Clientele Satisfaction Towards the TRI Extension Services Rendered to Corporate Tea Sector

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ABSTRACT

The extension services rendered by the Tea Research Institute of Sri Lanka (TRI) is the only organized extension service available for the corporate sector tea plantations in Sri Lanka. With the increasing demand from corporate tea sector for high level of technological interventions to face the challenges in the sector, the TRI has launched numerous extension activities to fulfill the demand. This study was conducted in 2007/08 in the up country tea growing region with the objectives to assess the satisfaction level of clients in the corporate tea plantations towards the extension services rendered by the TRI and to find out whether there is any relationship between clientele satisfaction and their characteristics. Clientele satisfaction was measured in five dimensions such as relevancy of TRI technologies/ information to the client, coverage of TRI extension service in terms of different types of clients, quality of TRI extension service, competency of TRI extension personnel and general usefulness of TRI extension service. Data were collected from a sample of 60 estate managers by interview method.

Major proportion of the respondents expressed low relevancy of technologies disseminated and low coverage of the TRI extension service to different categories of clients in the sector. High satisfaction level was expressed by the majority regarding quality of extension service, competency of extension personnel and general usefulness of extension service. Strengths and weaknesses of the extension system were identified from the client's perspectives relevant to different dimensions. Only two independent variables, attitude towards improved practices and contact frequency with TRI showed positive and significant contribution towards clientele satisfaction.

Key words: Competency, coverage, quality, relevancy, satisfaction, usefulness

INTRODUCTION

Tea is the second largest foreign exchange earner forming the third largest agricultural industry in Sri Lanka. The country's tea industry represents 1.2 percent of the Gross Domestic Product (GDP) and employs approximately one million people, of whom

about 600,000 are directly employed persons. Today Sri Lanka is a major player in the global tea industry and ranks as the third largest tea producer in the world exporting 22% of the worlds export, having an approximate share of 10 percent of the global market, with a production more than of 310 million kg made tea per year. The country also ranked as the largest tea exporter in the world (Anon, 2007). The major proportion (nearly 60%) of the tea lands in the country is managed by large plantation organizations of which the corporate sector occupies greater majority of the large tea plantations. With the emergence of corporate sector tea plantations after the privatization of state owned plantations in early nineties, demand for high level of technological interventions through extension services has increased than ever before.

The Tea Research Institute of Sri Lanka (TRI) is the apex body in the country that undertakes research studies on all aspects of tea cultivation, processing and product development and delivers extension services for the tea sector. The TRI extension system being the only primary source of technical information to the tea industry holds the primary responsibility in disseminating scientific information and technologies to the sector and, it is the only organized and recognized source of technology and information for the tea sector, particularly for the large plantations. The TRI extension system has launched numerous activities through various extension approaches to fulfill the extension needs of the corporate tea sector. However, there have been no studies undertaken so far to evaluate the services rendered to corporate sector clients. Hence, this study was conducted in 2007/08 with the objectives to assess the satisfaction level of clients in the corporate sector tea plantations towards the extension services rendered by the TRI, to study the relationship of clientele characteristics with their satisfaction levels and to suggest appropriate measures for improvement in the TRI extension services.

METHODOLOGY

Study area and sampling procedure

The Up country tea growing region that had the majority number of corporate sector tea estates and major proportion of the tea extent among the four regions (Up country, Mid country, Uva and Low country) was purposively selected for the study. Sample survey method was adopted for the study considering tea estate as unit of investigation. Out of the total number of 104 corporate sector tea estates in the study area, a sample of 60 estates was considered. First, the population was stratified into two as high yielding and low yielding estates based on the available criteria (Anon, 2003) and 27 high yielding estates and 33 low yielding estates were finally selected for data collection based on proportionate random sampling method. Thus the total number of tea estates selected for the sample survey was 60 and the survey was conducted in the year 2008. All the

managers of the sampled estates were selected as respondents for the survey. Thus the total number of respondents in the sample was 60.

Data collection

Pre-tested interview schedule was used to collect data from the respondents. Mainly, primary data were collected by the author through personal interviews with the respondents and supplemented with secondary data from official letters and reports to validate data where ever necessary.

Variables and their measurements

Based on the objectives of the study, research questions were formulated and accordingly variables were identified. Independent variables were selected based on the opinion of selected 30 numbers of judges. Finally nine independent variables were selected based on the means score of judges ratings.

Dependent variable

Clientele satisfaction towards the TRI extension system was the dependent variable of this study and it was operationalized as the degree of satisfaction of the client (estate mangers) with respect to different dimensions of the present TRI extension service. The dimensions considered were relevancy of TRI technologies/ information to the client, coverage of TRI extension service in terms of different types of clients, quality of TRI extension service, competency of TRI extension personnel and general usefulness of TRI extension service. The clientele satisfaction inventories consisting indicators for each dimension were developed based on relevant literature; Ray (1998), Saravanan and Veerabhadraiah (2003) and expert's opinion. Responses were obtained on four point continuum with the scores of 4, 3, 2 and 1. The inventories used are given in the annexure.

The dimension-wise satisfaction score of each respondent was calculated based on their scores obtained for relevant indicators and they were classified into three clientele satisfaction categories as less satisfied, moderately satisfied and highly satisfied using cumulative frequency method based on mean and standard error. Overall clientele satisfaction index was obtained by summing up the five dimension scores.

Overall clientele satisfaction index for each respondent was calculated using the following formula.

$$\text{Overall clientele satisfaction Index} = \frac{\text{Sum of scores obtained for all the dimensions}}{\text{Sum of maximum possible scores of all dimensions}} \times 100$$

Based on the overall clientele satisfaction indexes obtained by the respondents, they were classified into three categories as highly satisfied, moderately satisfied and less satisfied using cumulative frequency method based on mean and standard error.

In order to find out strong and weak areas of the TRI extension system, mean score values for the individual clientele satisfaction indicators were calculated.

Independent variables

Education level, in-service training, job experience in tea plantations, innovativeness, scientific orientation, attitude towards improved practices, social participation, contact frequency with TRI and communication channel utilization were selected as independent variables.

Educational level was operationalized as the extent of formal education acquired by the respondent based on the norms of Sri Lanka Education Department and the recruitment procedures followed by the regional plantation companies (RPCs). Education level was categorized into six such as grade 6–10, G. C. E (O/L) qualified, G. C. E. (A/L) qualified, diploma (1-2 year duration), diploma (more than 2 years duration) and university degree and measured with scores of 1, 2, 3, 4, 5, and 6 respectively.

In-service training was operationalized in consultation with relevant experts in the subject, as the total number of related training acquired while in the job during the last five years and duration of each of those training was also considered. Scores were assigned based on the number of training attended and length of training.

Job experience according to relevant experts in the subject was operationalized as the number of years completed in the positions held by the respondents. Scores were assigned for number of completed years in a position and the type of position held.

Innovativeness according to Rogers and Shoemaker (1971) was operationalized as the extent to which an individual had acquired an awareness of the need to be innovative and the person who felt the greatest need to change would be the first to innovate. Innovativeness of the respondents was assessed based on how soon they would prefer to adopt an improved practice *i.e.*, based on the answers such as, as soon as the innovation is brought to their knowledge, after they have seen it adopted by other members successfully and to prefer to wait and take their own time with scores of 3, 2, and 1 respectively.

Scientific orientation according to Supe (1987) is the degree to which a farmer is oriented towards the use of scientific methods in farming. The Supe's scale with slight

modifications was used in this study to measure scientific orientation. The scale consisted of six statements of which one of them was negative and the rest of the five statements were positive.

Attitude towards improved practices was operationalized as the degree of positive or negative mental disposition of the respondent towards the improved practices related to tea cultivation. The scoring procedure developed by Balasubramaniam (1988) was followed for this study with modifications. The scale consisted of 10 statements of which five were negative and five were positive.

Contact frequency with TRI was operationalized as the number of contacts that the respondents made in a year with TRI for technical advice, training, meetings *etc*., during the last five years by means of visiting the TRI, getting the TRI extension personnel to their estates, exchange of correspondence, contact by telephone and by e-mail. One score was assigned for every contact they made in a year. Number of average contacts made in a year over the last 5 years was considered.

Social participation was operationalized in terms of the degree of involvement of the respondents in formal organizations, either as member or office bearer. Scores were assigned for respondents depending on the number of organizations that they have memberships or/and holding office (office bearer).

Communication channel utilization was defined as the degree of usage of various individual, group and mass communication channels used by the respondents to obtain technical information. The list of the communication channels was administered to the respondents and their response on usage was recorded in three point continuum as frequently, occasionally and rarely assigning score of 3, 2, and 1 respectively.

Data analysis

Coded and scored data were transferred to computer for analysis and they were analyzed using SPSS software package. Based on mean and standard error, the clients were grouped into three as less satisfied group, moderately satisfied group and highly satisfied group. The cut-off points for this categorization was derived by using the formula "mean (X) + or – 1.96 Standard Error (SE)" as suggested by Fisher (1935). Accordingly less satisfied group: below X – 1.96SE, moderately satisfied group; between X – 1.96SE and X + 1.96SE and highly satisfied group: above X + 1.96SE. Cumulative frequency distribution and percentage analysis were done to quantify less, moderately and highly satisfied categories. Simple correlation coefficient values were worked out to find out the strength of association between dependent variable and independent variables. Multiple linear regression analysis was carried out to find out the

amount of overall contribution of independent variables to dependent variables. Based on the mean score values, the indicators were ranked and categorized to identify the strong and weak areas in the extension system.

RESULTS AND DISCUSSION

Overall clientele satisfaction towards the TRI extension system

Table 1 show that the larger proportion of estate managers expressed low level of overall clientele satisfaction (*i.e.* collectively considering all the five dimensions such as relevancy, coverage, quality, competency and general usefulness). Considerable proportion of them was highly satisfied with the present TRI extension system followed by less proportion of them moderately satisfied. This further indicates that there existed a wide variation with respect to the clientele satisfaction levels.

Table 1. Distribution of estate managers according to their overall clientele satisfaction levels towards the TRI extension service (n = 60)

Sl. No.	Overall clientele satisfaction level	Satisfaction index	Number	Percentage
1	Low	< 68.75%	24	40.0
2	Medium	68.75 to 74.23%	16	26.7
3	High	>74.23%	20	33.3

Mean = 71.49 Standard error = 1.40

Clientele satisfaction with respect to different dimensions

Findings of the clientele satisfaction in terms of relevancy of TRI technologies/ information to the client, coverage of TRI extension service to different types of clients in plantations, quality of TRI extension service, competency of TRI extension personnel and general usefulness of TRI extension service are as follows;

Relevancy of TRI technologies/ information to the clientele

Table 2 reveals that more than half (51%) of the estate managers opined that the technologies and information provided by the TRI were less relevant and, 29% of them opined highly relevant. One fifth (20%) of them expressed moderate level of relevancy. According to Table 3, high relevancy might have been due to problem solving ability of TRI technologies and information meeting clients need. Similarly, less relevancy might have been due to lack of technologies/ information in addressing gender related issues, location specific problems, cost effectiveness and incompatibility with the clients' socio-economic system.

Coverage of TRI extension service - clientele type wise

Clients in tea plantation sector could be categorized into different types such as company executives who usually function from head offices, estate level executives (managers including assistant managers), supervisory staff in the field and factory. Worker category including worker leaders, male workers (usually sundry workers) and female workers (usually tea pluckers) are the lower level employees. It is one of the mandates of TRI extension system to cover all the employee categories in the corporate tea plantation sector.

Table 2 reveals that nearly half (47.0%) of the Estate Managers expressed low level of clientele wise coverage of TRI extension service, followed by one third (33.0%) and one fifth of them (20.0%) expressed high and moderate level of coverage respectively.

Results of the indicator wise analysis given in Table 3 revealed that there is a high level of extension service coverage for RPC level and estate level executives whereas the low level of coverage for supervisory level staff (field and factory staff) and workers (both female and male workers) including worker leaders. This might be the reasons why major proportion of the estate managers has expressed low level of coverage of the TRI extension service.

Quality of the TRI extension service

Table 2 reveals that a major proportion (42.0%) of the estate managers expressed high level of quality in the TRI extension service and more than one third (36.0%) of them expressed low level of quality followed by more than one fifth (22.0%) of them expressed moderate level of quality of the service.

According to Table 3, providing trustworthy information, friendly interaction between extension personnel and clients and providing timely service might be the reasons for clients expressing a high quality in the TRI extension service. Drawbacks in providing up-to-date and unbiased information, in the use of appropriate/ effective communication methods for technology dissemination and in providing client oriented service might have been the reasons for expressing poor quality of the extension service.

Table 2. Distribution of estate managers according to their satisfaction levels towards the present TRI extension system (n=60)

Sl.No.	Satisfaction level	Satisfaction index	Number	Percentage
1	Relevancy dimension			
	Less	<60.59%	31	51.0
	Moderate	60.59 to 67.95%	12	20.0
	High	>67.95%	17	29.0
2	Coverage dimension			
	Less	<62.07%	28	47.0
	Moderate	62.07 to 69.87%	12	20.0
	High	>69.87%	20	33.0
3	Quality dimension			
	Less	<73.91%	22	36.0
	Moderate	73.91 to 81.51%	13	22.0
	High	>81.51%	25	42.0
4	Competency dimension			
	Less	<70.98%	19	32.0
	Moderate	70.98 to 81.02%	20	33.0
	High	>81.02%	21	35.0
5	General usefulness dimension			
	Less	<75.44%	23	38.0
	Moderate	75.44 to 82.30%	13	22.0
	High	>82.30%	24	40.0

Relevancy : Mean = 64.27 Standard error = 1.88
Coverage : Mean = 65.97 Standard error = 1.99
Quality : Mean = 77.71 Standard error = 1.94
Competency : Mean = 76.00 Standard error = 2.26
General usefulness : Mean = 78.87 Standard error = 1.75

Table 3. Distribution of indicators related to clientele satisfaction according to their mean scores

Sl. No.	Dimension and indicators	Satisfaction mean score	Rank
1.	**Relevancy of technologies/ information to;**		
a.	Clients need	2.77	II
b.	Specific to locations	2.47	IV
c.	Solve agricultural problems	2.80	I
d.	Cost effective/ affordable	2.55	III
e.	Compatible with the socio-economic system	2.55	III
f.	Gender oriented issues	2.27	V
2.	**Coverage of extension service to;**		
a.	Company executives	3.12	II
b.	Estate managers	3.30	I
c.	Field staff	2.57	III
d.	Factory staff	2.50	IV
e.	Worker leaders	1.90	VII
f.	Male workers	2.02	VI
g.	Female workers	2.05	V
3.	**Quality of the extension service in terms of;**		
a.	Timely service	3.02	III
b.	Providing up-to-date, unbiased information	2.82	VI
c.	Use of appropriate/ effective communication methods	2.87	IV
d.	Providing client based service	2.85	V
e.	Friendly interaction	3.50	II
f.	Providing trustworthy information	3.57	I
4.	**Competency of extension personnel;**		
a.	Scientific competency	3.50	I
b.	Communication competency	3.35	II
c.	Market competency	2.72	V
d.	Social competency	2.87	III
e.	Analytical competency	2.80	IV
5.	**General usefulness of the extension service;**		
a.	Creating awareness on general agricultural development of plantations	3.47	I
b.	Imparting information on new technologies	2.77	IV
c.	Helping clients in their decision making	2.82	III
d.	Helping clients in problem solving	3.27	II
e.	Developing vocational efficiency through education and training	3.47	I

(Maximum possible mean score= 4.00; Average mean score of all the indicators= 2.85)

Competency of the TRI extension personnel

Table 2 shows that more than one third (35.0%) of the estate managers opined high level of competency of the TRI extension personnel where as one third of them (33.0%) opined each moderate level followed by less than one third (32.0%) opined low level of competency. According to Table 3, the TRI extension personnel were perceived highly competent in scientific and communication aspects that might be the reasons for why clients rated them highly competent. Similarly the clients rating low competency might have been due to poor competency of the extension personnel in market, social and problem analytical aspects.

General usefulness of the TRI extension service

The data in Table 2 shows that higher proportion (40.0%) of the estate managers expressed higher satisfaction level with respect to general usefulness of the TRI extension service to the tea sector followed by 38.0% and 22.2% of them have expressed low and moderate level of satisfaction. According to Table 3 creating awareness on general agricultural development of plantations, helping the client in problem solving and developing vocational efficiency of clients through education and training might have been the reasons for client's higher satisfactions level. Weaknesses in the extension service with respect to imparting information on new technologies and helping the clients in decision making might have been the reasons for expressing low level of satisfaction.

Strengths and weaknesses of the present TRI extension system

Based on the satisfaction mean scores presented in Table 3, the indicators or aspects under various dimensions could be segregated into two categories and those can be interpreted as strengths and weaknesses of the present TRI extension system from the clientele satisfaction perspectives. The indicators holding a mean score value more than the average mean score (2.85) could be considered as strengths and the indicators holding a mean score value less than 2.85 could be considered as weaknesses of the TRI extension system. Accordingly, friendly interaction between the extension personnel and clients, providing trustworthy information, high level of scientific competency of the extension personnel, creating awareness on general agricultural practices, improving the vocational efficiency of the clients through education and training, communication competency of extension personnel, helping the clients in problem solving, social competency of extension personnel, providing timely and client oriented service are the strengths of the TRI extension service. On the other hand, poor coverage of extension service to worker leaders including male and female workers, lack of relevancy of technologies to gender oriented issues, coverage of extension service to factory staff and field staff, lack of location specific technologies, lack of cost effective/ affordable

technologies, poor compatibility of technologies with the socio-economic system of the plantations, lack of technologies to address clients problems/ needs, lack of information on new technologies, lack of up-to-date and unbiased information, poor competency of extension personnel on market needs/ issues and problem analysis and lack of contribution for client's decision making are the weaknesses of the TRI extension system. These findings suggest that there is a need to maintain or further improve the strengths while necessitating serious concern to take effective measures to minimize the weaknesses.

Relationship and influence of client's characteristics and performance of tea estates to the clientele satisfaction

Table 4 reveals (correlation analysis) that out of the nine independent variables studied, only three variables *viz.*, scientific orientation (X_5), attitude towards improved practices (X_6) and contact intensity with the TRI (X_8) showed positive and significant association with the clientele satisfaction at 1% probability level in case of X_5 and X_6, and at 5% probability level in the case of X_8.

Table 4 further reveals that all the eleven independent variables together explained 49.0% ($R^2 = 0.49$) of variation in the clientele satisfaction towards the TRI extension, F value being significant at 5% level. The balance 51.0% of the variation could be due to other variables not considered in the study (extraneous variables). Partial regression co-efficient values indicate that, of the nine variables, only two variables *viz.*, attitude towards improved practices (X_6) and contact intensity with the TRI (X_8) have contributed positively and significantly to the clientele satisfaction. Thus the estate manager's attitude towards improved practices and their contact intensity with the TRI could be considered as significant predictors of clientele satisfaction towards the TRI extension system.

The above results indicate that the unit increase in attitude of managers towards improved practices (X_6) and contact intensity with the TRI (X_8) would lead to an increase of 1.969 and 2.662 units in the clientele satisfaction respectively, keeping other variables at constant. It could be concluded that improving the attitude of estate managers towards improved agricultural practices and by increasing contact level of managers with the TRI, would lead to a better clientele satisfaction towards the TRI extension services.

Table 4. Correlation and multiple regression analyses of independent variables with clientele satisfaction index (n = 60)

Variable No.	Variable	Correlation analysis 'r' value	Regression analysis		
			Partial regression co-efficient	Standard error	't' value
X1	Education level	0.102^{NS}	0.166	1.628	0.10^{NS}
X2	In-service training	-0.154^{NS}	-0.226	0.140	-1.613^{NS}
X3	Job experience in tea plantations	0.033^{NS}	0.079	0.110	0.720^{NS}
X4	Innovativeness	0.135^{NS}	0.512	2.593	0.198^{NS}
X5	Scientific orientation	0.502**	-0.214	0.611	-0.349^{NS}
X6	Attitude towards improved practices	0.524**	0.942	0.479	1.969*
X7	Social participation	-0.112^{NS}	-1.869	1.819	-1.028^{NS}
X8	Contact intensity with TRI	0.443*	0.260	0.098	2.662**
X9	Communication channel utilization	0.141^{NS}	0.308	0.331	0.931^{NS}

R^2 = 0.49 F value = 2.445*

* - Significant at 0.05 (5%) level ** - Significant at 0.01 (1%) level

NS - Not significant

CONCLUSIONS

Based on the findings emerged from the study, it can be concluded that the TRI extension services have been effective in creating general awareness on agricultural practices, providing trustworthy information and providing training and education to the managerial level clients of the corporate sector tea plantations. The extension services have been helpful in providing client oriented service to help the plantation managers in problem solving. With respect to the TRI extension personnel, it can be concluded that they have been competent in social, scientific and communication aspects moreover; the extension personnel have been maintaining a friendly interaction with the clients.

The findings suggest that lack of extension activities targeting middle and lower level plantation employees is the major drawback in the TRI extension system. The technologies/ recommendations not adequately able to address location specific problems, being mostly cost ineffective and incompatible with the socio-economic

conditions/ problems prevail in plantations are the major problems related to the TRI technologies and recommendations. Lack of competency in analyzing problems in real conditions including market issues is the major weakness of the extension personnel. Based on the conclusions and also considering the various constraints of the sector and the TRI, the following approaches/ measures have suggested to improving the TRI extension service;

Para-extension aide approach: The TRI extension system may train and develop a pool of certified para-extension aids within the plantations itself in order to form another technology transfer stratum. This stratum would be a strong link between the TRI and middle/ lower level employees of the plantations which in turn may take over the part of technology transfer function to the middle and lower level employees of tea plantations.

Strengthening the clientele-extension-research linkage: In view of generating location specific and problem solving technologies, linkages between clientele and research systems, extension and research system may be strengthened. A bottom-up and participatory approach in the research need identification/prioritization would help in generating problem solving technologies.

In-service training for extension personnel: The TRI extension personnel may be regularly trained and given more exposure to improve their competency in problem analysis and finding solutions in the real conditions. They need to be actively involved in adaptive trials which will be a strong exposure to real field situations and problems.

LIMITATIONS

The study was conducted in a selected region; hence, the findings will be applicable only to such similar situations and general conclusions arrived at might be of value in other areas, subject to local adjustments. Most of the data collected were based on the expressions of the respondents, thus the study may not be free from biases involved with the respondents. Nevertheless, utmost care was taken to minimize such personal biases.

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ANNEXURE

Inventory for relevancy of the technologies/ information provided by the TRI

Sl. No.	Indicators of relevancy	Response and (score)			
		Always (4)	Mostly (3)	Sometimes (2)	Rarely (1)
1.	Clientele need oriented				
2.	Location specific				
3.	Problem solving ability				
4.	Cost effectiveness/ affordability				
5.	Compatibility with the socio-economic system of plantations				
6.	Gender oriented				

Inventory for coverage of TRI extension service in terms of clientele type

Sl. No.	Employee categories	Response and (score)			
		Very good (4)	Good (3)	Somewhat poor (2)	Poor (1)
1.	Company executives				
2.	Estate managers and assistant managers				
3.	Field officers and supervisors				
4.	Factory officers and supervisors				
5.	Leaders of workers including union leaders				
6.	Male workers				
7.	Female workers				

Inventory for quality of the TRI extension service

Sl. No.	Indicators of service quality	Response and (score)			
		Always (4)	Mostly (3)	Some times (2)	Rarely (1)
1.	Timely service				
2.	Up-to-date and unbiased information				
3.	Use of appropriate/ effective communication methods				
4.	Client (user) oriented service				
5.	Friendly interaction				
6.	Trustworthiness				

Inventory for competency of TRI extensional personnel

Sl. No.	Indicators of competency	Response and (score)			
		Very good (4)	Somewhat good (3)	Below average (2)	Poor (1)
1.	Scientific competency				
2.	Communication competency				
3.	Market competency				
4.	Social competency				
5.	Analytical competency				

Inventory for overall usefulness of TRI extension services

Sl. No.	Indicators of general usefulness	Response and (score)			
		Very useful (4)	Useful (3)	Somewhat useful (2)	Little useful (1)
1.	Creating awareness on general development of tea plantations				
2.	Imparting information on new technologies				
3.	Helping in decision making				
4.	Helping in problem solving				
5.	Developing vocational efficiency by education and training.				

INSTRUCTIONS TO AUTHORS

Aims and Scope

Sri Lanka Journal of Tea Science publishes full-length papers describing the results of original research and review articles dealing with tea related subjects. This area includes fundamental and applied aspects of agronomy, agro chemistry, agro physics, agro economics, biochemistry, ecology, entomology, ergonomics, mineral nutrition, plant water relations, nematology, pathology, soil biology, sociology, tea-extension, and technology. All contributions should be in English language.

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Section headings

First-, second-, third-, and fourth-order headings should be clearly distinguished but not numbered.

Appendices

Supplementary material should be collected in an Appendix and placed before the Reference section.

Acknowledgements

Acknowledgements of people, grants, funds, etc. should be placed in a separate section before the References.

References

References to books, journal articles, articles in collections and conference or workshop proceedings, and technical reports should be listed at the end of article in alphabetical order. Articles in preparation or articles submitted for publication, unpublished observations, personal communications, etc. should not be included in the reference list but should only be mentioned in the article text (e.g. Moore, personal communication).

In the text, references should be cited in alphabetical order. A reference identified by means of an author's name should be followed by the date of the reference in parentheses. When there are more than two authors, only the first author's name should be mentioned, followed by *'et al.'*. In the event that an author cited has had two or more works published during the same year, the reference, both in the text and in the reference list, should be identified by a lower case letter like 'a' and 'b' after the date to distinguish the work.

Examples:

Winograd (1986)
(Winograd, 1986a, b)
(Flores *et al.* 1988; Winograd, 1986)
(Bullen and Bennett, 1990)

Reference to books should include the author's name, year of publication, title, page numbers where appropriate, publisher, place of publication, in the order given in the example below.

Perera A K N Z and Wilfred K J 1991 Nitrogen Fixation in Tropical Cropping Systems. World International, Wallingford, Oxon, UK. 313 p.

References to articles in an edited collection should include the author's name, year of publication, article title, editor's name, title of collection, first and last page numbers, publisher, place of publication, in the order given in the example below.

Perera N K 1997 Iron requirement of cereals and legumes in solution culture. *In* Plant Nutrition-Physiology and Applications. Ed. M L Weerasekera. pp 113-117, Kluwer Academic Publishers, Dordrecht.

References to articles in conference proceedings should include the author's name, year of publication, article title, editor's name (if any); title of proceedings, first and last page numbers, place and date of conference, publisher and/or organization from which the proceedings can be obtained, place of publication, in the order given in the example below.

Wood G P 1969 Capillary conductivity data estimated by a simple method. *In* Water in the Unsaturated Zone. Vol. 1. Eds. P E Small and H Smith, pp 381-390. Proceedings of the Colombo symposium, June 1966, Colombo.

References to articles in periodicals should include the author's name, year of publication, article title, abbreviated title of periodical, volume number (issue number where appropriate), first and last page numbers, in the order given in the example below.

Tillman G L, Morrel E C and Osmond G 1984 Acidulation of Phosphate rock in soil. Soil Sci. Soc. Am. Proc. 28, 104-107.

References to technical reports or doctoral dissertations should include the author's name, year of publication, title or report or dissertation, institution, location of institution, in the order given in the example below.

Tyrone Y E 1995 Nitrogen nutrition of coconut trees. Ph.D. Thesis, University of Peradeniya, Peradeniya. 260 p.

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