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Analysis of Nutritional Contribution of Homegardening

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Abstract

The purpose of this paper is to examine the contribution of homegarden products to the food and nutrition of the Sri Lankan's diet. This study was carried out in Mapalana and Radawela, two villages of the Matara district in Southern Sri Lanka. Thirty families from each village were randomly selected and information was gathered using a pre-tested questionnaire. Based on this investigation, the following findings can be highlighted.

Average homegarden size in Mapalana and Radawela was found to be as 0.7 ac. and 0.5 ac., respectively. The corresponding monthly average income was Rs. 310 and Rs. 162. Coconut (*Cocos nucifera*), jak (*Artocarpus heterophyllus*), bread fruit (*Artocarpus incisa*), mango (*Mangifera indica*), guava (*Psidium guajava*), banana (*Musa sapientium*), cloves (*Syzygium eugenia caryophillus*), coffee (*Coffea spp.*) and pepper (*Piper nigrum*) are the most common perennials found in both villages. As annual crops sweet potato (*Ipomea batatas*), manioc (*Manihot esculenta*), chillies (*Capcicum spp.*), brinjol (*Solanum melongena*), and okra (*Hemidesnus indicum*), are often found in homegardens of both villages.

Almost all the homegarden products are for household consumption while major parts of the production of cloves, coffee, and pepper were sent to the local market. At Mapalana , homegarden products claim a share of 12 % of the recommended per capita calorie requirement for an average person in Sri Lanka, and 14 % in Radawela. Contribution of protein to the daily per capita protein requirement from homegarden products is very low at only about 5.8 % and 8.4 % at Mapalana and Radawela, respectively. The above calorie and protein supplies come from approximately 50 % of the land extent under homegardens at both villages. Further, cropping intensity of homegardens at Mapalana was 53 % and 69 % at Radawela.

This study demonstrates that there is a potential to increase the homegarden food production by launching programmes on technical assistance and effective utilisation of existing resources. Efforts should be made to increase the productivity of land resource because a considerable portion of land is being under utilised in this farming system.

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1 Introduction

Sri Lanka's economy is mainly dependent on agriculture which contributes about 21 percent of the Gross Domestic Product (CENTRAL BANK, 1993). Within the agricultural sector, two distinct production areas can be identified. One is a highly commercialised plantation sector which produces tea, rubber, and coconut. The other is the peasant sector producing mainly food crops such as rice, cereals, pulses, root and tuber crops, and vegetables. The peasant sector consists of about 78 percent of the entire population and provides a means of existence for the population.

Food is the major factor which determines growth, maintenance, and tissue repair of the human body. De Mel and Jogaratnam (1977) noted that the supply of food is mainly determined by the effective demand irrespective of the physiological need. In general, the major determinants of the demand for food are the number of the population and its structure, per capita income, prices of other commodities, and taste and preferences of the consumer (MELLOR, 1966). The question, however, is whether the composition and level of the intake of food items indicated by the effective demand will suffice to meet the required quantities for physiological needs: energy, amino acids, minerals, and vitamins.

It was reported by the Government of Sri Lanka (1988) that there has been serious deterioration in the nutritional standards of the population. That is, the national average chronic undernutrition or stunting (inadequacy of height for age) was 36.58 percent. This is the accumulated result of long term food deprivation. The acute undernutrition or wasting (inadequacy of weight for height) was 12.12 percent which is the result of short term food deprivation. Further, it shows that nutritional anaemia among the preschool and school children was over 60 percent while iodine deficiency diseases have increased significantly.

According to the Department of Census and Statistics (1982), the calorie intake in the low income groups (lowest 20 %) varies from 1200 to 1500 calories which is far below the expected norm of 2200 calories per person per day. Tilakaratne (1988) reported that on the basis of calorie intake, about 25 percent of the total population was below the poverty line. Moreover, the daily protein intake of the same group was below 30 g per person which is less than 60 percent of the recommended amount of 48 g for a normal person in Sri Lanka. According to the 1981/82 Consumer Finance Survey, the poorest group, which includes about 12 percent of the total population, spend about 80 percent or more of their income on food (CENTRAL BANK, 1981/82). This suggests that these households are experiencing an acute food shortage. The rapid population growth and slow growth of employment opportunities especially in the peasant sector intensify the further fragmentation of already existing small holdings. This leads to low levels of food production - leading to further malnutrition and undernutrition of the people. Therefore, it is necessary to increase the availability of food in adequate amounts to avoid malnutrition and undernutrition of the people.

In this respect, improvement of homegardening can be considered as one of the alternative to overcome this adverse situation.[1] However, improvement of homegardening has not received much attention to date. Hence, it is important to consider homegarden development as an effective strategy to increase food production. Such an effort can be regarded as an appropriate approach to combat the prevailing food crises in the country, especially in the rural sector. The major objectives of this study are to investigate the existing contribution of homegarden products to the Sri Lankans's diet and to make policy recommendations pertaining to improvement of the peasant farming system.

2 Methods

Information on households and homegardening was collected from 30 randomly selected households in each village. A preliminary investigation was carried out using a structured questionnaire. The questionnaire includes questions on household size, occupation, income, homegarden size, homegarden activities, crops grown and the uses of homegarden products. The data collected were tabulated in master sheets and analysed using simple tables to achieve the above objectives. By doing so cropping intensity was calculated using the following formula stated by Somani and Tikka (1984).

$$Cropping\ Intensity = \frac{Cropped\ area}{Sown\ area} \times 100$$

Correlation analysis was perform to determine the relationship between homegarden size and nutritional supplement (calorie, protein) from homegarden products.

3 Results and Discussion

This section is divided into three parts. The first part describes the general background of the study area. The second part describes the homegardening and associated activities, and the contribution of homegarden products to the Sri Lankan diet is examined in the third part.

3.1 General background of the study area

As mentioned earlier, the two villages selected for this study belong to the low country wet zone. The major part of the Matara district, including these two villages is predominantly an agricultural area. The average household size of Mapalana and Radawela is 5.2 and 4.8 respectively. The distribution of households according to different income categories of the two villages is presented in table 1. It shows that about 63 percent and 56 percent of households in Mapalana and Radawela, respectively were

[1] Homegarden can be defined as a multistoreyed mixed cropping system which includes both perennial and annual crops around the house.

below the income of Rs. 700 per month which is considered as the poverty line in the country (GOVERNMENT OF SRI LANKA, 1988). In Mapalana, about 20 percent of households receive an income between Rs. 700 and Rs. 1,500 per month and about 27 percent of households in Radawela receive this level of income. The percentage of households which receive an income greater than Rs. 1500 per month was the same for both villages - 17 percent.

Table 1: Households by different income categories

Income group Rs/Month	Households			
	Mapalana		Radawela	
	As a percentage of total	Cumulative percentage	As a percentage of total	Cumulative percentage
less than 500	33.0	33.0	26.6	26.6
500 - < 700	30.0	63,0	30.0	56.6
700 - < 1500	19.6	82.6	26.6	83.2
1500 - < 2000	3.5	86.1	3.5	86.7
2000 and above	13.3	100.0	13.3	100.0

Table 2 shows the distribution of people by employment in the two villages. It indicates that 51 percent of households in Mapalana and 31 percent of households in Radawela receive an income from government or private sector employment. About 34 percent and 51 percent of households at Mapalana and Radawela, respectively, receive an income from farming and other type of employment. A higher percentage of people in Radawela mainly live from farming and other casual employment, while the majority of households in Mapalana live mainly from either government or private sector employment.

Table 2: Distribution of households by employment

Type of employment	Households			
	Mapalana		Radawela	
	As a percentage of total	Cumulative percentage	As a percentage of total	Cumulative percentage
Govt. or private	51	51	31	31
Govt. or private plus farming	15	66	18	49
Farming and casual employment	34	100	51	100

3.2 Homegardening

The size of homegardens at Mapalana varies from 0.2 ac. to 4 ac. with an average size of 0.77 ac. At Radawela, the homegarden size varies from 0.1 ac. to 2.5 ac. with an average size of 0.58 ac. Table 3 shows the distribution of households according to the size of homegardens in both villages. It shows that more than 90 percent of households,

in both Mapalana and Radawela, have homegardens of less than 1 ac. About 7 percent of households in Mapalana have less than 0.25 ac. as garden, while 20 percent at Radawela have gardens less than 0.25 ac..

Table 3: Distribution of households according to homegarden size

Homegarden size (ac)	Households			
	Mapalana		Radawela	
	As a percentage of total	Cumulative percentage	As a percentage of total	Cumulative percentage
below 0.25	6.7	6.7	20.0	20.0
0.25 - < 0.50	33.3	40.0	30.0	50.0
0.50 - < 0.75	46.6	86.6	40.0	90.0
0.75 - < 1.0	6.7	93.3	6.6	96.6
1 and above	6.7	100.0	3.4	100.0

3.2.1 Homegarden crops

Annual and perennial crops are commonly grown in homegardens in both villages. Coconut (*Cocos nucifera*), jak (*Artocarpus heterophyllus*), bread fruit (*Artocarpus incisa*), clove (*Syzygium caryophyllus*), coffee (*Coffea spp.*), pepper (*Piper nigrum*), banana (*Musa sapientum*), sweet potato (*Ipomea batatas*), manioc (*Manioc esculenta*), mango (*Mangifera indica*), guava (*Psidium guajava*), brinjol (*Solanum melongena*), okra (*Hibiscus esculentus*) and chillies (*Capsicum spp.*), were the common crops for both villages. Polpala (*Aerua lanta*), gotukola (*Centella asiatica*), and ginger (*Zingiber officinale*) were often grown and used as medicinal plants in both villages.

3.2.2 Cropping intensity

The cropping intensity for both villages was calculated using the formula discussed above. According to the formula, if a crop is planted at the recommended spacing in the whole area cropping intensity will be 100 percent. If two crops are planted at the recommended spacing on the same land the cropping intensity will be 200 percent. The calculated average cropping intensity of homegardens at Mapalana was 53.2 percent and 69.6 percent at Ragawela. This indicates that land used as homegardens was not fully utilised. Further, it shows that at Mapalana, the uncultivated homegarden extent was 46 percent of the total homegarden area, and about 30 percent at Radawela. Further, results show that the uncultivated homegarden area increases with the increase of homegarden size. The correlation coefficient between these two variables at Mapalana was 0.62 and it was 0.52 at Radawela. This indicates that these two variables are positively correlated, suggesting that an increase in homegarden size will result in an increase in the uncultivated area.

3.3 Nutritive value of homegarden products

Almost all the homegarden products were used for household consumption and any excess was sent to the local market. However, all tea leaves were sold and the major parts of the cloves, pepper and coffee products were sent to the market, generating additional income for the households.

3.4 Homegarden activities

Cultural practices, such as fertiliser application, watering, pest and disease control were marginally undertaken in both villages. With respect to fertiliser application, about 10 percent of households at Radawela have applied fertilisers but this was limited to coconut plants. As cattle farming is practised in both villages, there is an available source of organic fertiliser, i.e. compost. However, it was evident from the survey that due to the lack of technical and other extension services nobody was making compost. It is evident that about 13 percent and 3 percent households at Mapalana and Radawela, respectively, have received information on planting of coconut, pepper and banana, but not for any other crops. No watering was practised for any crops in both villages. Although pest and disease attacks were identified by the farmers for crops like vegetables, control measures were not applied.

Table 4 shows the calorific contribution of homegarden products by size of the homegardens at Mapalana and Radawela. It indicates that calorie supplement from homegarden products increases as the size of homegardens rises for both villages.

Table 4: Calorie contribution from homegarden products by size of the homegarden*

Homegarden size (ac)	Households			
	Mapalana		Radawela	
	Calories head/day	As a percentage from recommended level	Calories head/day	As a percentage from recommended level
below 0.25	42.7	1.9	149.0	6.7
0.25 - <0.50	150.6	6.8	168.3	7.7
0.50 - <0.75	250.9	11.4	351.3	16.0
0.75 - <1.00	281.0	12.8	349.2	15.9
1.00 - <1.50	316.0	14.4	482.8	21.9
1.5 and above	370.1	16.8	432.6	19.6
Average	261.9	11.9	322.2	14.6

* Correlation coefficient between homegarden size and calorie contribution from homegarden products: Mapalana 0.9 and Radawela 0.8

At Mapalana, homegardens which are less than 0.25 ac., contribute about 42 calories to the daily per capita energy intake and about 370 calories in the case of homegarden

size greater than 1.5 ac. These calorie contributions correspond to about 2 percent and 17 percent of the recommended amount of 2200 calories for a average person per day in Sri Lanka. At Radawela, homegardens with less than 0.25 ac. contribute about 149 calories, and 433 calories in the case of homegarden size greater than 1.5 acres. These contributions are about 7 percent and 20 percent of the recommended daily per capita requirements for a average person in Sri Lanka. On average, in Mapalana, homegardens contribute about 262 calories and about 322 calories in Radawela. In other words, on average, homegarden products at Mapalana and Radawela contribute about 12 percent and 15 percent, respectively of the recommended daily per capita requirements of calories. As discussed earlier, the higher contribution of calories from homegarden products at Radawela could be attributed to comparatively higher cultivation of coconut, starchy food and fruit crops than that cultivated at Mapalana. At Radawela, about 90 percent of farmers cultivate plantation crops, especially coconut, and 60 percent of farmers cultivate starchy food crops which are the major sources of energy. The comparitive figures for Mapalana were 73 percent and 40 percent, respectively. Moreover, at Radawela, about 60 percent of farmers cultivate fruit crops and 53 percent of farmers at Mapalana. Correlation analysis shows that the contribution of calories and homegarden size in both villages are positively correlated and the figures are 0.9 and 0.8 respectively for Mapalana and Radawela.

The contribution of protein from homegarden products at both villages is similar to the calorie contribution discussed above table 5. The protein contribution too was comparatively higher in Radawela than in Mapalana. At Mapalana, homegardens with an area of less than 0.25 ac. supply 0.5 g of protein - 1.5 g at Radawela. At Mapalana, homegardens greater than 1.5 ac. contribute about 3.8 g to the daily protein intake - 5.8g at Radawela. Compared to the recommended daily per capita protein requirement of 48 g, these contributions are about 8 percent and 12 percent, respectively. On average, at Mapalana, homegarden products contribute about 6 percent of the recommended level of protein requirement and about 8 percent at Radawela. The relatively higher share of protein contribution from homegarden products at Radawela may be due to the fact that more food crops are cultivated in Radawela than in Mapalana. The correlation analysis between homegarden size and protein contribution shows that these two variables are positively correlated in both villages. For Mapalana, the correlation coefficient between these two variables was found to be 0.6 - 0.9 for Radawela.

4 Conclusion and recommendations

Average homegarden size at Mapalana and Radawela was 0.77 ac and 0.58 ac. respectively. Most common perennial crops in both villages were coconut, jak, bread fruit, mango, cloves, pepper and coffee. Among the annuals, sweet potato, manioc, brinjol, chillies and okra were common to the both villages. Further, medicinal plants such as ginger and polpala were found at both villages. At Mapalana, homegarden products have contributed 12 percent of the recommended per capita calorie requirements for an average person in Sri Lanka and 15 percent at Radawela. Further, homegarden prod-

ucts at Mapalana provide 5.8 percent of the recommended per capita protein requirement for an average person and 8 percent at Radawela.

Table 5: Protein contribution from homegarden products by size of the homegarden*

Homegarden size	Households			
	Mapalana		Radawela	
	Protein g/head/day	As a percentage from recommended level	Protein g/head/day	As a percentage from recommended level
below 0.25	0.5	1.0	1.5	3.2
0.25 - <0.50	1.5	3.2	2.2	4.6
0.50 - <0.75	4.6	9.6	4.0	8.3
0.75 - <1.00	3.1	6.5	4.2	8.8
1.00 - <1.50	3.6	7.5	5.4	11.3
1.5 and above	3.8	7.9	5.8	12.1
Average	2.8	5.8	3.8	7.9

* Correlation coefficient between homegarden size and protein contribution from homegarden products: Mapalana 0.6, Radawela 0.9.

Of the total area allocated for homegardens, the share of utilised extent of homegardens approximates 52 percent at Mapalana and 69 percent at Radawela. The cropping intensity at Mapalana was 53 percent and 69 percent at Radawela. Cultural practices such as fertiliser application, watering, application of pesticides and weedicides were very limited. Although there is a good potential to prepare compost using the existing materials no one practises this. Moreover, farmers in these two villages do not receive technical assistance or any other types of information about cultural practices, and identification of pest and diseases - except in the case of coconut and pepper.

Based on the above findings, the following recommendation can be made in order to improve the productivity of homegardens. The productivity of homegardens can be increased by launching development programmes which include the supply of technical assistance, and effective utilisation of existing resources especially land. As it is evident that the considerable portion of homegarden land is not fully utilised, more efforts should be made to increase the productivity of the land resources. One of the alternatives, among others, is to increase the cropping intensity of homegardens. This means that cultivation of more crops in a unit area. It is worth stating that mutual benefits of crops such as shade, nitrogen fixation ability, root depth and resistance to pests and diseases should receive attention when selecting crops.

Analyse des Ernährungsbeitrages durch Hausgärten

Zusammenfassung

Ziel dieser Arbeit war es, den Anteil der Erzeugnisse aus Hausgärten an der Versorgung mit Nahrungsmitteln und Nährstoffkomponenten für die Ernährung in Sri Lanka zu untersuchen. Die Feldforschung wurde in Mapalana und Radawela , zwei Siedlungen im Distrikt Matara im südlichen Teil Sri Lankas, durchgeführt. Nach der Zufallsmethode wurden aus jedem Dorf 30 Familien ausgewählt und durch einen vorgetesteten Fragebogen befragt. Die folgenden Resultate konnten ermittelt werden.

Die Größe der Hausgärten beträgt in Mapalana durchschnittlich je 0,7 acre und in Radawela je 0,5 acre. Die monatlichen Einkommen erreichen entsprechend jeweils 310 und 162 Rupis. Kokosnuß (*Cocos nucifera*), Jackfrucht (*Artocarpus heterophyllus*), Brotfrucht (*Artocarpus incisa*), Mango (*Mangifera indica*), Guajava (*Psidium guajava*), Banane (*Musa saipentium*), Gewürznelken (*Syzygium engenia caryophillus*), Kaffee (*Coffea spp.*) und Pfeffer (*Piper nigrum*) sind die hauptsächlichen Dauerkulturen in beiden Dörfern. Als einjährige Kulturen werden vor allem Süßkartoffeln (*Ipomea batata*), Maniok (*Manihot esculenta*), Chili (*Capsicum spp.*), Auberginen (*Solanun melongena*) und Wundklee (*Hemidesnus indicum*) angebaut.

Fast alle diese Produkte werden im eigenen Haushalt verbraucht, doch wird der Hauptteil der Ernten an Nelken, Kaffee und Pfeffer lokal vermarktet. In Mapalana beträgt der Anteil der eigenerzeugten Nahrungsmittel 12 % des für Sri Lanka empfohlenen Prokopfbedarfes an Kalorien, in Radawela 14 %. Der Anteil an der täglichen Proteinversorgung aus der Produktion der Hausgärten ist sehr niedrig und erreicht lediglich 5,8 % in Mapalana und 8,4 % in Radawela. Die Kalorien- und Eiweißversorgung kommt von etwa 50 % des Bodens der in beiden Dörfern für Hausgärten genutzt wird.Die Anbauintensität in den Hausgärten beträgt in Mapalana 53 % und in Radawela 69 %.

Die Ergebnisse der Feldforschung bestätigen, daß ein Potential zur Steigerung der Hausgärtenproduktion vorhanden ist. wenn entsprechende Programme zur technischen Unterstützung und effektiven Nutzung dieser verfügbaren Ressourcen durchgeführt werden. Es sollten Anstrengungen zur Produktivitätssteigerung unternommen werden, weil sich beträchtliche Landanteile in der Bewirtschaftung dieser Nutzungssysteme befinden.

Estudio de la contribución alimenticia de huertos familiares

Resumen

En el estudio se investigó la contribución de los huertos familiares en el abastecimiento con alimentos y componentes de nutrientes para la alimentación en Sri Lanka. El trabajo de campo se realizó en Mapalana y Radawela, dos comunidades en el distrito de Matara la parte sur de Sri Lanka. Por el método de azar se seleccionó 30 familias en

cada comunidad, quienes se entrevistaron según un cuestionario preparado. Se obtuvo los resultados siguientes:

El área pro medio de los huertos familiares llega a 0.7 acre en Mapalana y a 0.5 acre en Radawela logrando ingresos mensuales de 310 y 162 rupias respectivamente. Cocotero (*Cocos nusifera*), Jackfruit (*Artocarpus heterophyllus*), árbol de pan (*Artocarpus incisa*), mango (*Mangifera indica*), guayaba (*Psisum guajava*), plátano (*Musa saipentium*), clavillo (*Syzygium engenia caryophyllis*), cafeto (*Coffea arabica*) y pimentero (*Piper nigrum*) son los cultivos perennes comunes en las comunidades. Como cultivos anuales se registró generalmente boniato (*Ipomoea batata*), yuca (*Manihot esculenta*), chile (*Capsicum spp.*), berenjena (*Solanum melongena*) y trébol amarillo (*Hemidesnus indicum*).

Casi todos los productos se consumen en las propias familias, mientras que se vende la mayoría de las cosechas de clavillo, de café y de pimiento en los mercados locales. En Mapalana y en Radawela se logra un abastecimiento de 12 % y de 14 % respectivamente del valor de calorías per capita recomendado para Sri Lanka. La porción propia del abastecimiento diario con proteína por los huertos familiares esta muy baja y alcanza solamente 5.8 % y 8.4 % en Mapalana y en Radawela respectivamente. El abastecimiento con calorías y proteína se obtiene de un 50 % de las tierras utilizadas en los huertos familiares en ambas comunidades. La intensidad de cultivo en los huertos familiares alcanza en Mapalana 53 % y en Radawela 69 %.

Los resultados de los ensayos de campo confirman , que existe un potencial para el aumento de la producción en los huertos familiares, cuando se llevaría a cabo programas de asistencia técnica para la utilización eficiente de los recursos disponibles. La implementación de dichos programas sería ventajosa, porque se encuentran áreas considerables bajo este sistema de uso de la tierra.

5 References

1. CENTRAL BANK OF SRI LANKA (1981/82): Report on Consumer Finance Survey, Sri Lanka
2. CENTRAL BANK OF SRI LANKA (1993): Economic & Social Statistics of Sri Lanka, Sri Lanka
3. DE MEL, B. V. AND JOGARATNAM, T. (1977): Population growth, nutrition and food supplies in Sri Lanka. Marga: Quarterly Journal, Vol. 4., No. 1, pp. 60-92
4. DEPARTMENT OF CENSUS AND STATISTICS (1982): Nutritional Status. Its Determinants and Intervention Programmes. Final Report, Ministry of Plan Implementation, Sri Lanka
5. GOVERNMENT OF SRI LANKA (1988): Report by High Level Committee of Officials on Poverty Alleviations through People Based Development. Final report on an action programme, Sessional paper, No 12
6. MELLOR, J. W. (1966): The Economics of Agricultural Development. Cornell University Press, Ithaca, New York.
7. SOMANI, L. L. And S. B. S. TIKKA (1984): Dictionary of Agriculture, Second Revised and Enlarged Edition, Agricola publishing academy, New Delhi, India.
8. TILEKARATNE, S. (1988): Unemployment, poverty and inequality in the post 77 era, Economic Review, People's Bank of Sri Lanka, Sri Lanka.