
FACTORS AFFECTING THE DISCONTINUATION OF PROTECTED AGRICULTURE ENTERPRISES IN SRI LANKA

Madhavi Wijerathna¹, W. A. P. Weerakkody², S. Kirindigoda³

ABSTRACT

This study was conducted to find out the factors causing the growers to discontinue protected vegetable production after few seasons of operation and to propose appropriate remedial measures. The investigation was done through key informant discussions, observations and interviews of randomly selected 60 members of Protected Agriculture Entrepreneurs Association (PAEA) using a semi structured interview schedule. The main reasons for discontinuing protected agriculture enterprises were socio-economic factors, namely; lack of transport facilities, problems in the marketing, marginal monetary returns, dependency on external support schemes on investments, part time engagement, lack of family support and scale of production (less than 2000 sq ft.). The technological features of the production enterprises did not indicate a significant association with the discontinuation. In order to facilitate the sustainability and mobility of the protected agriculture enterprises in Sri Lanka, the supply chain should be reorganized to collect, transport, store and ultimately market the produce. Monitoring and advisory programs should be linked with the small growers to minimize the production risks while reducing the production costs and thus increasing the profit margins.

Key words: *Protected agriculture, Enterprises, Factors affecting, Discontinuation*

INTRODUCTION

Protected agriculture is a prominent high input agriculture which produces high quality fruits and vegetables as well as cut flowers and ornamental foliage. Generally, it is accepted that protected agriculture produce have a high value and high demand in both local niche markets and international markets. Meanwhile, the local market supply of vegetables through the open field production has been undergoing rigorous fluctuations due to unpredictable weather conditions in recent times. The per capita agricultural land holding in the Asia Pacific region is 0.25 ha. Therefore, future food production will have to come through intensive cropping on small land holdings and the crop production strategies have to be changed accordingly. This scenario welcomes protected agriculture due

to its specific advantages in food production (Gunaseena, 2001). As a profession, agriculture is not attractive for the educated youth, which is partly due to the drudgeries associated with field work. To motivate the educated youth, agriculture has to be regenerated to be a remunerative and drudgery-less industry as competitive as any other industry using agro technologies like protected agriculture (Sanwal *et. al.*, 2004). Moreover, the demand for high quality fruits and vegetables has been fast blooming with the rapidly expanding tourism industry in Sri Lanka, emphasizing the need of expanding protected agriculture.

Protected crop cultivation has been introduced to Sri Lanka in 1997 mainly to protect crops from adverse effects of intensive and prolonged rainfall and to provide near optimum environmental conditions for high

¹ Department of Agricultural Extension, Faculty of Agriculture, University of Peradeniya (20400), Sri Lanka.

² Department of Crop Science, Faculty of Agriculture, University of Peradeniya (20400), Sri Lanka

³ Chief Executive, Protected Agriculture Entrepreneurs Association, Shordans Building, Nugawela Rd, Peradeniya (20400), Sri Lanka

value horticultural species (Weerakkody, 2004). Protected Agriculture Entrepreneurs Association (PAEA) with its 12 years of active service has done pioneering work in the field of protected Agriculture in Sri Lanka. PAEA is the main center in the country which brings together producers, professional enterprises and agencies for accessing, sharing and disseminating innovative technologies available locally and internationally for the promotion and development of high-value horticulture industry in the country. The institute provides skills development, technical inputs, technical assistance, advisory and marketing services to the growers at the expense of high capital resources. PAEA is consisted of its members (nearly 500 has been registered from the initiation up-to-date), governed by the Board of Directors and manuvered by a seven member crew of contract employees.

However, upgrading and expansion of the protected agriculture enterprises in Sri Lanka is not at a satisfactory level. According to the data base of the PAEA and the key informant discussions, it could observe that there is a considerable tendency to discontinue the production by the members after several seasons of operation. Accordingly, there were 60 discontinued members. Niranjen *et al.* (2005) provide a list of 101 discontinued protected agriculture growers in Sri Lanka. Unlike open field agriculture, protected agriculture enterprises need relatively higher capital to initiate the production. It could observe that members tend to discontinue the production even after investment of higher sum of capital. Discontinuation can be a major reason to hinder the sustainable development and mobility of the protected agriculture enterprises in the country. Therefore, the objectives of this study were to find out the factors causing the protected agriculture entrepreneurs to discontinue protected vegetable production after few seasons of operation and to propose appropriate remedial

measures in order to upgrade and expand the protected agriculture enterprises in Sri Lanka.

MATERIAL AND METHODS

The available database of the PAEA and the information received from relevant publications (secondary data) were used to analyze the present status and to validate the significance of discontinuation of the active membership. Production and marketing data of the PAEA was analyzed to investigate their sales, profit margins and the stability of production. All together, a thirty member random sample from the discontinued membership (after several years of operation) and another thirty member random sample from the active membership were interviewed using a semi structured interview schedule to compliment the empirical analysis. Interview schedule was structured mainly covering the background information, input supply, technical information, agronomic aspects, extension and training as well as the marketing and other socio-economic aspects. Data were gathered from both active members and discontinued members for the purpose of comparison. Field visits and observations were made and discussions were conducted with the key informants (present and former office bearers of PAEA, officers of the department of agriculture, service providers and buyers) to supplement and verify the data base. Descriptive statistical analyses and Chi-square test were performed to investigate the causes of discontinuation of protected agriculture by the protected agriculture entrepreneurs and to find out association between variables.

RESULTS AND DISCUSSION

Background information and socio-economic reasoning

The majority of members (83%) in both samples were from Kandy district in central province of Sri Lanka. Close proximity to PAEA is one of the reasons to find many members from

Kandy district. In addition, suitable climatic conditions for protected agriculture prevail in the Central province of Sri Lanka could be another reason for this situation. There were 93% males in the continued group and 97% in the discontinued group, thus showing lack of female participation in protected agriculture entrepreneurship.

Any Sri Lankan above 18 years who is interested in protected vegetable production can obtain the membership by paying admission fee of Rs. 1500 and membership fee of Rs. 1000 per annum in PAEA. Figure 01 shows the number of members who registered at the PAEA from year 1997 to 2011, irrespective of their degree of active participation. The main reason for sharp rise in 2006 could be due to the subsidy scheme introduced for protected agriculture growers, through the German Technical Corporation (GTZ). In addition, it is clear that there was no significant increase in registration, indicating low mobility of the protected culture technologies and less expansion of the industry.

According to the same source of information, presently there are only sixty active members who are engaging in the production. Same number of members who had engaged in protected agriculture production for several seasons have given up (discontinued) due to

various reasons. The rest of the registered members (512) have not started the operation yet. They may not be well convinced or planning to fulfill the basic requirements for the production initiative.

Entrepreneurs transport the fresh crop produce to the PAEA by their own means. These produce is sorted, re-packed under the PAEA Logo and then delivered to the distant niche markets (buyers) under refrigeration. There are forward sales contracts with the growers, giving them a certified/fixed price. Some of the main buyers of the PAEA branded fresh vegetables are Sri Lankan Catering, Keels Super and some of the star class tourist hotels.

Analysis of variable market prices shows that the market prices of high value vegetables have increased over the last five years but not in an equal proportion with the rising cost of production, leading to diminishing profit margins (Mahaliyanaarachchi *et al.*, 2004). Figure 02 shows the total protected agriculture vegetable sales in rupees and the gross profit for the last five years, beginning from 2007. The total sales has increased over the time indicating a production hike. The profit has also increased but at a comparatively low scale, indicating a stagnation of profit margins over the time.

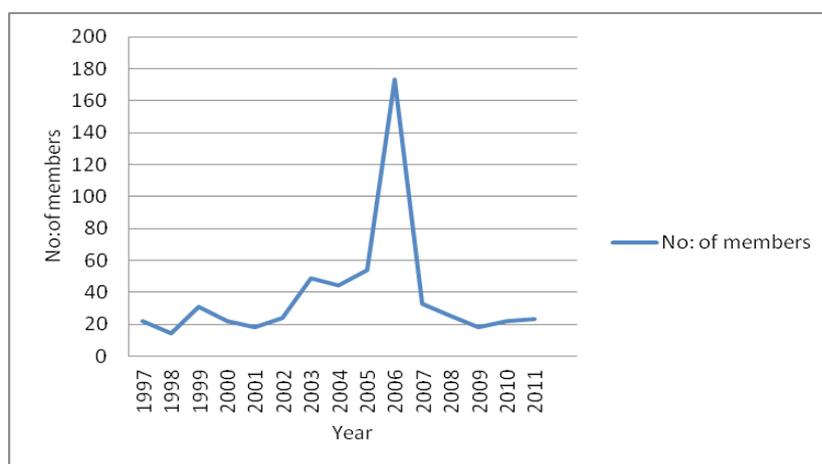


Figure 01: Number of members registered annually in the PAEA during 1997-2011
(Source: Membership register of the PAEA)

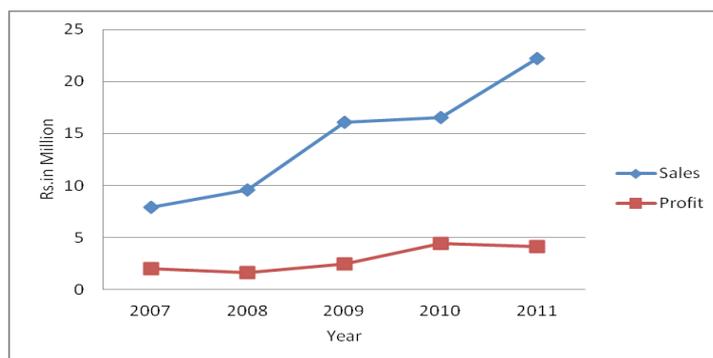


Figure 02: Total annual sales and gross profit of protected culture vegetables during 2007-2011

(Source: Financial reports of PAEA from 2007 to 2011)

There was an association between mode of transport and discontinuation of the enterprise ($p=0.031$). Majority (57%) of discontinued members used public transport and very few (23%) had used their own vehicles. In contrast, the majority (57%) of the continued members had transported their produce by their own vehicles and the use of hired vehicles and the public transport were by 27% and 17%, respectively. About 60% of the discontinued group claimed that the cost of transport was too high. Only 13% of the continued group stated that they have problems in transport cost. Small scale of operation and the long distance to the collection center (PAEA) are some of the reasons for the high cost of transport, which could be lesser when having a reliable and relatively cheap mode of transport.

The association between age and discontinuation was highly significant ($p= 0.000$). More members (63%) of the discontinued group were young (aged below 35 years) than that of continued group (20%). Meanwhile, nearly a half (50%) of the continued group was in the Middle age (35-55). The relationship between education level with discontinuation was significant ($p= 0.001$). Education level of discontinued members was fairly higher than that of continued members when considering ordinary level and advanced level qualifications. That was 68% and 52%, respectively. There may be alternative job

opportunities for more educated people which could be leading to shifting in to other jobs by ceasing protected vegetable cultivation. According to Chinsinga *et. al.*, (2012), young people do not see working in the agricultural sector as a viable means of realizing their dreams. They feel strongly that their vision of ‘the good life’ cannot be achieved by spending their time, and investing their energies in the agricultural sector. Therefore, they would like to go for non agricultural jobs. However, the diploma and degree holders in the continued group are much higher (64%) than that of discontinued group (36%). Protected agriculture is a high input agriculture which also needs higher level of knowledge, skills, management and decision making abilities comparatively to conventional agriculture. Furthermore, there were 30% of agriculture diploma and degree holders in the continued group. These factors may be the reason for higher percentage of degree and diploma holders were continuing the protected agriculture.

The association between discontinuation and full time/ part time engagement was tested and a significant association could be observed ($p= 0.005$). Majority (78%) of continued members were engaged the enterprise in full-time. In contrast, majority (62%) of members who have discontinued the production were part-time growers.

Table 01: Prior experience of the members in agriculture

Years of experience	Continued group (%)	Discontinued group (%)
0	23	17
1-10	20	33
10-20	20	37
20-30	20	10
30<	17	3

Table 01 shows percentage of continued and discontinued members, according to their prior experience in agriculture. Engagement in open-field cultivation and academic and professional background in agriculture were considered for the experience. The association between experience and discontinuation was not significant ($p= 0.167$).

Majority of discontinued group (80%) had stopped the business at the early stages (less than 5 years of operation). However, 33% of the discontinued members had used their tunnels and protected agricultural technologies to produce vegetables in very small scale for the home consumption and the remaining 67% had totally neglected the cultivation. A low percentage (27%) of discontinued members was like to resume the enterprise under a favorable support scheme while the majority (73%) had no such intension.

Production of tomato in a poly house was not found to be economically feasible. It takes nearly eleven years of continuous production to make it break even (Murthy *et.al.*, 2009). Continued members of the PAEA tend to cultivate more high value crops (45% Bell pepper) than the discontinued group. The discontinued group grew more tomato (56%) than that of continued group (6%). The fact that, market value of tomato highly fluctuates (due to open field supply) could have affected their income stability, ultimately giving up the practice. Success stories can be systematically investigated and documented to determine the potential of high value crop cultivation to be scaled up in different communities or districts (Sing *et.al.*, 2012). It is possible to share the

experience among growers of the PAEA but that was not happening systematically.

The association between scale of operation and continuation/discontinuation was tested and a significant association was observed ($p=0.000$). The arable extent of greenhouse floor of all members of the continued group was more than 2000 ft² (relatively large) while 80 percent of discontinued group had less than 2000 ft² (relatively small)

Association between the availability of family labour and discontinuation was significant ($p=0.000$) highlighting the fact that there is a tendency to continue the production by the growers who were highly supported by their family members.

Most (77%) of the continued members had initiated protected culture by their own investments in comparison to the relatively small fraction (47%) in the discontinued group. Majority (53%) of the latter (discontinued group) had started the business as government or none governmental (NGO) initiatives. It is intensive in terms of capital investments since the erection of a covering over ground is a large investment whatever location and requires money to purchase and operate (Hanan 1997). More than half (57%) of the continued members had obtained bank loans while it was 21% for the discontinued group, indicating the positive effect of bank loans for the expansion of the industry. Meanwhile, the recovery rate of loans was 100% for the continued group thus showing their risk seeking, business development and management abilities. However, 53% of those

who obtained loans stated that the amount of loan was adequate while the remaining 47% stated that it were inadequate, emphasizing the need of extra amount of credits to achieve their business targets.

As Hanan (1997) mentioned, there are some important questions to answer by any entrepreneur before starting a greenhouse enterprise. The first question to answer is the market size in relationship to the crops one proposes to grow? It can be elaborated as to whom is the product to be sold?, what, if any, marketing system is available?, what will be the transportation cost? What are the possible cost for grading, packaging and promotion? And how is the market likely to fluctuate with changing conditions? etc. In this study, the first market place of all in the continued and discontinued groups was the PAEA. Only 13% and 10% of them respectively had alternative markets, indicating very low flexibility of finding opportunities for their produce to sell. High value crops are basically cultivated to sell at super markets, hotels and clubs. However, many growers having no direct links with those markets sell in the open market to middlemen who usually keep a relatively high market margins (Niranjen *et al.*, 2005). Although protected agricultural produce is identified as a high value crop, this is one of the reasons for producers to receive less profit margins.

The majority of both groups (73% in continued and 80% in discontinued) have received at least one formal training on protected culture. Mainly their trainings are from the Department of Agriculture. A very few (7%) from both groups had foreign exposure visits (i.e. to India). However, 27% in the continued group and 20% in the discontinued group had not received any formal training. A counselor has employed by PAEA as an extension officer to give advice to these growers. Majority (87%) of continued members and 93% of discontinued members stated that the training they obtained was not adequate and sufficient. They all were

expecting to acquire new knowledge and skills on protected crop technologies emphasizing the need for improving the training and extension service.

Technical reasoning

Possible technical reasons (in relation to the use of planting materials, fertilizer, irrigation water, pest and diseases) which could be associated with continuation and discontinuation of protected vegetable production were studied. Any of these factors were not significantly associated with the discontinuation.

The majority of both continued and discontinued members (93%) engaged in the enterprise in their own lands while all in both groups installed arch type polythene (uv-treated) and net (insect proof) covered structures, made up of galvanized iron (GI) frames.

Perception of the members on satisfaction and profitability

Crop production through protected agriculture is usually more expensive per unit of production compared to conventional (open field) cultivation. These additional costs are usually justified if the monetary return per unit of product is higher (Jensen *et al.*, 1995). Perception of the members on profitability and satisfaction was studied in this study. Majority (57%) of the continued group perceived protected agriculture as a “profitable” venture and 53% of that group was in the “satisfied” category. Only 37% of the discontinued group was perceived the business as “profitable” and only 17% was in the “satisfied” category, as obvious from the results (Figure 03).

Protected agriculture entrepreneurs are mostly regarded economic factors as the main reason to adopt (Seyed *et. al.*, 2011). The association between profitability and continuation/discontinuation was tested and a significant association was found ($p=0.000$). About 10%

of the continued group was in the “highly profitable” category and 57% of that group was in the profitable group. For discontinued group about 43% was in the “not profitable” category.

Reasons given by discontinued group and suggestions of the members

Reasons

Figure 04 shows the reasons given by the discontinued members for their discontinuation. Marketing and transport problems were given as the major reasons for discontinuation by the majority (50%). The second severe most reason was pest and diseases attacks (13%). Thirdly, unavailability of labour in time (10%) and fourthly, inability to maintain and low profit (7%) .

Suggestions

Figure 05 shows the suggestions given by both continued and discontinued groups for sustainability and improvement of the protected agriculture enterprises in Sri Lanka. Accordingly the highest percentage of continued members (50%) was seeking training/ knowledge on new technologies. Their second highest (33%) suggestion was market expansion. PAEA is given a quota of crop for each grower based on the market demand. However, some continued members need to further expansion of their business but they are not in a position to do so without a market expansion through PAEA or any other mode.

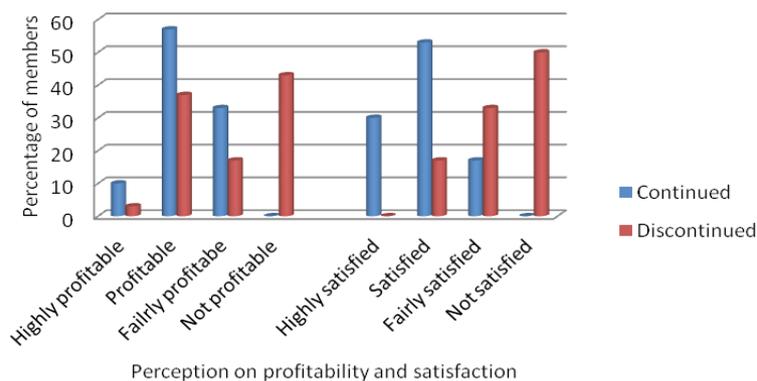


Figure 03: Percentage of members according to the perception on profitability and satisfaction

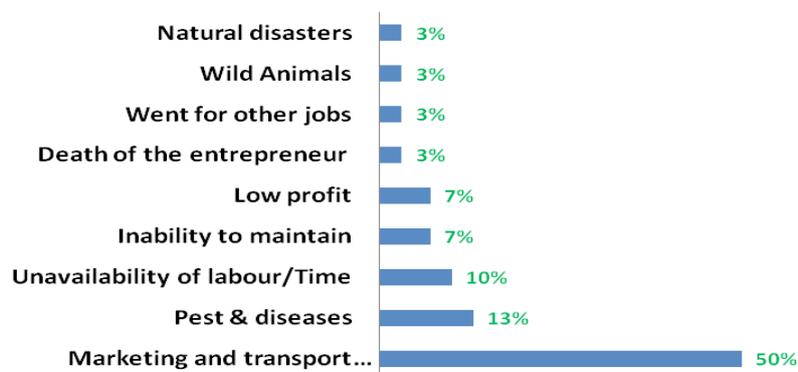


Figure 04 Reasons given for discontinuation by discontinued members

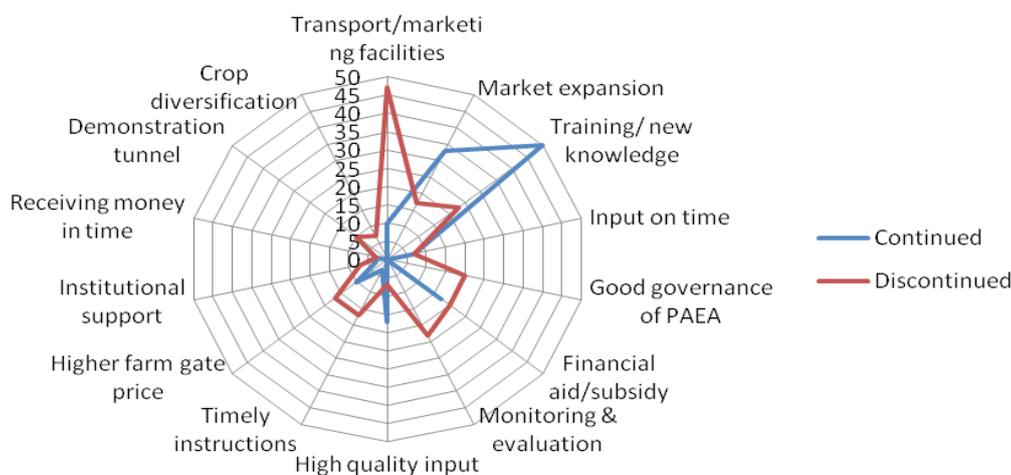


Figure 05: Suggestions given for improvements by continued & discontinued members (Radar which gives values relative to the centre point)

According to the suggestions given by discontinued members, the major (47%) suggestion was to improve transport and marketing facilities and their second highest (23%) suggestion was to monitor and evaluate the projects after implementation.

CONCLUSIONS

PAEA performs a coordinating role for its members, providing essential services. Discontinuation of growers mainly within the first five year period is a significant feature for the protected culture growers registered in the PAEA. Socio economic factors were the major reasons for discontinuation of protected agriculture. It was significantly associated with various aspects of the growers and the nature of enterprise. The majority of discontinued growers were younger (less than 35 years), having a medium level education (G.C.E. (O.L.) and (A.L.) qualified) and engaged in part-time basis. They were not having a support from the family members for running the production process and more dependent on the supporting schemes on investments.

Technological features of their production enterprises did not indicate a significant

association with the discontinuation. Small scale of operation (less than 2000 sqft.) and cultivation of tomato (less- value crop) were common among most discontinued growers. Close correlations indicated dependency on high cost of transport, lack of alternative markets and marginal monetary returns as the other main reasons for the discontinuity after practicing for several seasons. Meanwhile, discontinued member's perspective assured the significance of transport and marketing problems as the major reasons for discontinuation. Those who found protected agriculture profitable have become more enthusiastic than the discontinuing group.

Considering all the above discussed facts, the need of a market research to investigate the demand and supply behavior of the protected vegetable produces can be emphasized, aiming potential future expansions in production and marketing. For further improvements, the protected agriculture projects must be properly evaluated in terms of technological as well as the socio- economic feasibility and sustainability. Supply chain must be reorganized to collect, transport, store and ultimately market the protected culture

produce. The guidelines to growers must cover the peripheral information (such as their education/ experience requirements and investment capacity etc.) in addition to the technological packages. The monitoring and advisory programs must be linked with the small growers to minimize the production risks while reducing the production costs and thus increasing the profit margins. This case study can be a classic example for the relatively slow adoption and mobility of newly introduced agricultural technologies to the traditional farming set up in Sri Lanka

and other countries which have similar socio-economic conditions.

ACKNOWLEDGEMENTS

This research study was funded by University Research Grants (URG/2011/05/Ag) University of Peradeniya, Sri Lanka

Acknowledge the support given by the staff and membership of the Protected Agriculture Entrepreneurs Association (PAEA), Sri Lanka.

REFERENCES

- Chinsiga B. and Chasukwa, M. (2012) Youth, agriculture and land grab in Malawi, IDS Bulletin, Institute of Development Studies. Blackwell Publishing Ltd, 9600 Garsington Road, Oxford OX4 2DQ, UK and 350 Main Street, Malden, MA 02148, USA
- Gunasena, H. P. M. (2001). Intensification of crop diversification in the Asia- Pacific region, FAO Corporate Document Repository, Regional Office for Asia and the Pacific. [WWW.fao.org/docrep/003/x6906e/x690eoe.htm](http://www.fao.org/docrep/003/x6906e/x690eoe.htm) 28.11.2012
- Hanan, J. J. (1997). Green houses: advanced technology for protected horticulture, Colorado State University, Fort Collins, Colorado, CRC Press, Boca Raton Boston, London New York Washington, D.C. pp 7-10
- Mahaliyanaarachchi, R. P, Rosairo, H. S.R and Esham, M. (2004). Potential high value horticultural crops, their financial and marketing feasibility: A study conducted in the Ratnapura district in Sri Lanka, Faculty of Agricultural Sciences, Sabaragamuwa University, Belihuloya, 70140, Sri Lanka.
- Jensen, M. H and Malter, A J. (1995). Protected Agriculture: A Global review, World Bank Technical Paper (No.253), The World bank, 1818 H Street, N.W. Washington, D.C. 20433, USA.
- Murthy, D. S, Prabhakar, B. S, Hebbar, S. S, Srinivas, V and Prabhakar, M. (2009). Economic feasibility of vegetable production under polyhouse: A case study of capsicum and tomato. *Journal of Horticultural Sciences* 4(2):148-152
- Niranjan, F, Gunasena, H. P.M. and Sakalasooriya, M. B. (2005). Controlled Environment Agriculture in Sri Lanka, Sri Lanka Council for Agricultural Research Policy, 114/9, Wijerama Mawatha, Colombo 07, Sri Lanka.
- Weerakkody, W A P. (2004). Protected Culture, Postgraduate Institute of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka.

- Sanwal, S.K, Patel, K.K. and Yadav D.S. (2004) Vegetable Production under Protected Conditions in Neh Region: Problems and Prospects,http://gbpihedervis.nic.in/HTML/vol12_2/pdf/sksanwal.pdf 25.06.2012
- Seyed, J.F., Hosseini,F, Floria, M. and Seyed, M.M. (2011). Factors Influencing the Economic Aspects of sustainable agriculture in Iran, *World Applied Science Journal* 13(2): 287-294
- Sing, K.M and Kumar, A . Strategies for High Value Agriculture Based livelihood: Application of Participatory Rural Appraisal in Afganistan ,SSRN:<http://ssrn.com/abstract=2119766>, 30.07.2012