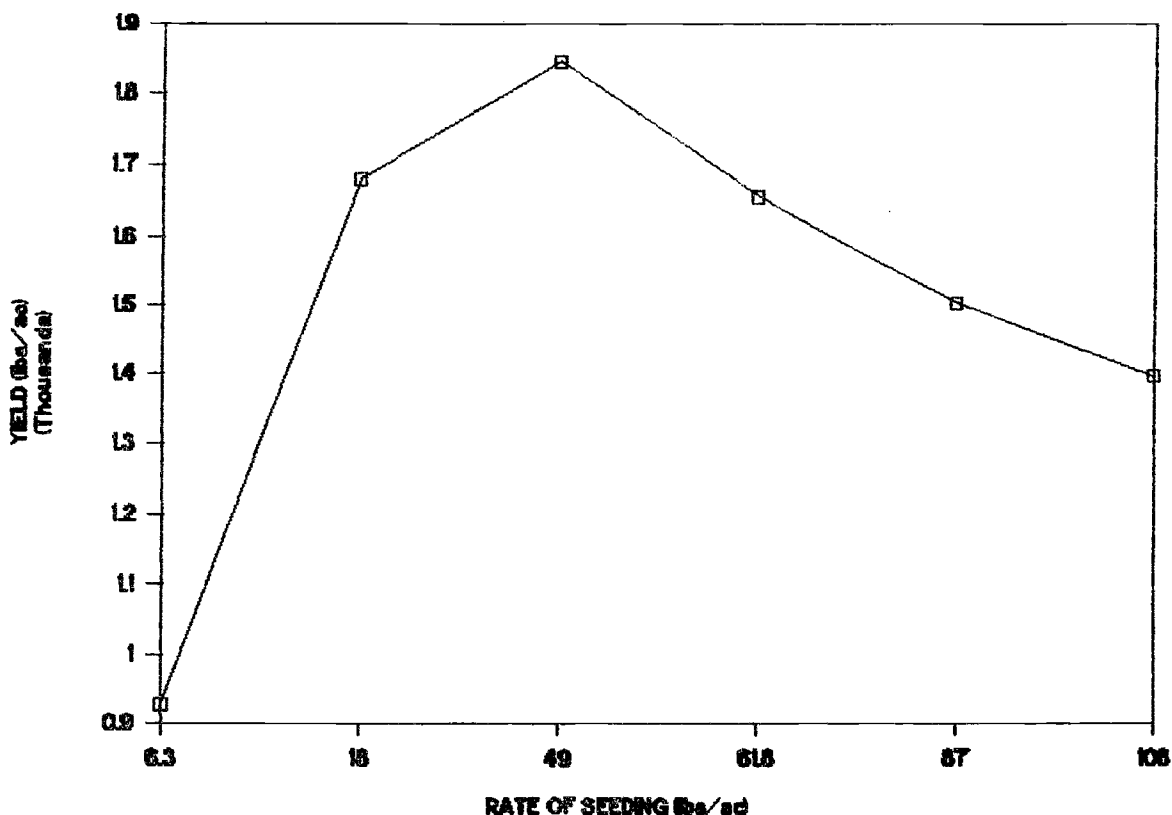


Figure 2. One-Irrigation Barley Yields of Seco vs Rate of Planting on John Chapman Farm, San Simon, Cochise County 1987.

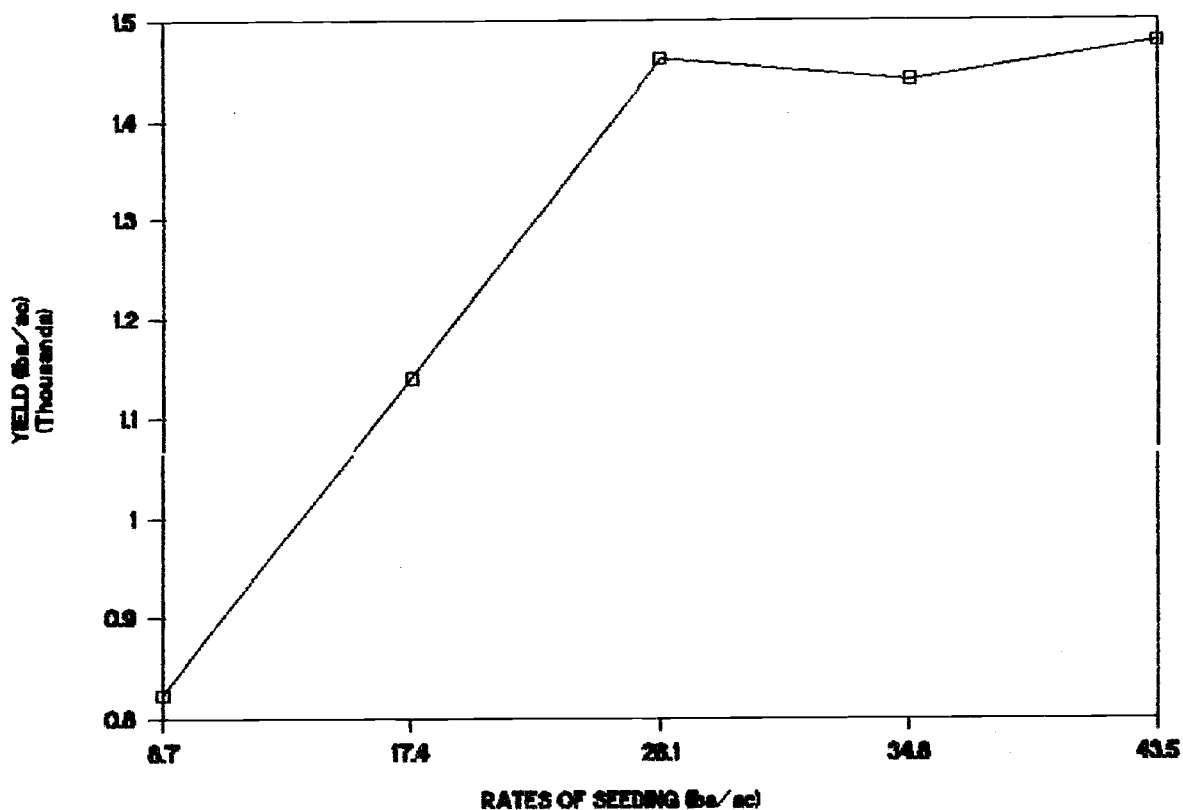


Figure 3. One-Irrigation Barley Yields of 2-22-9 vs Rate of Planting on John Chapman Farm, San Simon, Cochise County 1987.

## SITE E

The seeds planted into moist, prepared soil got off to a quick start; however, birds consumed more than half of the emerging seedlings. The seeds planted into unprepared ground were dug up and eaten before rain came to sprout them. The surviving plants were spaced about a foot apart in their rows. Deer, rabbits and javelina grazed on the plots next, so no forage nor grain production measurements were made. Observations were as follows; seed planted in the unprepared ground needed to be planted deeper for a better chance to germinate; more than 20 pounds of seed per acre would need to be planted to achieve a desirable stand. Rainfall (Table 2) alone or with the 2.5 acre inch pre-irrigation were inadequate to raise a crop; those areas receiving the most water produced the largest plants.

## ACKNOWLEDGMENTS

The following people are appreciated for their interest and help in this project. They provided land, equipment and time, and helped with planting, harvesting and making observations.

Pete Brawley, Hackberry Ranch, Graham county  
Ted McRae, Bureau of Land Management, Safford, Graham county  
Russell Lundell, Safford, Graham county  
Ed Barnes and John Chapman, San Simon, Cochise county  
Ron Orozco, SSVEC and homeowner, Cochise, Cochise county

## REFERENCE

1. Ottman, Ramage and Thacker. 1986. Seeding Rate of One-Irrigation Barley. Forage and Grain, Coop. Ext., Ag. Exp. Sta. Report Series P-66, Univ. AZ, Tucson. pp66ff.
2. Climatological Data. National Oceanic and Atmospheric Administration. Asheville, North Carolina.
3. Arizona Climate. 1960. Institute of Atmospheric Physics. University of Arizona, Tucson.