

Adoption of and Farmer Perception on new Sugarcane Variety SLI 121 : A Case Study

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ABSTRACT

The level of adoption of the high-yielding variety SLI 121 introduced by the Sugarcane Research Institute in 1992 has not been satisfactory. A study was undertaken to analyze the process of adoption, performances of the variety, the reasons for discontinuing and the farmers' perception on the new sugarcane variety SLI 121 and the farmers' requirements and preferences of a new variety. A survey was carried out with a group of 30 farmers in C-7 sector of the Sevenagala Sugar Industry who adopted SLI 121, during 1996 to collect data using a structured questionnaire and it was supplemented by three case studies. Data analysis was done using non-parametric methods supplemented with qualitative information. Majority of farmers have continued with 121 up to 6th ratoon while one third of farmers have replaced 121 with Co 775 within 5 years. Plant crop yield of Co775 in the first crop cycle was significantly correlated to that of SLI 121 in the sample of farmers and mean plant crop yield of Co 775 in the first crop cycle was significantly higher than that of SLI 121. However, when SLI 121 was replaced with Co 775 in the subsequent crop cycle, the plant crop yields of the two varieties were not significantly different. High cane and sugar yield and easiness to cut were the superior characteristics, and demand for more water was the main adverse characteristics of SLI 121 as identified by farmers. However, nearly half of farmers have perceived that SLI 121 was a good variety. High cane yield was the main characteristic looks for by farmers in selecting a new variety on the other hand high sugar yield was not considered as preferable characteristic by majority of farmers.

Key words: *Sugarcane varieties, farmer perception, technology adoption*

INTRODUCTION

Where as the current national requirement of sugar is in the region of 622,000 tonnes per annum, the sugar sector at present provides only about 9% of the requirement and is operating at low overall productivity and profitability. One of the main reasons for low productivity is low cane and sugar yields which are still lower than those in other countries with similar climatic conditions (Keerthipala, 2007). The cane yields and sugar recovery rate (i.e., the weight of sugar recovered as a percentage of cane weight processed) in Sri Lanka over the last 10 years averaged about 55t/ha and 8.38% respectively (Central Bank, 2005 and 2006). In India, the average cane yield and sugar

recovery rate for the same period was 68t/ha and 9.97% respectively, whilst in Thailand respective yields were 57t/ha and 9.98% (F.O.Licht, 2006). Low adoption levels of high-yielding varieties in the local sugar industry was one of the main contributory factors for the low level of cane yield and sugar recovery rates (Darmawardena and Krishnamurthi (1992) and (Keerthipala, 1997). To increase the use of high-yielding varieties by farmers, number of varieties with high cane and sugar yield including SLI 121, SL 88116, and SL 8306 had been introduced by Sugarcane Research Institute during last two decades. But, Co 775 is predominantly cultivated by the majority of farmers still in Sevenagala Sugar Industry area from where nearly one third of the local cane demand was met annually (Perera, 2003).

The new cane variety SLI 121 which gives with high cane and sugar yield, under irrigated cultivation, was introduced to sugar companies by Sugarcane Research Institute in 1992. Even after nearly fourteen years, spread of this variety in the sugarcane plantations has been not satisfactory. As Rogers (1995) opined, the diffusion research literature indicates that both people differences in innovativeness as well as innovation differences (i.e. how the properties of innovations affect their rate of adoption) are important in adoption and diffusion rates of new technologies. So, farmer preferences, varietal characteristics, extension strategies used in popularizing these varieties, etc. could attribute to this failure of the variety. Thus, it is pertinent to study the process of adopting this variety by the farmers, any reasons for the rejection and the farmers' perception on the variety to recommend suitable measures to improve the adoption. Further, knowledge of farmers' preferences and requirements of a new variety will be important to recommend new varieties which are suitable to farming situations.

The specific objectives are to study the process of adoption, analyze varietal performances, any reasons for adopting or discontinuing and the farmers' perception on this new variety and to identify the farmers' requirements and preferences of a new variety.

METHODOLOGY

This study was conducted in the Sevanagala Sugar Industry area where SLI 121 was initially introduced to farmers. Whereas the new variety was introduced to about 120 farmers in C-7 and C-8 sectors of Sevanagala Sugar Industry, only about 40% of them had been able to grow the new variety replacing Co 775 due to prevailed drought situation and problems related to irrigation facilities in some areas. So, C-7 area of the irrigated sector was selected purposively for the study considering easiness to find adequate number of farmers who adopted new variety in one location. A farmer survey was conducted in 2006 with 30 farmers who were able to adopt new sugarcane variety SLI 121

in the C-7 sector. To collect primary data on farmers experience on new varieties and their perception on the same a pre-tested interview schedule was used. The secondary data were collected directly from the plantation staff. In this study prominence was given to gather information related to experiences with new variety and farmers' subjective preferences for characteristics of a new variety.

Two case studies with farmers who have experience with varietal introduction process were done to get in-depth understanding on the introduction process and problems encountered during the adoption process. Another case study with a group of high-yielding farmers who cultivated SLI 121 in C8 and C7 sectors was also conducted to get additional information on the performance of the variety. This group was selected purposively considering their cane yield and ratoon performances.

Statistical Package for Social Sciences (SPSS) was used to analyze the data. Spearman correlation analysis was used to establish the level of relationship between the variables. The mean differences of the yields of two varieties obtained by sample farmers were tested using t-tests and Mann-Whitney test. The information gathered through the case studies were also used for qualitative explanations.

RESULTS AND DISCUSSION

Mean age, education and experience of farmers in the sample were 50yrs, up to grade 5 and 14yrs respectively. It showed that majority of farmers had experience with sugarcane farming to take decisions considering their field conditions, resources availability when they were adopting new variety.

Variety Selection

All farmers reported that Co 775 and SLI 121 were the only recommended varieties for their areas and more than 90% of farmers reported company

extension staff as the sole source of information on cane varieties and for obtaining seed material.

It was evident that factors considered in the varietal selection by farmers were not satisfactory. Before cultivating the new variety, they all had grown Co 775 and both varieties were selected by them according to company recommendations and they had not studied varieties before the selection. And they were provided with only good characteristics of new variety SLI 121 such as high sugar and high cane yield of SLI 121 only when the variety was introduced to them. Rogers and Shoemaker (1971) considered knowledge as a function of an innovation decision process "when the individual is exposed to an innovation existence and gains some understanding of its functions". Hence it is most important that the innovation should be exposed to farmers adequately to get wider understanding about both of its superior and adverse characteristics when it is introduced for adoption. Thus will enable farmer to make rational decisions considering personal requirements, compatibility with his or her situation and availability of resources, in relation to the new technology.

Adoption of the new variety and performances

Majority of farmers reported that they had not experienced significant difference in the services provides by the corporation for two varieties such as input supply, irrigation facilities and advisory activities while crop management had also been the same.

Table 1 shows the varietal adoption by the sample farmers. Majority (66%) of farmers have continued with SLI 121 up to 6th ratoon while 33 % farmers have replaced SLI 121 with Co 775 within 5 years.

Plant crop yields of Co 775 was significantly correlated to that of SLI 121 (Spearman correlation = 0.568 ($p=0.034$)). This implies that individual crop management was not significantly different between two varieties and the yield performances of both varieties are related to individual farmer situations. However, mean plant crop yield of Co 775 (at the beginning) was significantly higher than that of SLI 121 plant crop yield ($p < 0.001$). But mean plant crop yield of Co 775 when it was planted in second time by replacing SLI 121, was not significantly different from the same farmers' mean plant crop yield of SLI 121.

But the case study with selected high-yielding farmers at C-8 and C-7 sectors disclosed positive aspects of variety SLI 121 as those farmers were able to get uniform high yield up to 06th ratoon as shown in Table 2. They had got significantly higher mean plant crop yield compared to that of both Co 775 (at the beginning) and SLI 121 (second cropping cycle) of the farmer group at C -7 sector ($p < 0.001$). However, their cane fields had assured water supply during the studied period. It was also observed that these farmers were more innovative and willing to continue with the new variety than the majority of farmers in the group at C -7. The other factors such as field conditions, services provided by the industry and mean experiences in sugarcane farming of these farmers were not significantly different from those in the farmer group at C -7 sector.

Table 1. *Farmers' adoption pattern of varieties and average yield*

Variety (order of adoption)	Number of farmers	Mean plant crop yield(t/ha)
Co 775(first cropping cycle)	30	127.5 (41.91)*
SLI 121 (second cropping cycle)	30	97.85 (35.28) *
Co 775 (third cropping cycle)	10	89.50 (10.5) *

- Standard deviations are indicated in the parenthesis

Table 2. Yield performances of of the group of high-yielding farmers who cultivated SLI 121 in C-7 and C-8 Sectors of Sevenagala

Farmer	Yield (metric tons per hectare)							
	Plant	R1	R2	R3	R4	R5	R6	Average
164	140	92	108	108	78.6	116	92	104.92
168	160	120	128	125.3	113.3	132	126.6	110.46
169	108	77.3	44	104	90.6	94.6	89	86.79
176	130.6	101.3	74.6	108	90.6	114.6	101.3	103.00
198	132	118.6	146.6	116	153.3	122.6	102.6	127.39
221	124	84	60	132	110.6	180	137.3	118.27
222	116	73.3	74.6	92	81.3	80	66.6	83.40
223	185	117.3	122.6	126.3	121.3	202.6	117	141.73
224	141.3	100	90.6	125.3	110.6	106.6	100	110.63
226	137.3	68	56	77.3	90.6	101.3	102.6	90.44
227	169.3	137.3	121.3	132	134.6	148	129.3	138.83
Average mt/Ha	140.32	99.00	93.30	113.29	106.85	127.19	105.85	112.54

Farmers' perception on new varieties

Main reason for replacing SLI 121 was poor yield according to 10 farmers who discontinued the variety before completing the ratoon cycle and 04 farmers of them reported others influence also one of the other factors influenced on their decision. Farmers' rejection of recommendations needs to be investigated closely as farmers analyse their performances by using different criteria (Fujisaka, 1993). In the present case, farmers used to compare new varieties with their experiences of Co 775 with which they had started their sugarcane farming career.

High cane and sugar yield and easiness to cut are the superior characteristics of the variety identified by the farmers (Table 3). Demand for more water (63 %), better care (23%) and high incidence of wild boar damage (23%) have been the main adverse characteristics identified by farmers (Table 4). However, 47 % of farmers have perceived the variety as good (Table 5).

Table 3. Good characteristics of SLI 121

Character	Percentage of farmers(N=30)
High cane yield	50
High weight	47
Easy to cut	40
Less spines	26

Table 4. Adverse characteristics of SLI 121 according to farmers

Character	Percentage of farmers(N=30)
More water requirement	63
High care compared to Co 775	26
More wild boar damage	26

Whereas the majority of farmers do not prefer a variety that requires more water, paradoxically they had adopted SLI 121 which requires more water. This confirms that the existence of gap in

Table 5. Overall perception on SLI 121

Perception	% of farmers (N=30)
Good	47
Poor	26
Neutral	26

knowledge about the varietal requirements, which had negatively affected their decision making when they were going for a high-yielding variety. Where farmer situations were matched with the varietal requirements, the situation was entirely different. It was visible by the better performance of high-yielding farmers from the same variety with assured water supply, and their ability and willingness to continue with the new variety.

Nearly 50% of farmers reported good tillering and low water requirement as main superior characteristics of Co 775.

As shown in Table 6, high cane yield was the main characteristic looked for by farmers in selecting a new variety; and low water requirement and good growth were reported as second and third most important characteristics. High sugar yield which is one of the most important selection criteria in the plant breeding programme of Sugarcane Research institute was not considered as preferable characteristic by majority of farmers.

Table 6. Preferred Characteristics of a new variety by farmers

Character	Percentage of farmers (N=30)
High cane yield	73.68
Less water requirement	36.84
Good growth	21.85
High sugar yield	15.78
More tillers	15.78

CONCLUSIONS

Farmers used to compare new varieties with their previous experiences with Co 775. As a result, they had tended to reject the new variety perceiving as low-yielder by comparing the yield of new variety with the yield of Co 775 obtained in the previous cropping cycle. (at the inception for Co 775 which now produce more or less similar yield.) Absence of quality-based cane pricing system compelled farmers to consider high cane yield as the main important character of a new variety and led to less encouragement for quality improvement.

Inadequacy of studying varieties by farmers in relation to their situations was observed as one of the other main factors which affected the process of adoption.

Providing opportunities for farmers to adequately study new varieties in advance enabling them to select the best suited one to their situations, and farmer education on varietal characteristics and performances, for changing attitudes on variety selection is suggested to improve adoption of new varieties by farmers. A quality-based pricing system would also be important for changing attitudes on high sugar-yielding varieties.

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