'Solum' Barley As A Low Input and Profitable Rotation Option

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Abstract

'Solum' barley was planted in four large acreage demonstration studies in Maricopa County from 1990-92. In two of the four demonstrations, a single fruit set cotton production strategy was implemented resulting in a double crop/rotation in the same year. Barley yields were 4672, 4460, 4305, and 4721 pounds per acre respectively. These yields were accomplished with 13-20 acre inches per acre of water both from irrigation and rainfall sources. All demonstrations resulted in a positive net return of from 150 to 200 dollars per acre. In addition, physical soil characteristics such as tilth, water holding capacity, and intake rate were significantly improved. A cotton yield of roughly two bales per acre was measured in one location with the 1992 yield to yet be determined.

Introduction

Low grain prices over the past several years has resulted in significant planting acreage decrease of small grains. Input production costs of traditional small grains have exceeded net returns resulting in an unprofitable production scenario. As a result, a great deal of cotton monoculture is practiced. There is speculation that lack of small grain production and resultant lack of sound rotation practices have also resulted in a steady decline of cotton yields. Monoculture practice can result in several long term production difficulties including lack of organic matter, disease and nematode increase, lack of weed competition, lack of crop diversity (economics), and a resultant long term cotton yield decrease.

'Solum' barley was developed in the breeding program of Dr. Thomas Ramage of the University of Arizona beginning in 1974. Solum was bred specifically for the North African coast where full utilization of 8-15 inches of winter rains would occur. Due to relatively low yields under rainfed conditions, Solum was never intended to be used widely under semi-arid Southwestern, high input, irrigated conditions. However, with changing conditions in Arizona agriculture, Solum barley appears to offer an economically viable option to result in a positive cash flow situation as well as many physical soil benefits.

Solum develops a deep root system (8 ft. or more) which enables the crop to essentially "mine" water and nutrients from deep within the soil profile. As a result, additional water and fertilizer inputs are minimized from the production standpoint. Solum is an early maturing variety coming off roughly one week earlier than Barcott and three weeks earlier than Gustoe. The earliness characteristics also result in less total input costs and some potential double crop options.

To come off on a timely basis in the spring, the recommended planting window is from November 20-December 5. It has been observed when this planting window is utilized, the crop will be harvest ripe (depending on spring weather) from mid-April to the first week of May. A low planting rate from 25-50 pounds per acre is feasible due to the excessive tillering and compensation potential. When planting on the flat, it is recommended to plant at 12-14 inch row spacing by plugging every other hole on the drill. When planting on beds, three rows per bed have produced excellent results.

The objectives of this study were to 1) determine economic and practical feasibility of using a short season, low input barley to result in positive cash flow and an economically feasible rotation, and 2) observe soil physical properties changes such as improvements in organic matter content and water holding capacity, and 3) note timing required to produce barley followed by a single fruit set cotton crop within the same calendar year.

Materials and Methods

Solum barley was planted in four large acreage field demonstrations 1990-92 in Maricopa County. Field sizes ranged from 28-70 acres. The demonstrations were conducted in Chandler, Litchfield Park, Waddell, and Gila Bend. Planting date ranges were from November 19 to December 10. Planting rates ranged from 25-30 pounds per acre. Two of the demonstrations were planted in borders and two on beds. As indicated, when planted on the flat, 12-14 inch row spacing was utilized and three seed rows per 38 inch row when planted on beds. The barley was dry planted and irrigated up with a deep establishment irrigation enabling a deep effective root zone of 6-8 feet.

In three of the four studies, no pre-plant fertilizer was applied. One site water ran approximately 50 pounds per acre of nitrogen in the establishment irrigation. In three of the four studies, a second irrigation was applied at the pre-boot growth stage in early March. Winter rainfall was much higher than normal in both 1990-91 and 1991-92 with rainfall totalling from roughly six to nine inches. This accounts for the lack of a second irrigation on the one study.

No additional inputs were required over the course of the growing season. Again, intentions were that of low input but yet profitable winter grain production. All studies were custom harvested the first week of May.

Results and Discussion

The results of these demonstration are extremely encouraging and offers an option to consider. In all four studies, total input costs were less than $100 per acre including land preparation, seed, irrigation, and harvest costs. Total water received, including rainfall, ranged from 15-20 acre inches per acre. Rainfall ranged from roughly 6-9 inches and should be considered in the overall water requirement of the crop.

Grain yields were 4305, 4460, 4672, and 4721 pounds per acre. In all cases, the grain was sold on the local market for a minimum of $6.00 per hundred pounds. As can be easily seen, net returns ranged from $150-180 dollars per acre resulting in greater than a 150 percent return on investment.

Conclusions

One of the first objectives of this program was to investigate the feasibility of a short season, low input barley to accomplish a double crop and a rotation all in the same year. It was felt that if the barley could result in a break even scenario, the organic matter and soil tilth improvement would be well worth the slight planting date delay of a cotton crop following the barley. However, in light of the late season insect pests including the whitefly encountered in 1992, late planted cotton is unacceptable.

However, a review of the positive aspects of Solum barley as a component of a diversified cropping pattern has merit. In all cases a positive cash flow was realized under limited input conditions. This diversification may offset some unexpected future crop losses. Without a doubt, all ground following the barley had increased water holding capacity and water intake rate as a result of the organic matter contribution and improved soil tilth.

All of these studies had heavy aphid infestations, although not detrimental to yields. As a result, high beneficial predator populations also built. This may offer an opportunity to carry the beneficials into subsequent summer crops resulting in biological insect control of early season pests.

Solum barley undoubtedly offers an opportunity to exercise rotation with a positive economic cash flow. Total cash inputs are minimal with both maximum economic and physical soil benefits. Although not developed and bred for traditional high input, high yield Arizona conditions, Solum can be of value with current agricultural conditions.

	Chandler	Litchfield	Waddell	Gila Bend
Planting Date	Nov 25, 1990	Dec 4, 1991	Nov 19, 1991	Dec 10, 1991
Planting Rate	25#/ac	30#/ac	28#/ac	30#/ac
Total Irr	11 in	8 in	12 in	12 in
Rainfall	5.8 in	8.5 in	8.8 in	6.5 in
Nitrogen	0#/ac	50#/ac	0#/ac	0#/ac
Yield	4672#/ac	4305#/ac	4460#/ac	4721#/ac
Input Costs	<$100/ac	<$100/ac	<$100/ac	<$100/ac
Net Return	$180/ac	$158/ac	$168/ac	$183/ac
Harvest	May 6, 1991	May 2, 1992	May 6, 1992	May 4, 1992