AGRICULTURAL PRODUCERS IDENTIFY BARRIERS TO IMPROVING WATER USE EFFICIENCY IN THE RIO GRANDE BASIN

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INTRODUCTION

Considerable research exists about technologies for promoting water conservation but very little information exists on farmer perceptions and institutions that act as barriers to water conservation. This is especially true for institutionally complex Rio Grande water resources that are shared by Colorado, New Mexico, Texas, and Mexico, and administered by numerous federal and state agencies and various private water user organizations. A survey of agricultural producers and water right holders in the Mesilla Valley in southern New Mexico was conducted to identify agricultural production and irrigation management practices and barriers, real and perceived, to the adoption of water use efficiency improvements. A random sample of 200 irrigators owning 2 acres or more of irrigated land from a total population of 8,300 irrigators receiving water from the Elephant Butte Irrigation District were surveyed. The responses provide insight into producer rationale for adoption or rejection of conservation measures and can be used to help guide the development of water use efficiency programs. Of particular note, producers responded that they had no interest in one of the most widely promoted policies to encourage water conservation.

BACKGROUND

Producers in the Elephant Butte Irrigation District receive annual allotments of surface water from the U.S. Bureau of Reclamation, Rio Grande Project. In a full water supply year, farmers are allotted 3 acre feet of water per acre. On some farms this is supplemented with ground water from the alluvial Mesilla Bolson. The climate is arid (Chihuahuan Desert) with an average, but highly variable rainfall of 8.5 inches. The dominant crops grown are pecans, alfalfa and cotton, on a total of approximately 78,000 irrigated acres. Typical seasonal water applications for these crops range from 5 acre feet per acre to 2.5 acre feet per acre. Virtually all water is applied by furrow or flood irrigation. Respondents reported applications of 4 inches per irrigation and an average of eight irrigations per season. This is less than previous reports of irrigation water use. Farmers were asked about both surface and ground water use, however, most wells are not metered and the quantity of ground water pumped is not measured. Table 1 provides a summary of respondent crops, water supply, land ownership and irrigation practices. Surface water released from Elephant Butte Reservoir takes three to four days before it is delivered to farm fields, complicating scheduling and some efficiency management practices. After more than 20

years of full water allotments, several years of severe drought have hit the region hard. Total inflows to the reservoir last year were only 11% of the 30-year average. The water allocation to farmers by planting season in early spring was just 3 inches per acre and the forecast allocation for the year is projected to be 50% or less of a full supply. The need for and importance of conserving water was certainly evident during the period the survey was being conducted.

IRRIGATION MANAGEMENT AND BARRIERS TO CONSERVATION

The survey included questions on the use of irrigation scheduling methods, current water management practices, producer management changes in response to drought induced reductions in water availability, reasons for not reducing current water use, and interest in financial incentives to conserve water. Scheduling irrigations to best meet crop needs can be an effective way to conserve water. Respondents were provided a list of methods or devices that can be used to determine whether or not irrigation is needed. Methods included soil probe/soil sampling, tensiometers, electric resistance blocks, neutron moisture probes, feel method infrared/canopy temperature, and irrigation records. The majority used feeling and looking at soil to determine the timing and amount of water to be applied. A small percentage of irrigators used more sophisticated water conservation methods such as tensiometers, computerized irrigation scheduling, or crop consultants.

Interestingly, more than 86% responded that they would make no change in water management practices if supplies were reduced by one-third, from three to two acre feet (Table 2). Even if supplies were reduced two-thirds, to only one acre foot, almost half said they would not change practices. The other respondents said they would deficit irrigate, line ditches, meter, drip irrigate, and laser level fields to conserve water. Only two percent said they would change crops and none responded that they would change irrigation scheduling. With supplies so low this year, one can only wonder how irrigation scheduling will not change or be selected by default.

Surface water deliveries by the District to farmers are typically based on records of field size and time of diversion. In many cases farmers do not know the exact quantity of water applied to their crops because surface and ground water irrigations have not been metered. Recently, Elephant Butte Irrigation District introduced a surface metering program where water use is measured, the information is downloaded for access and water use quantities are shown and billed to irrigators. However, irrigators currently participating in the program cite the expense of meters ($200 to $700 each) as a limit to more widespread adoption.

Water pricing and transfers are widely promoted as effective methods to encourage water conservation. Various institutions set the rules governing if and how water can be transferred. These institutions significantly influence the ability and desirability of water transfers. EBID irrigators are assessed $50 per acre per year for the right to use an initial allotment (typically 2 acre feet per acre or $25 per acre foot), determined each year on the availability of water in Elephant Butte Reservoir. Farmers were given a scenario that if their water could be sold at a guaranteed price ($200 and $400) this year and indefinitely would they change any of their current irrigation methods, technology, and management practices. Most said they would not change their current water management practices. Many responded that the amount of land they irrigate was not large enough to make any capital investments in irrigation efficiency. The

financial incentive of saving a small amount of water at those prices would not give them a large enough return on their investment and labor expenses. All (100%) declined when asked if they would take advantage to permanently sell part or all of their water. This could be answered in part because 100% also responded they could not find a buyer for saved water. A few respondents (1.1%) stated that if given the opportunity to sell on a yearly basis they would. Additionally, respondents were asked why they would not reduce current water use. Most stated they need all the water they currently receive.

CONCLUSIONS

Although almost all respondents acknowledge that water conservation is important, our survey indicates that most agricultural water users in this area do not measure the quantity of water they apply and use low technology methods for determining irrigation scheduling. The perception is that the water savings and benefit of measurement will not exceed the costs. The majority of respondents said they would not change water management practices even when faced with moderate to severe reductions in available surface water supplies.

Despite widely promoted water transfers and markets as methods to encourage conservation, the opportunity to sell or rent water, even at prices of up to $400 per acre foot, seem to have little effect on willingness of agricultural producers in this region to invest in water conservation measures. We may be seeing the well-known 'water is different' phenomenon, in which the cultural attachment to existing water rights and use patterns in agriculture is higher than potential selling prices of water, even for prices up to $400 per acre foot.

As the severe drought continues into summer 2003, several hypotheses present themselves that should be tested. Small numbers of irrigators reported that they would install concrete lined ditches, meters, and drip irrigation systems in an attempt to conserve water. Where surface water shortages occur, many plan to pump groundwater rather than reduce either water use per acre or take land out of production. Where both surface water and groundwater supplies are reduced some producers say they will attempt to maintain crop yields by irrigating fewer acres.

Among all agricultural activities in this area, pecan trees appear to produce the greatest economic value per acre of land and possibly the greatest value per foot of water. Pecan growers will likely pay almost any price needed to keep their trees in production because of the very high damages associated with losing those trees. As the 2003 drought continues we would expect water use in agriculture to shift into pecans at the expense of most other crops.

Table 1: Crops, Land Ownership, Water Source and Irrigation Practices						
Crop Types	Total Acres (%)	Land Ownership	Water Source	Average Water Applied per Irrigation	Number Irrigations Per Season	Method to determine Irrigation
Pecans	43%	O (100%)	D (55%) B (45%)	3.7 inches	7.9	Feel
Alfalfa	34%	O (79%) L (21%)	D (79%) B (21%)	3.3 inches	8	Feel
Cotton	15%	O (40%) L (60%)	D (71%) B (29%)	2.9 inches	5.4	Feel

Land Ownership: O = Personally Owned; L = Leased
Water Source: D = Ditch Water Only; W = Well Water Only; B = Both Ditch and Well Water

Table 2: Drought Induced Response in Water Management Practices		
How will you change your water management practices if your water supply is reduced	3 acre feet to 2 acre feet available supply	3 acre feet to1 acre foot available supply
No change	86.8	48.3
Deficit Irrigation	0.0	14.2
Concrete Lined Ditches	2.2	12.0
Metering	0.0	7.6
Drip Irrigation	4.4	5.4
Laser Leveling	1.1	4.4
Micro Sprinkler	2.2	3.3
Crop Changes	1.1	2.2
Fallow/Rest Land	1.1	1.1
High Flow Turnouts	0.0	1.1
Irrigation Scheduling	1.1	0.0

Survey answer as a percentage of responses.

Table 3: What Are Barriers to Water Conservation		
Response	Yes (percent)	No (percent)
I need all the water I receive	52.7	47.2
Water Conservation is too expensive	14.2	85.7
Water conservation takes too much labor	10.9	89.0
Build up of salts in the soil.	9.8	90.1
No financial incentive	4.4	95.6
Distribution system restricts me from conserving water.	3.3	96.7
On-going adjudication process	1.1	98.9
I cannot find a buyer for my saved water	0.0	100.0