



Revitalization of citronella industry in the Southern Region

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Abstract

Citronella is one of the most important industrial crops grown by village farmers in the southern region of Sri Lanka. Present total local production and export volume have been declined seriously, resulting abundance of citronella cultivations. But Ceylon citronella has comparatively higher world market price than Java and China citronella. The objectives of the study were to examine the present situation of citronella industry; to identify factors affecting the declining of production and exports and to come up with suggestions and remedial measures for revitalization of citronella industry. The study was mainly based on primary data collected through a field survey from Hambantota and Rathnapura districts. Simple random sampling was utilized to select thirty cultivators and thirty distillery owners of citronella. A structured questionnaire was used to collect the data during 2008. The study revealed that the average farm land extent is about two to less than four acre consisting small and medium scale farmers. Majority of the cultivations are more than twenty years old. The citronella industry is becoming more dependent on correct cultural practices. However, weeding is the only important cultural practice adopted by farmers and no one use fertilizers. The yield variation between major growing areas is found to be very high (Hambantota-10 kg/Ac/harvest, Ratnapura-30kg/Ac/harvest). Present marketing channel of citronella industry mainly consists with growers, distillery owners (collectors) and exporters. Net Present Value (Rs36,684) and B/C ratio (2.508) were higher in Rathnapura district showing more benefits than other growing areas. Uneconomic yield, labour unavailability and insufficient raw materials supply for oil distillation were main factors affecting the declining of production and exports in the point of view of cultivators, processors and exporters. Introduction of subsidy scheme for cultivation and fertilization, mechanization of harvesting, implementation of productivity improvement programmes for existing citronella cultivations such as replanting, introduction of new process to purchase oil based on quality, expansion of extension services and development of infrastructure facilities are suggestions for revitalization of citronella industry in the southern region.

Keywords: Citronella, Cultivators, Distillery owners, Exports

Introduction

Citronella belongs to family Graminae and genus *Cymbopogon*. It is indigenous to Sri Lanka. The two principle types of Citronella grown in Sri Lanka are Ceylon type (Heen Pengiri) *Cymbopogon nardus* and Java type (Maha Pengiri) *Cymbopogon winterianus*. According to the recent census on agriculture (2002), present total land extent is about 974 ha which include 690 ha from Hambantota district and 277 ha from Rathnapura district. A third small area of 6 ha is reported in Matara

district (DEA database, 2008). Currently, citronella cultivation has concentrated only to Katuwana, Netolpitiya, and Panamura area including 12 distillery units from Hambantota district and 35 units from Rathnapura district. By 1890, Sri Lanka was the only country exporting citronella oil. But in 1997, Sri Lankan contribution to annual world production (5000 tonnes) was 200 tonnes (Oyen and Dung, 1999). Sri Lanka has exported 93 MT of citronella oil in 1985 and it has declined to 23.2 MT in 2005. Figure 1 gives details of Sri Lanka's exports for last 35 years.

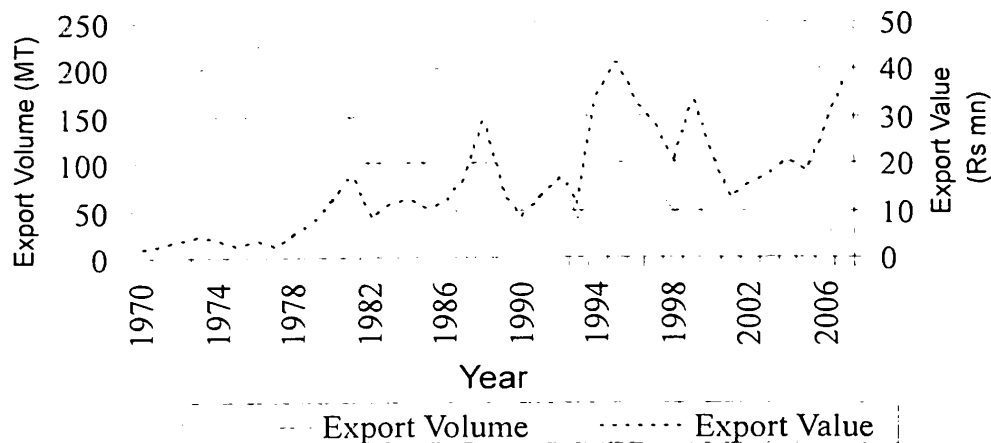


Figure 1. Export Performance of Ceylon Citronella Oil
 Source: Department of Export Agriculture (2007)

At the beginning of year 2007, the spot price of Ceylon citronella was US\$10/kg and now it has reached up to the level of US\$20/kg (EDB database, 2008).

Justification of Research Problem

Increase global competition has opened the way to diversify the export agriculture sector aiming at local and export markets. In view of this, citronella is suitable as a priority area for further developments. Citronella is an export agricultural crop that earns a valuable amount of foreign exchange. But, citronella cultivated land extent has declined seriously from 40,000 acres in 1911 to 974 hectares in 2002 (DEA database, 2008). The total exports also have recorded a decline from 193 MT to 19.4 MT during the period of 1970 to 2007 (EDB database, 2008). It shows the trend of citronella farmers leaving the industry. So, it is necessary to identify available constraints, difficulties and remedial measures regarding citronella for expansion of production as well as exports.

Objectives

The general objective of the study was to examine the existing condition and identify the potential for revitalization of citronella industry in the southern region. Specific objectives were;

- ◆ To examine the present situation of citronella industry,
- ◆ To identify factors affecting the declining of production and export in citronella industry,
- ◆ To make suggestions and remedial measures for revitalization of citronella industry.

Methodology

The study was conducted in Hambantota and Rathnapura districts covering 5 agrarian service center areas and the sample population was selected in order to represent cultivators and distillation units' owners. Sample size was 30 cultivators and 30 distillery owners. Samples were selected on the basis of the lists provided by Tangalle and Rathnapura regional office of Department of Export Agriculture (DEA) and Export Development Board (EDB). Simple random sampling method was used to select sample units. A survey was conducted with structured questionnaires. Informal discussions were also carried out with assistance directors of Tangalle and Rathnapura district office of DEA and with agricultural officers in Katuwana and Panamure areas.

Results and Discussion

Present Situation of Citronella Industry

(a) Cultivation

Citronella was the main crop grown in the surveyed areas, probably due to the soil and climatic conditions being more suitable. Other crops grown in surveyed areas were paddy, coconut, cinnamon, fruits and vegetables.

The average size of a farm land owned by a cultivator in Rathnapura district was about 3.72Ac and in Hambantota district land size was about 2.05Ac. Field investigation revealed that Hambantota district has comparatively old plantations nearly 30 years. Further, Replanting in citronella fields was not a common practice in Hambantota district (20%) while it was much common in Rathnapura district. Up to 93% of holders were owned mono cultivations and only 7%

were owned mixed cultivations in Rathnapura. In Hambantota, mixed cultivation percentage was about 20%. A large proportion of mixed farmers have intercropped citronella with coconut than other crops like cinnamon. One of the main reasons for these disparities in two districts was that the export agriculture assistant scheme was executed in Rathnapura district and it facilitated cultivators to obtain subsidy for mono cultivations. The availability of planting materials is also very critical factor for cultivation. In comparison Rathnapura (73%) has this problem more than Hambantota (40%).

Cost of planting materials, which need to cultivate 1 acre of land area also was highly different between two districts. Planting materials from 2/6th of acres (In villages it is called as two "alli") are needed to replant 1Ac of land and the cost of one *alli* in Panamura area was about Rs3,500. The cost of same amount of planting materials in Hambantota was very low in price (Rs200). Most of the farmers in Hambantota were given planting materials for free of charges because of the low demand due to low oil yielding ability of that strain. Even though the DEA has recommended using "grass mixture" fertilizer for citronella, almost all the farmers were not using any inorganic fertilizer for their cultivations. Usages of organic fertilizer also were negligible. All of farmers in the sample cultivate citronella completely under the rain fed conditions. Weeding is the only important management practice adopted by citronella farmers. It directly affect on citronella causing yield reductions and quality problems. 93% of citronella farmers in Rathnapura district practice weeding 4 times/year after each harvest but farmers (80%) in Hambantota district practice weeding only 2 or 3 times per year.

Harvesting can be done both manually and using machines. About 60% of farmers in Rathnapura district use machine harvesting, which was modified using a grass cutting machine. But farmers in Hambantota still use manual harvesting. Citronella can harvest in 3 months intervals. Both districts follow 4 harvests/year. Labour scarcity is one of the major constraints in citronella industry. Specially in Hambantota district labour unavailability was a serious problem. Both districts paid daily wages for land preparation and planting while paying wages per "wadiya" (charge) basis for harvesting.

(b) Processing of Citronella Oil

Distillation plant is the center which is used for distilling of citronella oil from leaves. There were only 12 and 35 functioning distillation units respectively in

Hambantota district and Rathnapura district. In Hambantota, nearly 42% of distilling units were very old ranging above 30 years old. Any new distillation plant (<10 years old) couldn't be observed in Hambantota district. But in Rathnapura district, 72% of distillation units were below 10 years old. Shifting and establishing of citronella cultivations in Rathnapura districts was occurred in later time periods than Hambantota and it was the reason to having young distillation plants in Rathnapura. Most of the distillation units had two stills. The capacity of a still was not uniform. It ranged from 300 to 500 bundles (250 to 350kg) of citronella grasses per still per charge. Distillation units having two stills were facilitated nearly 3 charges (wadi) per day under normal working conditions. But in Hambantota district, 25% of distillation units were distilled 4 charges per day while it was about 5.6% in Rathnapura. Working time period per day for a distillation unit was totally depended on production situation. Even though the capacity of production was high, the number of charges distilled per day was low due to insufficient raw material availability. In Panamura area, 72% of distillery units take 4 hours to complete one charge of oil distillation. About 92% of distillation units which were in Hambantota were distilled one charge within 3 to 3.5 hours. The well known fuel type for distillery units is dried citronella leaves. The investigation revealed that, it was hard to find distillery units' owner who used fire wood or any other fuel type to distill oil. Fuel requirement to distill one charge of fresh leaves was about half of dried citronella charge (1/2 wadi). Therefore, the fuel requirement per day (to distill 3 fresh charges) was about 1.5 charges of dried citronella leaves. Almost all the distillery owners (94%) is used electricity to pump water to cooling tank.

In citronella industry, the distance between harvesting place and the processing unit has a relationship. According to the results, the average distance for distillation unit is about 1km. Even though there are distillation units within close distances, most of the farmers have usually used a selected still throughout the past. Selection of a distillation unit is depended on many factors including both social and economic considerations such as performances of distillation plant, distillation fee, personal relations and ability to get credit facilities etc. Half of the surveyed cultivators use tractors to transport citronella leaves from field to distillation unit. 47% of farmers use bullock carts. Only few farmers (3%) who are very close to the distillation unit do not use any vehicle.

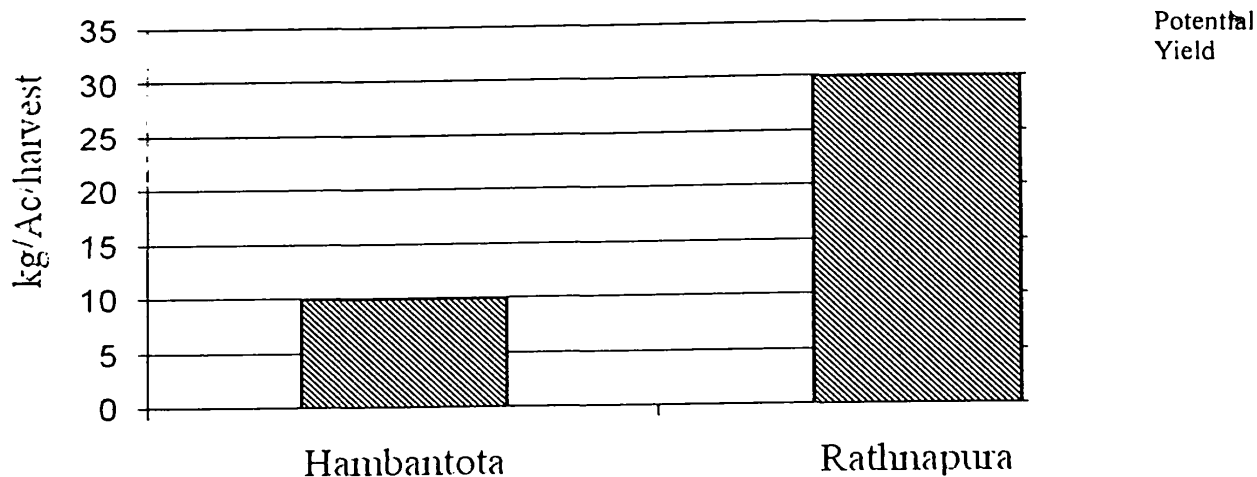


Figure 2. Distribution of Farmers According to Average Oil Yield

Specially in Panamura area, farmers do not involve in transportation. It is totally done by processors. The average cost to transport one charge of citronella herbage is about Rs200. It is depended on the distance, type of vehicle and infrastructure facilities such as road conditions. Distillery owners charge the farmers for the use of their facilities by taking a fraction of the oil production from each charge of grass distilled. This fraction vary from 1/7 to 1/8, with the most common proportion being 1/8 of the total production in Rathnapura district and 1/7 of the total production in Hambantota district. The survey has revealed that the average yield of Hambantota district is only up to 5.5 bottles/Ac/harvest while Netolpitiya farmers has an oil yield of 8.5 to 9 bottles/Ac/harvest. In Panamura area, the average oil yield is about 12.5 bottles/Ac/harvest. The strain grown in Panamura area has good oil yield than other strains (Figure 2).

(c) Marketing

All distillery owners act as village level/small scale oil collectors. They purchase oil from cultivators on cash. Some leading processors collect citronella oil from other distillery owners also. They act as large scale collectors. During the period of data gathering, the price received by a farmer was about Rs1,250 per bottle

in Panamura and Rs1,300 per bottle in Hambantota district. Buying price in Panamura was lower than Hambantota due to transportation cost; because oil extracted in Panamura was finally sold to leading essential oil companies in Hambantota district. Distillery owners who sell oil directly to exporters earn Rs2,000 per bottle while others who sell oil to large scale collectors earn Rs1,800 per bottle. The survey reveals that about 75% of distillery owners have sold their oil directly to exporters while rest (25%) sell oil to large scale collectors in Hambantota district. But in Rathnapura district about 61% of distillery owners sell oil to large scale collectors while 39% of processors were sell oil to exporters. The reason for this difference is most of the oil exporting firms are situated in Hambantota district and therefore Hambantota distillery owners have more chances to sell oil to exporters.

(d) Problems and Constraints in Citronella Industry

An attempt was made to identify main problems and constraints faced by cultivators and processors in surveyed area using a "semantic differential scale" which ranging from strongly agree to strongly disagree (+2 to -2).

Table 1. Problems and Constraints Affecting the Cultivators

Perception of Cultivators	Mean	Remarks	Z Value
Cultivation and production problems			
Uneconomic yield due to old cultivations	1.6	Strongly agree	4.741
Insufficient labours availability	1.9	Strongly agree	4.781
High labour cost	1.1	Agree	4.541
Transportation and processing problems			
Poor road facilities	1.5	Strongly agree	4.64
High transportation cost	0.8	Agree	3.904
Marketing problems			
Distillers dominate in trade	1.4	Agree	4.782

Table 2. Problems and Constraints Affecting the Processors

Perception of Distillery Owners	Mean	Remarks	Z Value
Processing problems			
Insufficient supply of raw materials	1.8	Strongly agree	4.632
Lack of new technology	0.6	Agree	2.876

Results were analyzed using "Wilcoxon sign test". According to the results, low yield and labour scarcity are one of the main problems which cultivators have to face in the industry. Further they are facing limitations due to bad infrastructure facilities specially in transporting harvest to the distillation. According to the distillery owners' point of view, they do not have any problem related to quality of raw materials and marketing but they are demanding for new technology and the supply of raw materials. (Table 1 & 2).

(e) Profit Margin Analysis

Profit margin was analyzed only to Rathnapura district as Hambantota had already very old plantations which

records poor yield and poor adaptation on recommended cultural practices. According to the results, a farmer who has 1 year old cultivation (1ha) can get a net profit of Rs167,335. Table 5 shows net present Value (NPV) and Benefit Cost (B/C) ratios at 5% discount rate for Panamura cultivations where is more profitable than other areas

The main reason to having low profit margins from Katuwana and Walasmulla ASC areas is poor oil yield which can obtain from fresh leaves distillation. All other costs on citronella industry were not much differing for each ASC areas.

Table 3. Profit Margin Analysis for Panamura ASC Area

	Age of citronella plantations (Year)				
	1	2	3	4	5
Land preparation (Md/ha)	40				
Planting (Md/ha)	20				
Weeding (Md/ha)	50	65	65	65	65
Labour cost @ 500Rs	55 000	32 500	32 500	32 500	32 500
Harvesting (1500Rs/charge)	27 000	43 200	43 200	43 200	43 200
Planting materials	7 000				
Transportation	3 600	5 760	5 760	5 760	5 760
Distillation labours cost (2 labours)	3 000	4 000	4 000	4 000	4 000
Distillery fee	36 565	58 500	58 500	58 500	58 500
Total cost (Rs)	125 165	143 960	143 960	143 960	143 960
Oil yield (bottles)	225	360	360	360	360
Income @ 1300Rs/bottle	292 500	468 000	468 000	468 000	468 000
Net Profit (Rs)	167 335	324 040	324 040	324 040	324 040

Table 4. Profit margin analysis for all ASC area

	Age of citronella plantations (Year)				
	1	2	3	4	5
Panamura ASC area	167 335	324 040	324 040	324 040	324 040
Netolpitiya ASC area	122 220	242 955	242 955	242 955	242 955
Middeniya ASC area	101 415	210 757	210 757	210 757	210 757
Walasmulla ASC area	21 185	82 610	82 610	82 610	82 610
Katuwana ASC area	18 500	67 645	67 645	67 645	67 645

Table 5. NPV and B/C Ratios for Panamura ASC Area.

Discount Rate	NPV (Rs)	B/C
5%	36,684	2.508
10%	18,158	2.431
15%	11,809	1.401

Factors Affecting for the Declining of Production and Exports

To identify main factors affecting for the declining of production and exports “semantic differential scale” was used. Results were analyzed using “Wilcoxon sign test”. Following perceptions were significant in 5 % significant level. In the point of view of cultivators, uneconomic yield, lack of labours and poor infrastructure facilities were main factors affecting the declining of production. According to the perception of distillery owners, the main factor to declining of exports was lack of sufficient raw materials to distill oil.

During the mid 90 s, low price received for citronella was the main reason for the leaving of citronella industry. But at present, all farmers are satisfied with the present price levels and it is not a reason for the declining of production. Lack of systematic replanting process and cultivated low oil yielding strains are the major reasons to having uneconomic yield from existing cultivations.

Suggestions and Remedial Measures for Revitalization of Citronella Industry

- ♦ Introduce sound subsidy scheme for fertilization (inorganic) and cultivation.
- ♦ Motivate farmers to use organic fertilizers.
- ♦ Introduction of improved high oil yielding varieties specially for Hambantota district.
- ♦ Establishment of nurseries to purchase planting materials in village level.

- ♦ Implementation of productivity improvement programmes for existing cultivations.
- ♦ Mechanization of harvesting with suitable instruments.
- ♦ Introduction of high performing distillery plants and modern technology.
- ♦ Introduction of new process to purchase oil based on quality instead of quantity. (According to Geraniol%)
- ♦ Expansion of extension services.
- ♦ Provide solutions for land ownership problems in citronella growing areas.
- ♦ Development of infrastructure facilities like roads.
- ♦ Introduce and establishment of citronella oil based industries in domestic market.

Conclusion

At present, citronella is a declining industry showing rapid decline in production as well as export volume. But, there was an acceptable increase in export value in recent past. Continuously during last three years world market prices of Ceylon citronella oil have recorded comparatively much higher values than Java and China citronella oil.

The average extent of a farm land was 2.05 Ac in Hambantota and it was about 3.72 Ac in Rathnapura. Therefore the citronella industry essentially consists of small and medium scale farmers. Most of the farmers in Rathnapura have expanded cultivated land extent during the recent past due to high price hike. Currently, the yield variation between major citronella cultivating areas is found to be very high. (Hambantota-10kg/AC/harvest, Ratnapura-30kg/ AC/ harvest).

Table 6. Factors Affecting the Declining of Production

Perception of Cultivators	Mean	Remarks	Z Value
Insufficient labour availability	1.67	Strongly agree	4.213
High cost for labours	0.93	Agree	2.398
Poor infrastructure facilities	1.57	Strongly agree	4.541
Uneconomic yield	1.70	Strongly agree	4.557
Poor performances of distillation units	0.57	Agree	2.172
Perception of Distillery Owners			
Lack of sufficient raw materials	1.87	Strongly agree	4.641
Insufficient labour availability	0.56	Agree	3.103
High labour cost	0.70	Agree	3.673

The farm gate price of Ceylon citronella oil at the time of the survey was 1300 Rs per bottle. Net present value and B/C ratio of Rathnapura were comparatively higher than in Hambantota district. Therefore it can be concluded that citronella cultivation in Rathnapura is more beneficial.

In the point of view of cultivators, uneconomic yield, lack of labours and poor infrastructure facilities were main factors affecting the declining of production. The labour shortages are likely to be more problematic in future citronella production. In the point of view of processors, the main reason for the declining of production was lack of raw materials for oil distillation. Insufficient oil supply from local suppliers was the main factor affecting the declining of oil exports. Therefore, there is a strong relationship between factors affecting the declining of production and exports in the point of view of growers and processors.

Introduce sound subsidy scheme for fertilization and cultivation, implementation of productivity improvement programmes for existing citronella cultivations, mechanization of harvesting, introduction of high performing distillery plants, introduction of new process to purchase oil based on quality instead of quantity (According to Geraniol %),

expansion of extension services and development of infrastructure facilities would be main fruitful approaches in order to revitalization of citronella industry in the southern region.

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