JOURNAL OF THE NACAA

ISSN 2158-9429

VOLUME 14, ISSUE 1 - JUNE, 2021

Editor: Donald A. Llewellyn

SUGARCANE PRODUCTION SCHOOL ESTABLISHED FOR THE LOUISIANA SUGAR INDUSTRY

Orgeron, A.J., Area Pest Management Specialist, LSU Agcenter
Cater, M.W., Evaluation Specialist, LSU Agcenter
Gravois, K.A., Sugarcane Specialist, LSU Agcenter
Wilson, B.E., Sugarcane Entomologist, LSU Agcenter
Deliberto, M.A., Sugarcane Economist, LSU Agcenter
Salassi, M.E., Associate Vice President of Agriculture, LSU Agcenter

ABSTRACT

Based on stakeholder interactions, Louisiana sugarcane producers made known a need for continuing education. In 2017, a sugarcane production school for producers was conceptualized, designed, conducted, and evaluated by sugarcane extension educators with the Louisiana State University Agricultural Center. A primary focus of the program delivered a robust, deep learning opportunity of sugarcane production practices for participants. The school was comprised of five, 2-day, concurrent sessions conducted in the months of March, April, May, July, and September. Participation was limited to 26 students and was contingent upon acceptance and a $1,000 fee. Participants were administered a pre-test and post-test survey to evaluate knowledge of sugarcane production practices, which showed a statistically significant increase following participation in the school. This information was used to adjust and improve the school, which was held the following year.

INTRODUCTION

Sugarcane is an economically important agricultural crop for Louisiana and is ranked as the state's most valuable row crop (Louisiana State University Agricultural Center, 2019). In 2019, sugarcane was produced on 482,000 acres in 24 Louisiana parishes (Deliberto et al., 2020). Sugarcane is also produced in the states of Florida and Texas; however, many aspects differ among these industries, particularly, production in Louisiana is characterized by family farming operations, in contrast to the corporate farm model in Florida.

Periodically, needs assessment surveys are conducted within the Louisiana sugarcane industry to ensure the educational needs of producers are met. Gravois (2017) conducted such a survey in 2016 and reported that 76% of the respondents indicated that they used knowledge gained from the LSU AgCenter's Sugarcane Extension outreach program when making decisions regarding their farming and/or milling operation. The survey also indicated that producers preferred person-to-person interactions, especially when the decision involved great expense. Maintaining a good web site was also deemed important. Sugarcane production extension education opportunities have principally involved farm visits, parish-wide and regional producer meetings and field days, as well as electronic and written communications, from county agents and state specialists. These outreach methods provide a platform to deliver timely information; however, the structure of producer meetings and field days limits presentations to 15 – 20 minutes per topic, thus limiting the capacity for deep learning.

The genesis of the School resulted from a sugarcane producer asking the general manager of the American Sugar Cane School about the fate of a former Sugarcane Production School once conducted by faculty at Nicholls State University, Thibodaux, LA. In January of 2017, stakeholder discussions were expanded to include representatives from the LSU AgCenter, the American Sugar Cane League, and the Louisiana Farm Bureau's Sugar Advisory Committee. Need, priority and a functional platform were discussed to meet the need for Louisiana sugarcane producers to have a more robust opportunity for deep learning of sugarcane production practices. The concept of a Sugarcane Production School for new or beginning producers was developed as a result.

MATERIALS AND METHODS

In January 2017, the Sugarcane Production School Planning Committee was formed and was comprised of the sugarcane specialist and other discipline specialists from the LSU AgCenter, the general manager and senior agronomist from the American Sugar Cane League, and members of the Louisiana Farm Bureau's Sugar Advisory Committee. The committee proposed a broad range of topics to be covered in the school (Table 1).

Table 1. Proposed Sugarcane Production School topics suggested by the Sugarcane Production School Committee.

Proposed Topics:	
Variety development	Sugar policy and political activities
Cultural practices	Insects and their control
Fertilization, soil testing, and liming	Precision agriculture
Harvesting philosophy	Diseases and their control
Business management	Environmental and other regulations
Drainage and irrigation	Government programs
Weed biology and control	History of the industry
Immigration labor policy and procedures	

To participate in the school, interested individuals were required to fill out an application, and if chosen were required to pay a $1,000 fee. Participation was limited to 26 students. The school created interest beyond that of sugarcane producers, which included raw sugar factory employees/board members, landowners, and county agents. One county agent participated in the school at no cost. The school was comprised of five, 2-day, concurrent sessions. Sessions were designed as not to keep producers from their farming operation for more than a two-day period per month, and sessions were conducted in the months of March, April, May, July, and September. Each class was seven hours long and was comprised of four to five lessons on various topics. Class sessions were about equal portions of classroom teaching and hands-on laboratory experience. Participants were given two recess periods and provided lunch, along with encouragement to better acquaint themselves with fellow participants.

Prior to the first meeting, a survey was developed to collect demographical information on participants, as well as to assess program participants' perceptions of knowledge for 39 topics (n = 24 respondents). The topics were grouped into seven areas of concentration: sugarcane production, plant pathology, soils, economics, entomology, agricultural technology, and post-production concepts. Given the extremely small sample size and the large number of test items, factor analysis was not possible. Mean values were computed for each of the seven areas of concentration. Paired samples t-tests were used to determine if the change in mean values from pretest to posttest was statistically significant. An a priori alpha level of 0.007 was set to correct for multiple comparisons.

RESULTS AND DISCUSSION

The largest percentage of respondents had a 4-year college degree (f = 8; 53.3%), with the remaining respondents reporting completion of high school (f = 4; 26.7%), completion of a 2-year college degree (f = 1; 6.7%), completion of a master's degree (f = 1; 6.7%), or completion of a doctoral degree (f = 1; 6.7%). The education level of the respondents ranged from high school graduate to doctorate degree, with 42% reporting the highest level of education being high school graduate and 42% reporting a 4-year college degree (Table 2).

Table 2. Highest level of education for the participants[1] in the Sugarcane Production School.

Highest Level of Education	Frequency	Percentage
High School Graduate	10	42
2 Year College Degree	2	8
4 Year College Degree	10	42
Master's Degree	1	4
Doctorate Degree	1	4

[1] 24 of the 26 participants responded to the survey.

The average age of the respondents was 31.27 (±9.11 years; *Range* 19-49 years). Most respondents were male (f = 14; 93.3%). 80% of the respondents were 35 years of age or less, and the oldest participant was 49 years of age (Table 3).

Table 3. Age of the participants[1] in the Sugarcane Production School.

Age	Frequency	Percentage
19	2	8
20	2	8

23	4	17
26	3	13
27	1	4
28	3	13
33	3	13
34	1	4
36	1	4
40	1	4
44	1	4
45	1	4
49	1	4

[1] 24 of the 26 participants responded to the survey.

Sugarcane farming experience also varied among respondents, and 74% had l0-years or less farming experience (Table 4). Respondents averaged 6.43 years of farming experience (±6.98 years; *Range* 0-11 years).

Table 4. Years of sugarcane farming for the participants[1] in the Sugarcane Production School.

Years of Sugarcane Farming	Frequency	Percentage
0	2	9
1	2	9
2	4	17
4	2	9
5	1	4
7	2	9
8	2	9
9	1	4
10	1	4
14	1	4
17	2	9
20	2	9
22	1	4

[1] 23 of the 26 participants responded to the survey.

The largest percentage of respondents farmed more than 2000 acres (*f* = 8; 57.1%). The remaining respondents farmed 0-500 acres (*f* = 3; 21.4%), 1501-2000 acres (*f* = 2; 14.3%), or 1001-1500 acres (*f* = 1; 7.1%) (Table 5). Respondents reported very little or no change in sugarcane yield over the last 4 years (*f* = 5; 38.5%), 10% or less increase (*f* = 5; 38.5%), 11%-20% increase (*f* = 2; 15.4%), or less than 10% decrease (*f* = 1; 7.7%).

Table 5. Farm size of the participants[1] in the Sugarcane Production School.

Farm Acreage	Frequency	Percentage
0-500	3	13

501-1000	1	4
1000-1500	3	13
1501-2000	3	13
>2000	13	57

[1] 23 of the 26 participants responded to the survey.

There were 15 matched pretest/posttest responses garnered from the 2017 Sugarcane School evaluation. Perceived knowledge constructs were developed from the pretest/posttest survey responses and were categorized by area of concentration, namely sugarcane production, plant pathology, soils, economics, entomology, agricultural technology, and post-production concepts (Table 6). The survey evaluation scale ranged from 1 to 10, where 1 represented a complete lack of knowledge and 10 represented a complete understanding of the subject area.

Table 6. Mean values and standard deviations for the 39 items on the pretest and posttest sugarcane school survey.

Items	Pretest		Posttest	
	M	***SD***	***M***	***SD***
Botany of Sugarcane	2.93	1.75	5.80	1.61
Growth and Physiology of Sugarcane	4.21	2.04	6.47	1.51
Variety Development in Sugarcane	3.87	2.17	7.07	1.79
Sugarcane Variety Identification	4.60	2.56	6.27	1.94
Molecular Breeding in Sugarcane	1.92	1.55	4.93	1.62
Cultural Practices of Sugarcane	5.00	3.16	7.87	1.51
Planting Sugarcane	6.13	2.17	8.33	1.54
Row Spacing effect in Sugarcane Production	5.07	2.19	6.67	1.35
Harvesting Sugarcane	6.47	2.53	8.27	1.28
Sampling Sugarcane at the Mill and the Core Lab	4.08	1.75	5.93	1.67
Seed-cane	4.73	2.55	7.07	1.67
Principles of Conducting Sugarcane Research	2.80	2.21	6.93	1.71
General Principles of Weed Control	4.73	2.71	7.27	1.39
Spring Weed Control in Sugarcane	4.73	2.74	7.60	1.50
Plant Disease in Sugarcane	3.53	2.03	6.67	1.05
On-Farm Management of Sugarcane Diseases	3.87	2.20	6.87	1.68
Properties of Herbicides Used in Sugarcane	4.13	2.03	7.00	1.60
Sprayer Calibration for Use in Sugarcane	4.53	2.67	7.27	1.53
Sugarcane Herbicide Options at Planting	4.40	2.47	7.27	1.67
Chemicals Used to Aid Sugarcane Maturation	4.80	2.68	7.80	1.26
Basic Soils Concepts	4.07	2.05	6.80	1.61
Soil Health in Sugarcane	4.07	2.15	7.00	1.13
Precision Agriculture for Sugarcane	4.13	2.29	6.93	1.87
Overall Economics of the U.S. Sugar Industry	3.73	1.94	6.60	2.10
Production Cost Concepts of Sugarcane	3.93	2.40	6.40	1.92
H2A & H2B Labor Programs	4.40	2.61	6.80	2.11

Items	Pretest		Posttest	
	M	*SD*	*M*	*SD*
Farm Decision Analysis Principles	4.13	2.50	6.47	1.64
Farm Planning	4.73	2.43	7.07	1.83
Farm Record Keeping	4.87	2.42	7.27	1.71
Relationship Between Crop Cycle Length	4.47	2.13	6.93	1.39
Sugarcane Leases	4.53	2.29	6.47	2.07
Sources of Market Information for Sugarcane	3.60	2.03	6.73	1.79
Sources of Industry Information for Sugarcane	3.93	2.28	6.73	2.15
Sugarcane Entomology	2.80	2.11	5.87	2.07
Insect Scouting in Sugarcane	3.20	2.27	6.20	1.57
Use of Field Map Software	3.27	2.43	5.93	1.53
Fire Weather Forecasts	3.73	2.43	6.47	2.03
Sugar Refining	2.87	1.36	6.20	1.15
Sugar Marketing	2.93	1.98	6.20	1.42

Pretest results across all areas of concentration ranged from a mean value of 2.90 for post-production concepts to 4.34 for plant pathology and means for the posttest survey ranged from 6.03 for entomology to 7.22 for plant pathology (Table 7). Changes in perceptions of knowledge from pretest to posttest were statistically significant for all seven areas of concentration.

Table 7. Mean values, standard deviations, *t*-values, degrees of freedom and *p*-values for sugarcane school areas of concentration.

Perceived Knowledge Constructs	*M*	*SD*	*t(df)*	*p*
Sugarcane Production Posttest	6.80	0.94	5.81(14)	< .001
Sugarcane Production Pretest	4.33	1.84		
Sugarcane Plant Pathology Posttest	7.22	1.14	5.94(14)	< .001
Sugarcane Plant Pathology Pretest	4.34	2.20		
Soils Posttest	6.91	1.33	5.50(14)	< .001
Soils Pretest	4.09	2.06		
Economics Posttest	6.75	1.64	5.99(14)	< .001
Economics Pretest	4.23	1.93		
Entomology Posttest	6.03	1.70	6.11(14)	< .001
Entomology Pretest	3.00	2.11		
Ag Technology Posttest	6.20	1.58	6.31(14)	< .001
Ag Technology Pretest	3.50	2.27		
Post-Production Posttest	6.20	1.24	6.98(14)	< .001
Post-Production Pretest	2.90	1.56		

*α set to 0.007 *a priori* to adjust for multiple *t*-tests. The table presents the means and standard deviations for each item (n = 39) at pretest and posttest.

CONCLUSIONS

This concept of developing formal, classroom educational extension programs is a sound method for increasing knowledge for new and beginning agricultural producers and others who desire to further their education related to sugarcane production in Louisiana. One of the greatest challenges that extension educators involved in this program experienced, was development of technical content that could be mastered by all participants, regardless of their educational level. The small class size allowed for networking opportunities for the participants as well as the extension educators. Participants also reported that the school's format allowed for the time away from their operation to be minimal, thus when developing this type of formal classroom instruction, it is imperative to ensure the school is conducted in a way to minimally interfere with busy times of year on the farm and to minimize time away from operations. Because of the success of the 2017 sugarcane production school and continued demand, a second school was conducted in 2018.

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