



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Estimating the Value of Irrigation Scheduling

Shyam Nair

Sam Houston State University
PO Box 2088
Huntsville, Texas 77341
(936) 294-1193
shyam.nair@shsu.edu

Steve Amosson

Texas A&M AgriLife Extension Service
6500 Amarillo Blvd W
Amarillo, Texas 779106
(806) 677-5600
samosson@ag.tamu.edu

Selected Poster prepared for presentation at the Southern Agricultural Economics Association's 2016 Annual Meeting, San Antonio, Texas, February 6-9, 2016

Copyright 2016 by Shyam Nair and Steve Amosson. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

INTRODUCTION

The Northern High Plains (NHP) of Texas is home to more than a million acres of irrigated crop production. Corn is the most important crop in the region and accounts for almost 40% of the irrigated acreage (USDA NASS, 2015). Corn is also the major water user in the region with about 60% of the region's total irrigation water being used for corn production (Freese and Nichols Inc., 2015).

Since this area is dependent on the Ogallala Aquifer for irrigation water, the diminishing water availability from the Aquifer is making the adoption of more water efficient irrigation practices necessary. Management techniques such as irrigation scheduling and deficit irrigation are critical for sustaining irrigated agriculture in the region.

Although optimal irrigation scheduling can enhance profits, it also has some associated costs. Understanding the economic value of irrigation scheduling will enable the producers to assess the associated costs and returns and make informed decisions. Hence, the objective of this study was to estimate the value of irrigation scheduling for corn in NHP of Texas.

METHODOLOGY

- Irrigation quantity and corn yield data from the "200-12 Demonstration Project" during 2012-2014 were used for the analysis (NPGDC, 2015)
- The project had both demonstration plots (optimal irrigation scheduling followed) and side-by-side control plots (farmer's practices followed) during these years
- Since the corn production function is approximately linear at the levels of irrigation used in the region (Marek et al., 2011), production per acre-inch of irrigation from the demonstration and control plots were compared to estimate the value of irrigation scheduling, assuming constant marginal productivity
- The increase in profitability was estimated from the increase in yield per ac-inch considering corn prices during those years and additional cost for harvesting and hauling
- The corn budgets for the respective years were used as guidelines for profit calculation (Texas A&M AgriLife Extension, 2015) and Returns Above Direct Expenses (REDE) per acre-inch from the demonstration and control plots were also compared

Table 1. Average irrigation, yield, and yield/ac-inch for demonstration and control plots

Year	Control			Demonstration			% change in yield /ac-inch irrigation
	Irrigation (ac-inch)	Yield (lbs./acre)	Yield / unit irrigation (lbs./ac-inch)	Irrigation (ac-inch)	Yield (lbs./ acre)	Yield / unit irrigation (lbs./ac-inch)	
2012	21.85	157.67	7.22	18.21	143.78	7.89	9.40%
2013	23.37	224.09	9.59	18.36	200.18	10.90	13.69%
2014	20.12	215.20	10.70	17.56	198.30	11.27	5.39%
All data	21.83	201.20	9.22	18.06	182.63	10.11	9.72%

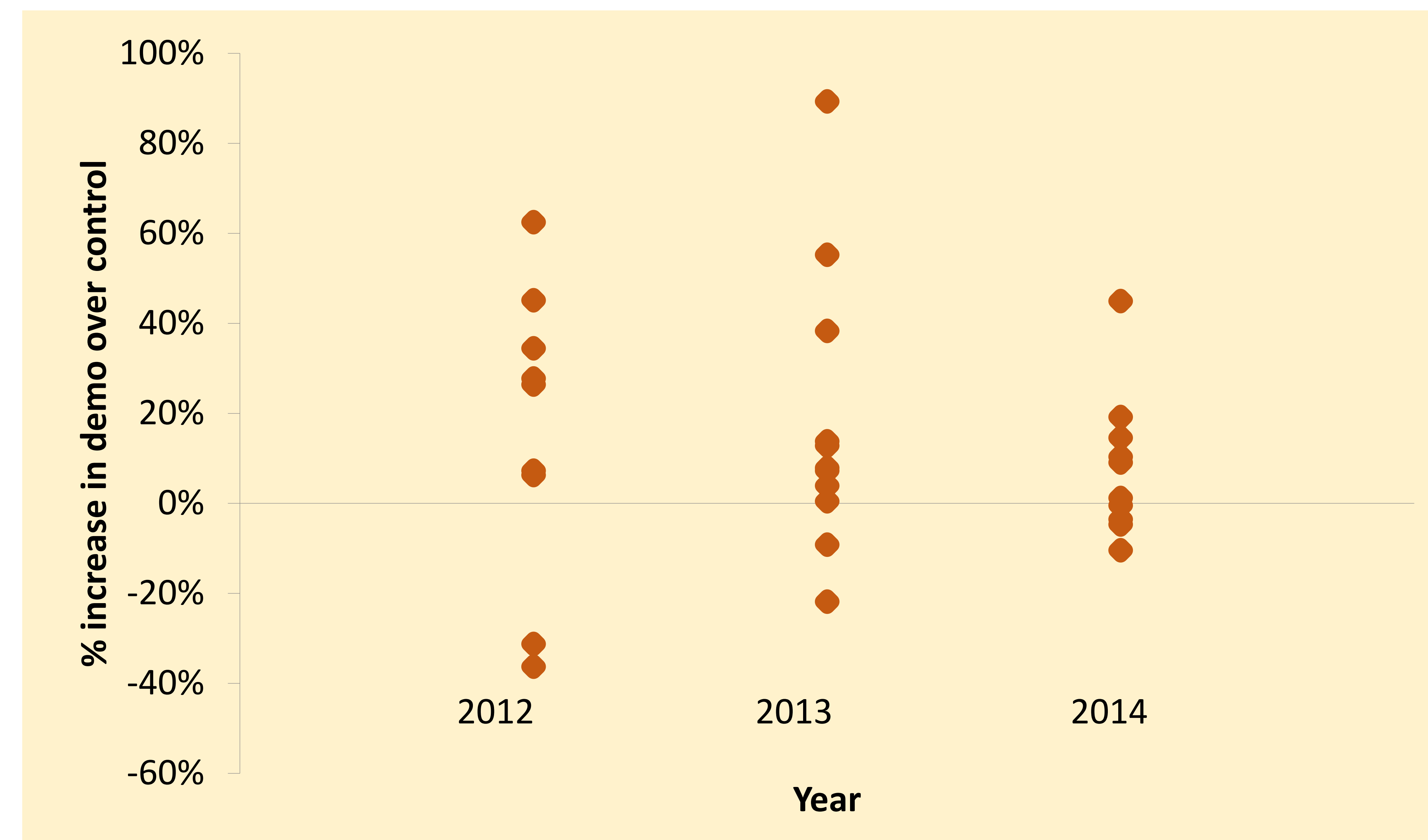


Figure 1. Percentage increase in yield /ac-inch for demonstration over control plots

Table 2. RADE/acre-inch for demonstration and control plots

Year	Returns/ac-inch (control)	Returns/ac-inch (demo)	Increase in returns (demo over control)	% increase in returns (demo over control)
2012	\$23.34	\$25.39	\$2.05	8.78%
2013	\$22.34	\$25.24	\$2.90	12.98%
2014	\$17.11	\$17.32	\$0.21	1.23%
All data	\$21.03	\$22.71	\$1.68	7.99%

RESULTS

- Overall, the demonstration plots used 18.06 ac-in of irrigation to produce 182.63 bu. of corn per acre, while the control plots produced 201.20 bu. of corn per acre with 21.83 ac-in of irrigation (Table 1)
- On average, science-based irrigation scheduling resulted in a 9.72% increase in corn yield per acre-inch of irrigation water applied compared to the farmers' practice (Table 1)
- Considering the average yield (182.63 bu./acre) and price (\$5.57/bu.) over these years, a 9.72% yield increase translates to \$91.22/acre revenue increase after adjusting for additional cost for harvesting and hauling (\$0.41/bu.)
- The percentage increase in yield per ac-in for demonstration over control showed a decreasing trend for values above zero from 2012 to 2014. This suggests that producers may be learning about proper irrigation scheduling, and their practices became more efficient with respect to the control over the course of the trial (Figure 1)
- Return for the demonstration was 7.99% higher than control, and would increase to 10.88% if the unusually low value observed in 2014 were disregarded (Table 2)
- The average RADE, considering both the demo and control plots, was \$434.75 per acre. Thus, a 7.99% increase in RADE translates to a gain of \$34.73 per acre, while an increase of 10.88% would result in a gain of \$47.30 per acre

CONCLUSIONS

Sound irrigation scheduling practices increased net returns for corn producers in Texas NHP. The value of irrigation scheduling depends on corn prices, the amount of irrigation water available, and the resultant yield. The producers seem to learn from the demonstration project and use the knowledge to refine irrigation scheduling.

REFERENCES

- Freese and Nichols Inc. 2015. Initially Reported Plan for the Panhandle Water Plan. Panhandle Regional Planning Commission, Amarillo, Texas. April 2015. Available at <http://www.panhandlewater.org/>.
- NPGDC. 2015. 200 Bushels of Corn on 12 inches of Irrigation Water Demonstration Project 2012. North Plains Groundwater Conservation District. Project report available at <http://www.northplainsgcd.org/education/200-12-project.html>
- Texas A&M AgriLife Extension. 2015. Crop budget for strip tilled Bt corn for district 1. Available at <http://agecoext.tamu.edu/files/2013/08/btcorngst1.pdf>
- Marek, T.H., D.P. Porter, N.P. Kenney, P.H. Gowda, T.A. Howell, J.E. Moorehead. 2011. Educational Enhancements to the Texas High Plains Evapotranspiration (ET) Network. Technical Report to the Texas Water Development Board, Austin, Texas. Texas AgriLife Research, Amarillo, Texas. AREC publication 2011-8. 34p.