STUDY ON THE ADOPTION OF NEW TRI FERTILIZER MIXTURE (VPLC-880) AMONG TEA SMALL HOLDERS IN MATARA DISTRICT OF SRI LANKA

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ABSTRACT

Small holdings sector holds 45 percent of the area under tea plantation. The average yield in the small holder sector was 1,867kg/ha in comparison to 1,358kg/ha in the estate sector in 2005.The Tea Research Institute introduced a new fertilizer recommendation for mature tea in 2000. The major objectives of this study were to determine the level of adoption of the fertilizer mixture and to assess the influence of attitudes towards the recommendations on the selection of fertilizer by the planters. Data collection in the study was by survey research through personal interviews using a structured questionnaire. Information related to tea cultivation and fertilizer usage, land and crop information, attitude of the respondents towards plant nutrition, information sources, credibility of information sources were gathered from a group of 45 tea small holders selected randomly in the Matara district.

Many of the respondents (78 percent) had medium attitude towards the practical aspects of the new fertilizer mixture and 55.6 percent of the respondents had high attitudes towards the economic aspects of the new fertilizer mixtures The most important reasons for the low adoption were low practicability influences, and the attitude towards the new recommendation and the monopoly and interference of tea factory in distribution of TRI fertilizer. It can be concluded that the knowledge and adoption of the new fertilizer recommendation were low. The extension officers of TSHDA could target all land size holders and younger farmers to increase the adoption of new TRI fertilizer recommendation and improve tea productivity.

Key words: Adoption, Attitudes, Fertilizer, Productivity, Tea small holders

INTRODUCTION

The tea sector in Sri Lanka has always been a vital component of her economy. It is also the country's largest employer providing employment both directly and indirectly to over one million people. It also contributes a significant amount to government revenue and to the Gross Domestic Product. "Ceylon" tea from Sri Lanka, acclaimed as the best tea in the world has its inheriting unique characteristics and reputation running through more than a century. The influence of climatic conditions of its plantation impacts on the product a variety of flavours and aromas, synonymous with quality.

Tea grown in Sri Lanka is divided into two categories. Depending on the elevation of growth, tea is categorized as high grown and low grown. The area under tea plantations increased from 225,000 hectares in 1950 to the highest level of 245,000 hectares in 1981. However, it had declined to 222,000 hectares by 2005.Tea growing was earlier concentrated in the mid elevations (600-1,200 meters) and higher elevations (1,200 meters and above). Tea growing has extended to low elevations (600 meters and below) gradually. The distribution of tea lands in Sri Lanka is mainly among the Central hills, Sabaragamuwa, Uva, Southern districts of Galle and Matara and in some areas of the southwestern slopes of the island. Tea is Sri Lanka's leading export crop. Tea is also the third largest agricultural industry in Sri Lanka and represents 2.3 percent of overall GDP (Central Bank , 2005). Currently 8 percent of Sri Lanka's tea export value is in the form of tea bags or instant tea products. In constant terms, tea value added has increased by 2.2 percent in 2005 over the last years. The increase in price of green leaves and Colombo market price mainly affected the current increase. Average price of green leaves increased by 2.8 percent, while the average f.o.b price increased by 6.1 percent. (Department of Census and Statistics, 2005).

The increase in production was achieved through production increase of 8 percent and 11 percent in high and medium elevations, as well as the efforts made to achieve higher production induced by higher tea prices. However, production in low grown areas does not receive sufficient rainfall, especially in the first quarter of 2005. The low incidence of labour disputes and strikes in Regional Plantation Companies (RPCs) may also have contributed to this increase. Total tea production consisted of 3.15 million Kg of black tea and of 2 million kg of green tea. Black tea consisted of 299 million Kg of orthodox tea and 16 million Kg of Cut Tear and Curl (CTC) tea in 2005 (Central Bank, 2005).

As in previous years, the tea small holders' sector continued to dominate and contributed 65 percent of total tea production in 2005 due to both greater land area used as well as higher yields. The average yield in the small holder sector was 1,867 Kg/ha in comparison to 1,358Kg/ha in the estate sector in 2005. This is contributed to relatively older tea plantations and the depletion of soil fertility consequent to sloping land terrain especially in high and mid grown areas. However, the small holder yield has been revised downwards following the latest census. The estimated national average yield was 1,645 Kg/ha in 2005, which remains below potentially achievable yields. The average cost of tea production increased by 7.3 percent, to Rs.168.85/kg.

METHODOLOGY

Study area
Out of fourteen Divisional Secretaries' (DS) Divisions in the Matara district, the Pasgoda Divisional Secretariat area was selected for the study. There were approximately 12, 900 tea small holdings in the DS area. Pasgoda sub office region is divided into five TI/EO ranges, namely Beralapanatara, Kirilapana, Pasgoda, Dampahala and Urubokka (TSHDA, 2005). A stratified random sample of 45 farmers was selected from above five TI/EO ranges. Data collection was done in the study by Survey Research through a personal interview using a structured questionnaire.

Development of scale for level of adoption of new TRI tea mixture
In order to measure the adoption of fertilizer recommendation in mature tea, an adoption Index was developed considering the following aspects of fertilizer recommendation and usage.
1) Application of new TRI tea mixture (VPLC-880)
2) Dosage of application
3) Frequency of application
4) Application of Urea according to yield slab
Adoption level was calculated by using the following equation. Level of

$$\text{Level of Adoption} = 100 - \left[\frac{(R-A)}{R} \times 100 \right]$$

R= Recommended amount (Dosage of fertilizer/Frequency of fertilization /Urea)
A= Adopted amount (Dosage of fertilizer/Frequency of fertilization / Amount of Urea)

Adoption levels were calculated for each three aspects (Dosage of fertilizer application, frequency of application, application of Urea according to yield slab) of fertilizer recommendation and finally the average adoption levels were calculated.

Farmers who are not practicing the new TRI recommendation were categorized under zero adoption level.

Farmers who are applying new TRI recommendation were categorized according to their level of adoption as follows.

Type	Percent Adoption
High adopters	100
Medium adopters	50<100
Low adopters	Less than 50

Five point Likert Scale (Babbie, 1990) was used as follows.
5-Strongly Agree 4-Agree 3-Neutral 2-Disagree 1-Strongly Disagree
Statements of the attitude scale were prepared based on two aspects of the new TRI mature tea fertilizer recommendation *viz*. practical aspects and the economic aspects.

RESULTS AND DISCUSSION

Fertilizer Mixtures used by tea smallholders
Most of the respondents used the old TRI recommendations, especially the U-709 (66.7 percent) mixture, while the other major old TRI mixture was the T-1130 (11 percent). These mixtures were used for both VP fields and seedling fields. Only 22.2 percent had adopted the new TRI fertilizer recommendation for mature tea. It was found that majority of the respondents (89 percent) had not selected the fertilizer mixtures on their own preference, used the fertilizer provided by the tea factories and TSHDA, which were the old mixture.

Level of adoption of VPLC-880 Mixture
According to the survey results 77.7 percent of farmers did not apply VPLC-880. According to the adoption 50 percent were medium adopters. Thirty percent of the respondents were low adopters and only 20 percent were high adopters. Those 20 percent applied VPLC-880 according to the TRI recommendation. They applied VPLC-880 by recommended frequency, dosage and also applied required amount of urea according to the yield level.

Fertilizer suppliers to the smallholders

Three fourth (75.6 percent) of the respondents purchased fertilizer from the factory, while nearly 11 percent purchased fertilizer from traders. About 4.4 percent of farmers purchased fertilizer through TI/EO and factory, while the rest of them purchased fertilizer through TI/EO and traders. According to the study, it was found that the major fertilizer suppliers to the farmers in the study area were the tea factories, and that they were playing a major role in fertilizer adoption.

Source of information on new TRI fertilizer

It was found that 48.9 percent of respondents used tea factory as their main information source and 6.7 percent used TI/EO to obtain information about tea farming. Nearly 28.9 percent received information from both factory and other farmers. About 13.3 percent respondents received information from factory and TI/EO.

Table 01. Distribution of information flow

Information sources	Percent
1. Factory	49
2. TI/EO	7
3. Other farmers, Factory	29
4. TI/EO, Factory	10
5. TI/EO, Other farmers	2

Reasons for poor adoption of new fertilizer recommendations

Fertilizer application by small holding sector changed with their attitudes, knowledge and income. According to the survey results, interference of the tea factories in distribution of fertilizer is the major reason to deviate from the application of new TRI tea mixture. Low practical feasibility was the second most influencing factor for non-adoption of the new mixture. So, low economic feasibility was identified as the other reason. Some of the respondents have adopted VPLC-880 in the last few years and found that it was not increasing their yield, and difficult to practice in the field. Because they had to mix urea in the field and also had to calculate the urea quantity according to the yield slab, mixing urea was another problem. If the mixtures are in the form of ready to use, it will be more user friendly and practicable.

Attitudes of respondents towards the new fertilizer mixture

Ten statements were selected for the attitude scale after consulting with expert in social science and extension. The statements were further categorized into two types as practical aspects and economical aspects

on the use of the new fertilizer mixture. Figure 01 shows how the respondents scored on each aspect.

Category	Score range
Very low	1.0-1.1
Low	1.2-2.0
Medium	2.1-3.0
High	3.1-4.0
Very High	4.1-5.0

A five point Likert scale (5-Strongly Agree   4-Agree 3-Neutral 2-Disagree 1-Strongly Disagree) was used for scoring and categorization was done based on the score as above.
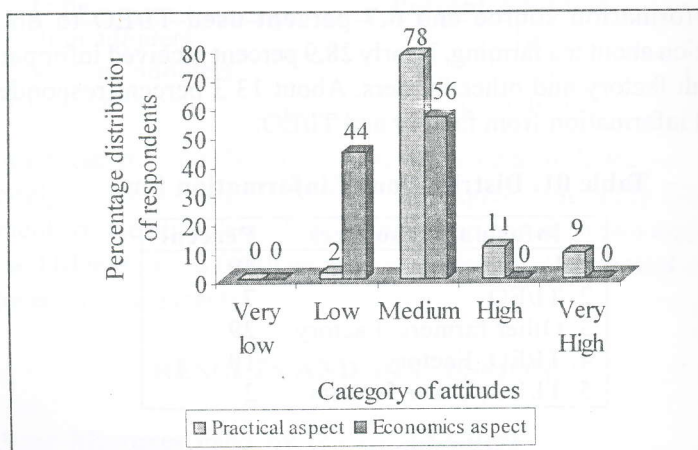

Figure 01: Distribution of respondents according to Attitude Score

Majority of the respondents (78 percent) had medium attitude towards the practical aspects of the new fertilizer mixture, about 55.6 percent had medium attitudes towards the economic aspects of the new fertilizer mixtures. One of the major reasons for the poor adoption of new fertilizer mixture was influence of low practicability on the attitude towards the new fertilizer recommendations. Low economic feasibility also influences to some extent. It will reconfirm the low practicability of the new mature tea mixtures on the tea small holdings.

Tea growers' attitudes towards the new fertilizer mixture
Overall attitude towards the new fertilizer mixture was assessed and it was revealed that 64.4 percent of respondents had medium attitude towards the new fertilizer mixture. Only 35.6 percent of them had a high attitude towards the new fertilizer mixture. Therefore, it is clear that most of the respondents were not familiar with this fertilizer mixture

introduced by TRI. Most of them were unable to express their views due to the lack of knowledge about new fertilizer mixture. Even some respondents who had a positive attitude about the mixture had not applied it due to the unavailability.

Relationship between adoption of new fertilizer mixture and socio-economic factors

The estimated correlation coefficient was used to find the effect of socio-economic factors to the adoption of new fertilizer mixture. As shown above, the adoption level is positively related to education level, income of the respondents, extent of land, but negatively related to the age of the respondents and experience.

Table 02. Correlation coefficient between adoption of new fertilizer mixture and socio-economic factors

Variable Socio-Economic factors	Application of VPLC-880
Age	-.553**
Education	.602**
Land extent	.575**
Income	.585**
Experience	-.589**

** Correlation is significant at the 0.01 level (2-Tailed).

Older farmers had low tendency to adopt VPLC-880 than younger farmers. This may be due to less awareness of the older respondents in the adoption of new technology. Even if the older respondents are exposed to the innovation they will not become interested in adopting it. They have lower propensity to take risk and have positive attitudes towards the traditional methods of cultivation.

Educated respondents are adopters of the new fertilizer mixture. It may be due to better understanding about scientific methods of cultivation, greater propensity to take risk and of new innovation supported by access to information.

Respondents who have larger land extents were high adopters than those who had a smaller extent. The reason is probably the respondents who have comparatively large extent of land are spending much time and greater effort on tea cultivation. They are willing to expose more to information sources than others. Therefore, they have a high level of adoption.

CONCLUSIONS

Adoption of new fertilizer mixture was very low and it was significantly related to attitudes of the farmers towards the mixture and to the fertilizer suppliers, communication behavior and information flows to the small holders. Socio-economic factors such as age of farmer, education level, and income of the farmer, extent of land and experience of farmer also show a significant relationship with the adoption. Extension services of TSHDA should focus on all land sizes and younger small holders to disseminate knowledge and adoption of the fertilizer. Influence of factories on distribution and usage of fertilizer should be eliminated.

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