2020

Irrigated Cotton Farm Management Competition Report

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Introduction

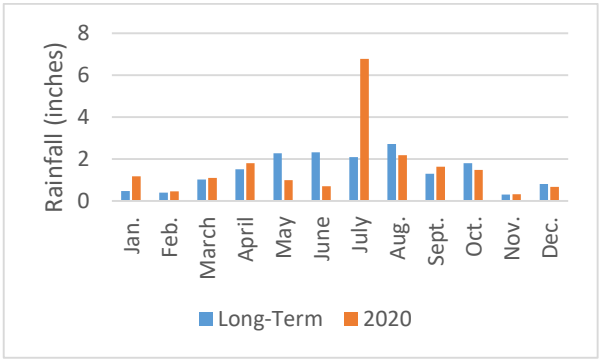
The Testing Ag Performance Solutions (TAPS) program hosts farm management competitions that promotes profitability and efficiency through peer-to-peer interaction. The program hosted 3 competitors in the subsurface drip irrigated (SDI) cotton competition at the Oklahoma Panhandle Research and Extension Center (OPREC) near Goodwell, OK. The competitors were assigned farms numbered 1-3 with the 4th farm being management by our extension team. Farm 5 served as the check treatment and received no irrigation after first square. Each farm was replicated in plots on our SDI systems. The TAPS competition allows growers and/or crop consultants to compete against each other as well as against University extension specialists within the same field for most profitable, and highest efficiency for water and nitrogen (N) fertilizer.

Approach

The contestants were responsible for 4 management decisions, including irrigation scheduling; variety selection, seeding rate, and growth regulator application rates. Each team's decisions were implemented on 4 randomized zones of our SDI system in a split plot design. Four rows of each plot were planted to the participants selected variety and seeding rate, and the other 4 rows were planted at a seeding rate of 45,000 seeds/acre of NG 2982 B3XF. The staff of Oklahoma Panhandle Research Extension Center managed all farm plots. The costs for each farm were recorded and lint yield and quality were measured. A soil moisture probe was provided for each farm to monitor soil profile moisture and weekly crop progress reports were provided to the participants.

2020 Results

The 2020 growing season was another challenging year for irrigated crop production in the Oklahoma Panhandle with dry and warm weather in the early season, with high winds. The OPREC received near normal rainfall during March and April but was 1.3 and 1.6 inches below normal during May and June. This combined with high winds, low humidity and a depleted soil profile from the prior crop required that irrigation be applied after planting to germinate the cotton. Therefore, each treatment received 3.25 inches of irrigation between May 14 which was the planting date and June 4. Soil profile moisture sensors suggested that this increased profile stored water but did not result in drainage below 4 ft. Participants were give opportunity to irrigate on July 2 when the crop began to square and were allowed to dictate irrigation rates every three days until the irrigation season was completed on September 2.



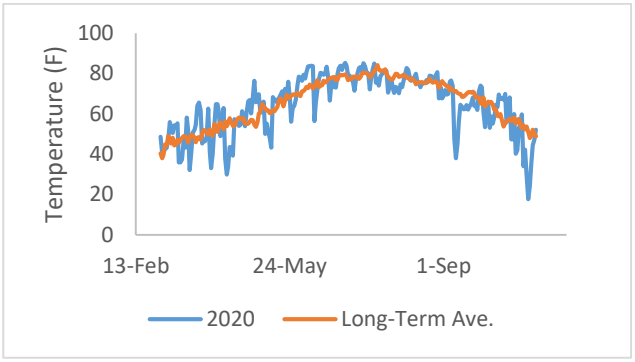


Figure 1: The 2020 and average long-term temperature and rainfall at Goodwell, OK Mesonet.

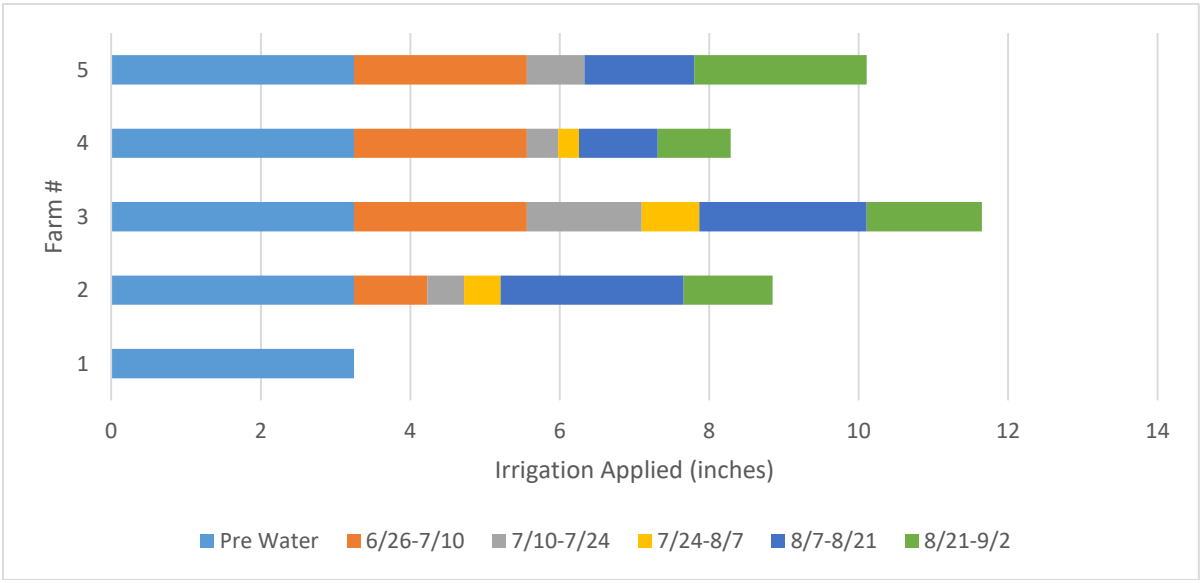


Figure 2: Irrigation Water applied for each corn farm during the irrigation season, which started with pre water on May 20 and ended on Sept 2. OSU Extension managed farm 2 and farm 1 is the check that received no water after pre water. The total length of bar represents total irrigation applied.

Figure 2 shows the irrigation applied by the three participants and the OSU extension team (farm 2). Farm 3 applied the most irrigation during the season. Along with other 2 participants Farm 3 applied. 2.31 inches of irrigation before 7/10. Furthermore, farm 3 continued to irrigate at levels beyond those applied by any other farm through 8/7. Farm 3 then applied similar amounts of irrigation after 8/7 as was applied to the Extension Team farm 2. Despite the variation in the total amount and distribution of irrigation among the farms none of them applied irrigation in excess of that suggested by the difference between the mesonet estimated ET and rainfall. In fact, between July 1 and Sept. 1 the deficit based on this difference was 8.6 inches. So although the irrigation applied by farms 3-5 during the early part of July did appear to cause drainage as observed on the soil moisture probes. The seasonal total irrigation was still below water deficit as estimated by ET and rainfall for all treatments. In fact, farm 2, 3, 4, and 5 only applied 65, 98, 59 and 80% of the estimated deficit.

Comparing the lint yields achieved by the standard variety in figure 3 we see that farm 2 and 3 optimized yields for this variety with no significant difference between their yield and the farm 5 yield. When comparing irrigation treatments, it is important to evaluate the standard variety because of the gross differences in the productivity of the participant varieties. The suppressed yield in farm 4 is particularly interesting because this farm chose to irrigate with 2 inches (which replaced only 30% of the estimated deficit) between 8/7 and 9/1 as compared to the other farms that applied 3.8 inches (which replaced 60% of the deficit). Visual observations in late August suggested that plants on farm 4 were under much more water stress than remaining farms.

The lint yield for participant varieties were optimized on farm 3 but was not significantly different from farms 4 and 5. The variety selected for farms 1 and 2 produced the lowest yield among the farms. All varieties were subjected to 2,4-D drift as was apparent on the standard variety, and farms 2 and 4 participant varieties. Farms 3 and 5 selected 2,4-D resistant varieties and did not appear to suffer from any dicamba or other auxin injury. Table 1 shows the varieties used for each farm and the standard variety used on each farm. Recall that the standard variety was also treated with the same pix applications on each farm and the participant varieties (figure 4) were treated with the participants chosen pix treatment so it is not possible to separate the impact of variety from the impact of the pix.

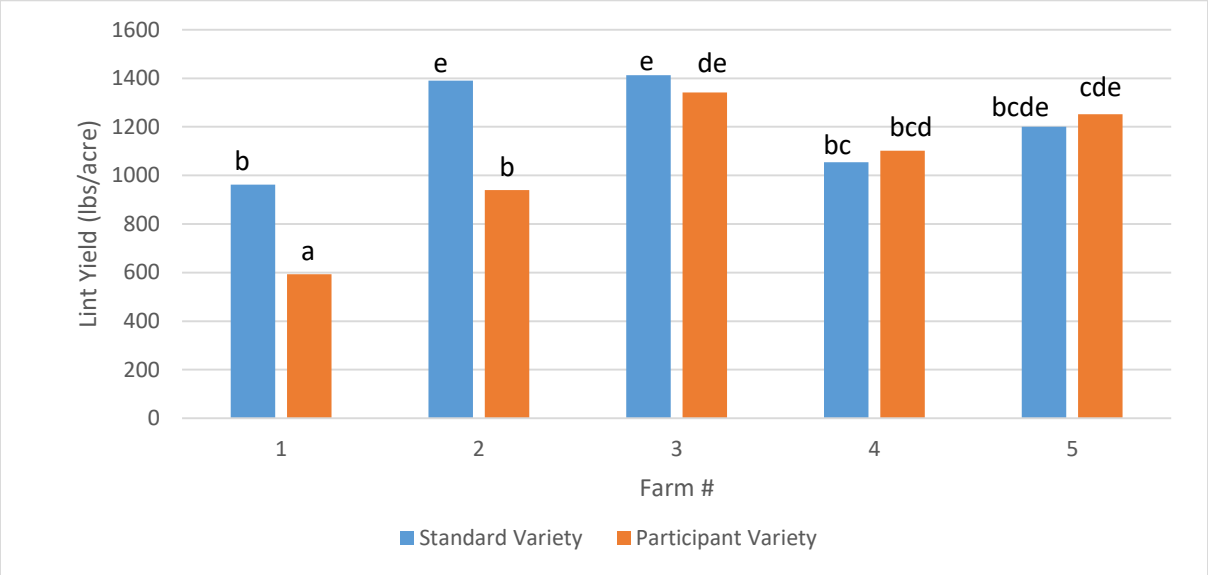


Figure 3: Cotton lint yield for the participant variety and the standard variety produced on each farm at Goodwell, OK. OSU Extension managed farm 2 and farm 1 was the irrigation check that received no water after pre water was applied.

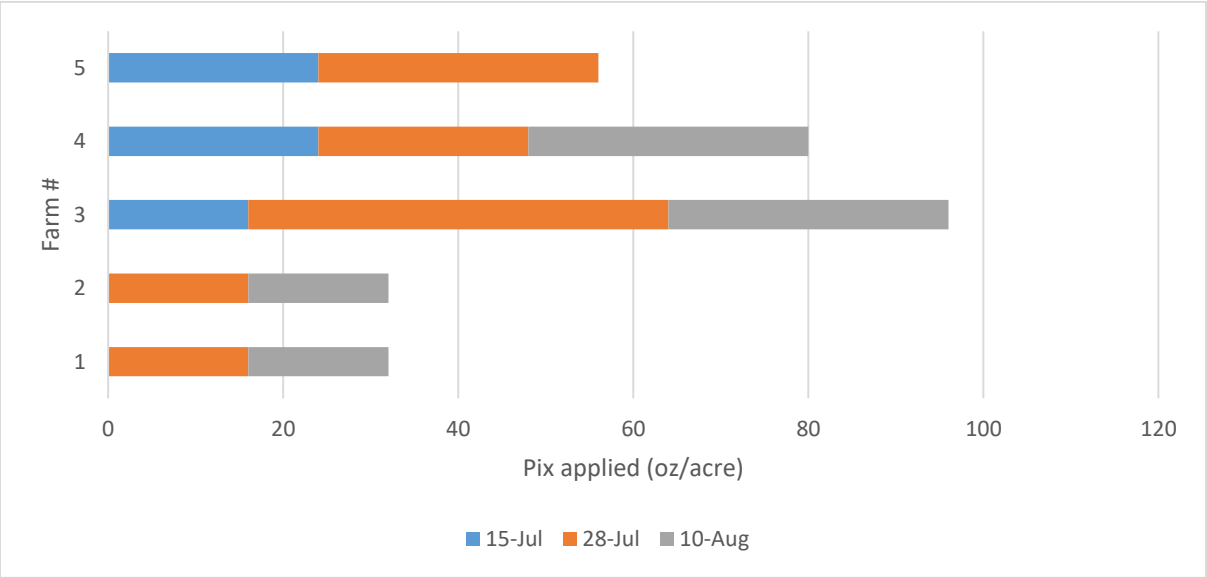


Figure 4: Pix applied to participant cotton variety at three application dates. The standard hybrid on each farm received the same Pix applications as did Farms 1 and 2.

Table 1: Participant selected hybrid and Seeding rate and the standard hybrid and Seeding rate.

Farm #	Variety	Seeding rate
1	DP2012	45000
2	DP2012	45000
3	PHY400	55000
4	DG3385	65000
5	PHY210	55000
Standard	NG2982	45000

Figure 5 shows the loan value achieved by the standard variety and pix treatments for each farm and the participant selected management of each farm. The quality of all the cotton was limited by the near freezing event on September 9th but the participant selected variety and pix combinations for farm 5 produced a loan value that was significantly greater than the remaining farms. This combined with the higher production costs (figure 6) for farm 3 made farm 5 the most profitable (figure 7) despite having a numerically lower lint yield as compared to Farms 2 or 3. Notable difference in production cost between farm 3 and 5 were a higher irrigation, harvest and pix cost for Farm 3.

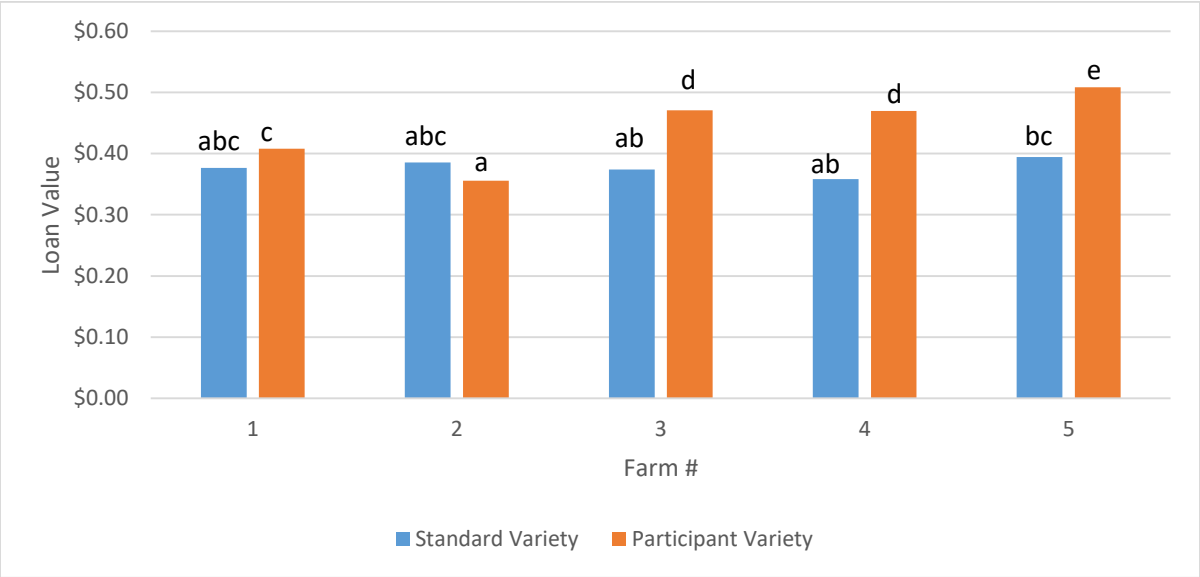


Figure 5: Loan value of cotton based on quality parameters. Farm 1 did not received irrigation after pre water and farm 2 was managed by OSU extension.

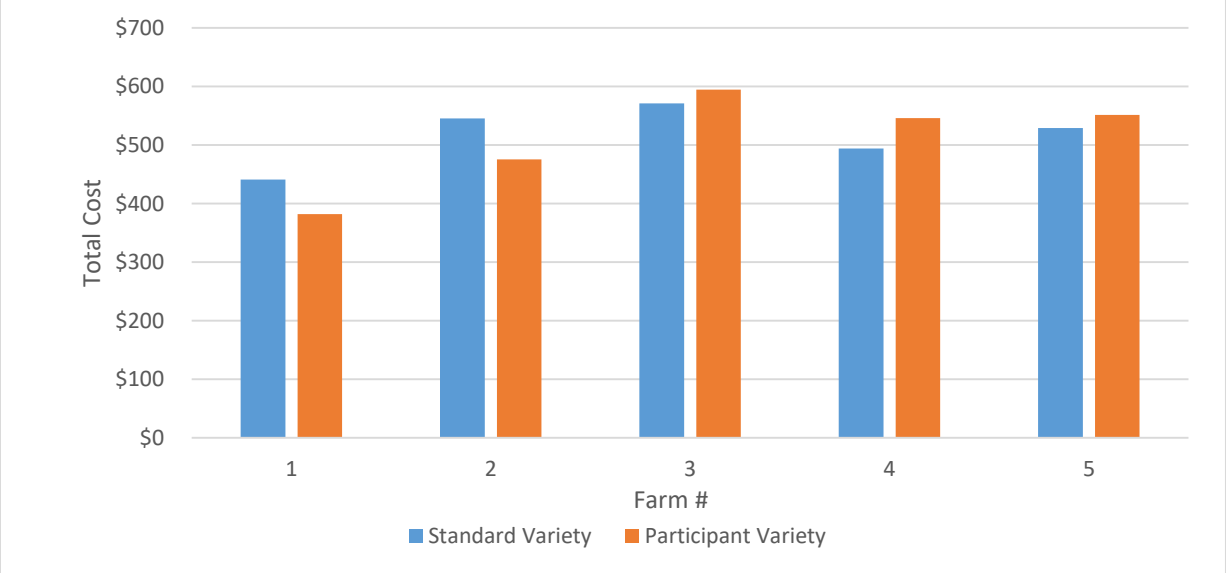


Figure 6: Total Cost of Production ending at harvest of seed lint. Farm 1 did not received irrigation after pre water and farm 2 was managed by OSU extension.

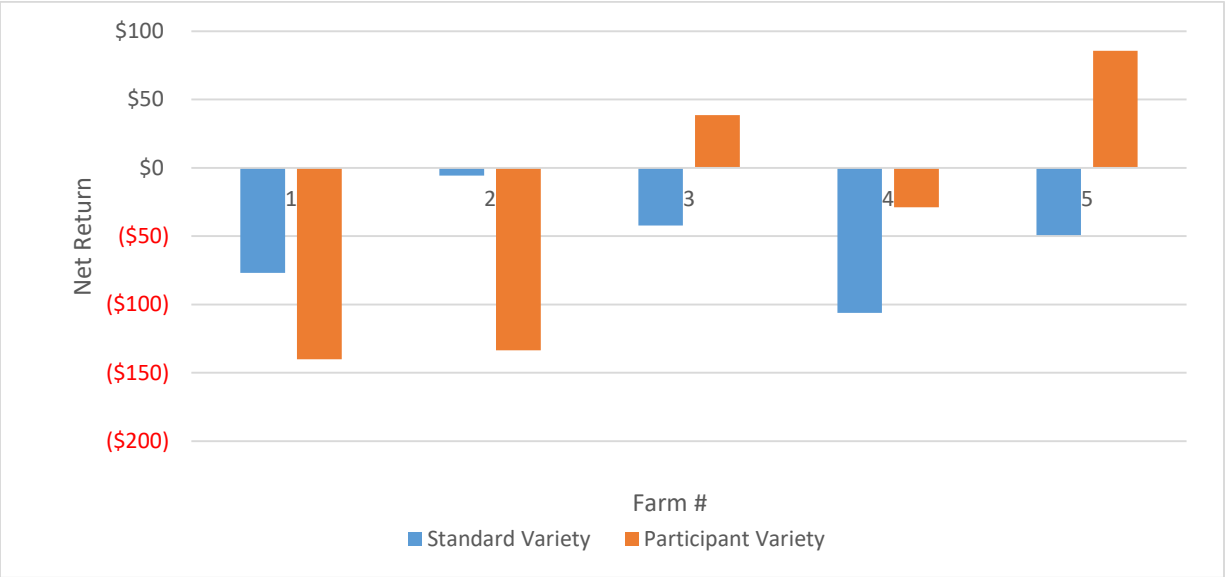


Figure 7: Net return to land and labor based on Loan value of cotton based on quality parameters. Farm 1 did not received irrigation after pre water and farm 2 was managed by OSU extension. <u>It is important to note that these returns were calculated based on the loan value of the cotton and not the actual sale price which can differ.</u>

Competition Results and Winners:

The most profitable farm as managed with participant variety and pix selection was farm 5. This farm was managed by Scott Schechter. We extend our respect and congratulations to Scott for his success in managing this cotton successfully.

It is difficult to validate but I think that farms 1, 2 and 3 suffered too much auxin herbicide damage in this year. Also, it is difficult to separate the impact of variety and population selection from the effects of growth regulator management. In 2021 we will have standard pix applications on subplots of the two varieties in each plot along with the participant selected pix applications. This will separate the impact of growth regulator from the obvious variety impacts on profitability.