

REPLANTING SKIPPY STANDS

Philip Jost¹ and Alexander M. Stewart²

¹Crop and Soil Sciences, University of Georgia, Statesboro

²LSU Ag Center, Alexandria, LA

Introduction

Whether or not to replant cotton when faced with a less than optimal stand continues to be a difficult decision. Ultimately the choice to replant or leave the original stand is often made based on past experience. Once the decision has been made a producer often spends the remainder of the season wondering if the decision was correct or not. Currently a majority of season-long production costs are incurred once planting has been accomplished. Thus stand establishment is critical.

The objective of this research was to evaluate the yields of less than optimal stands in relation to the yield of an optimal stand planted later (replanted). Furthermore the objective was to mathematically describe a skippy stand.

Materials and Methods

Skippy stands were established in 4-row plots 40 feet long replicated four times in both South Louisiana and East Georgia in 2004 and 2005. Skippy stands were obtained by planting varying ratios of a Liberty Link (Ignite herbicide tolerant) cotton variety with a non-Liberty Link variety during the first week of May at both locations. Ratios consisted of 100% LL, 80% LL, 60% LL, 40% LL, and 20% LL. Often times a skippy stand in the field is the result of mechanical impedance to plant emergence as opposed to poor germination, resulting in a stand that is not only skippy but also stressed. Thus, each of the varying ratios of LL to non-LL seeds was planted at both an optimal depth and 2 inches deep in an effort to impose a stress. Replant plots were seeded the first week of June. To establish skips all plots planted the first week of May were treated with Ignite at 32 oz/A once seedlings had reached the 1-true leaf stage to remove all non-LL plants. This same process was repeated in 2005 with a LL variety and a full-season RR variety (DPL 555 BGRR) and non-RR variety, where skips were established by treating plots with glyphosate at 1 lb ai/A.

Data collection consisted of machine picked plot yields taken from the two center rows of each plot. The yields of all plots were expressed as a percentage of replanted plot yields within a replication. Skip length and frequency within a plot was documented by measuring all skips within the two center rows of each plot that were greater than 12 inches. This number is referred to as cumulative skip length per 80 foot of row. Cumulative skip lengths were determined for the following categories: greater than 1 ft, 1.5 ft, 2 ft, 2.5 ft, 3 ft, 3.5 ft and 4 ft. The standard deviation of skips in each of these categories was also determined.

Regression analysis was performed on all data. Initial independent variable selection was made via PROC STEPWISE in SAS. Independent variables consisted of cumulative skip lengths, standard deviations of skip lengths, location, stress, variety and all interactions.

Results and Discussion

Stepwise variable selection indicated that skip lengths greater than 3 feet was the significant independent variable (Table 1). Since variety and stress were shown to minimal effects on final yield in comparison to skip length these data were pooled across skip lengths. In addition, to make the model more user friendly skips were converted to a numbering system. A skip of 3 feet was given a value of 1, a skip of 9 feet was given a value of 3. Thus in field evaluation skips greater than 3 feet are summed and divided by 3. The resulting number is inserted into the model.

Table 1. Analysis of variance and parameter estimates for modeling skippy stand yields in relation to replant yields

<u>Analysis of Variance</u>					
Source	DF	Sum of Squares	Mean Square	F value	Pr>f
Model	4	4.66071	1.16518	47.56	<0.0001
Error	69	1.69041	0.02450		
Corrected Total	73	6.35112			
	R ²	0.7338			
	R ² _{adj}	0.7184			
	C.V.	14.812			
<u>Parameter Estimates</u>					
Variable	DF	Estimate	Standard Error	T Value	Pr> t
Intercept	1	1.2401	0.04734	26.2	<.0001
LA_05	1	-0.18044	0.06067	-2.97	0.004
GA_04	1	0.3495	0.052	6.72	<.0001
GA_05	1	-0.08301	0.05275	-1.57	0.1202
# 3ft skips/80ft	1	-0.01934	0.00242	-8	<.0001

It is important to note that the independent variables LA_05, GA_04, and GA_05 are “dummy” variables thus there are in effect four models, one for each location in each year, as indicated in Table 2.

Table 2. Depiction of models by location relating skippy stand yields to replant yields

<u>Parameter Estimates</u>				
Variable	Louisiana		Georgia	
	2004	2005	2004	2005
	Estimate			
Intercept	1.24	1.59	1.06	1.16
# 3ft skips/80ft	-0.01934	-0.01934	-0.01934	-0.01934

While the intercept of the models vary between LA and GA in 2004 and 2005 the influence of the number of 3 foot skips is consistent across locations and years. The intercept values for the LA data are significantly greater than the values obtained for GA. The proper interpretation of this is that the replant performed poorly in LA relative to GA. This is a key point since the LA data was generated from a dryland study, where the GA study was irrigated. Thus these data support the idea that replanting in a non-irrigated situation is more risky than replanting where irrigation is available.

While two years of data at two locations does not lend itself to producing a model to explain all potential replant situations, the model developed does begin to lay some ground work. Figures 1 and 2 graphically depict the performance of a skippy initial stand in relation to a replanted stand in LA and GA in 2004 and 2005. How this data will be used will vary by location and field. What is left to question is what level of performance for a skippy initial stand is acceptable. For instance if the calculated performance of the initial stand relative to a replant is 1, then intuitively the stand should be kept since a replant is not predicted to perform any better. However, should replanting occur if the predicted performance value of the initial stand is 0.95, 0.9, 0.85, or 0.8? This decision will ultimately be influenced by the average production history of a given field. For example if a field has an average production history of 700 lbs lint/A for later planting dates a 10% reduction would equate to 70 lbs. Another field may have an average production history of 1000 lbs lint/A for later planting dates in which a 10% yield reduction would equate to 100 lbs. Replanting the former field may not be justified, in the latter replanting may be of benefit.

The final step for this model will be to develop an index explaining current soil and environmental conditions which can be related to the intercept of the model. This is especially important in dryland situations. The intercepts of the models generated in Louisiana vary significantly, in 2004 the replanted plots performed better than in 2005. This difference was primarily due to extremely dry conditions at the time of replanting in 2005.

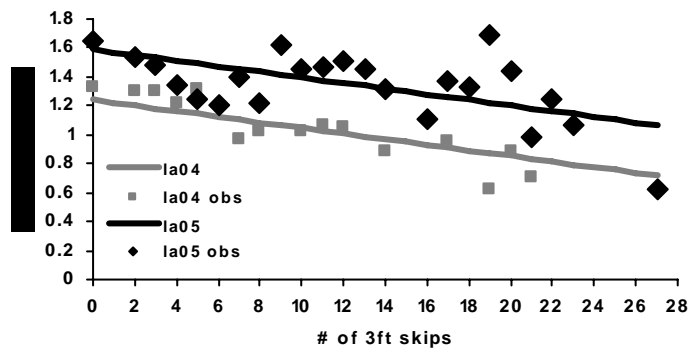


Figure 1. Predicted versus observed yields of skippy stands shown as a percentage of replant yields, Louisiana, 2004 and 2005.

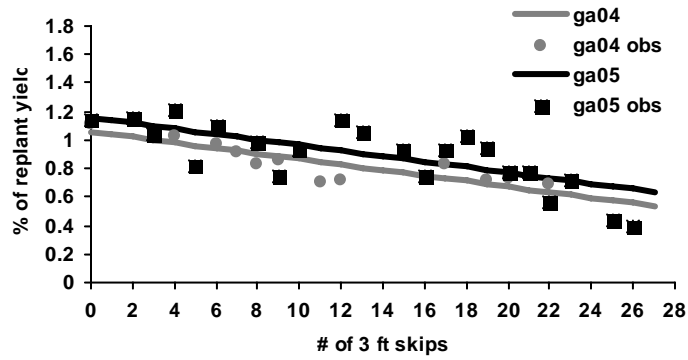


Figure 2. Predicted versus observed yields of skippy stands shown as a percentage of replant yields, Georgia, 2004 and 2005.