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THE ESSENTIAL OIL EXPORT SECTOR OF HAITI:
Trends, Problems and Policy Options
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*Unless otherwise noted, the data refers to the Haitian Fiscal Year.

EXECUTIVE SUMMARY

(i) Between 1950 and 1980 the value of essential oils exports has grown very fast. Since 1970-74, however, this growth has reflected much more the behaviour of average unit prices rather than the trend in physical volume. The latter has been declining since 1970-74. The current situation reflects particularly the problems confronted by vetiver oil exporters.

(ii) Vetiver oil is the most important essential oil product. It represents at least half the value of the total for any given year. It is followed by lime oil and amyris in order of importance. These three products account for 95% of the total value of essential oils exports in general. Haiti also exports a small volume of bitter orange oil.

(iii) Essential oils exports still remain a marginal source of foreign exchange for the Haitian economy. The period 1975-1979 represented the peak period for essential oils exports as they averaged \$7.8 million a year. The highest value of essential oils exports was reached in 1978 with \$9.7 million. Over the past three years, 1980-1982, the annual average of essential oils exports has been around \$5 million.

(iv) While essential oils do not have a great importance at the national level, they do have a tremendous impact on the southern region. This is because vetiver is grown mainly around the Les Cayes area. The area also contains a fair number of plants processing vetiver and lime.

(v) At the processor's level, the essential oils sector appears to be reasonably competitive: the technology is stable, standard and simple; capital costs are not high even by Haitian standards and the supply of inputs does not constitute a tremendous problem. In the case of lime oil, however, the need to process fresh fruits does pose a logistical problem. The main problem in essential oils may well be located at the international marketing level, especially for the smaller firms.

(vi) At the farm's level, the production of vetiver and lime is extremely scattered. This reflects both the relatively low yield per hectare and the small size of the average farm. Consequently, the combination of a widely scattered production pattern at the farm level and the enormous amount of agricultural inputs that must be processed means that the domestic marketing channels for the raw materials is very complicated and extremely labor intensive.

(vii) The price of vetiver roots to the farmer does not seem to have changed greatly over the last decade. It may even have fallen in real terms (constant dollars). On the other hand, the price of lime appears to have improved. Not much is known about the trend in amyris wood prices.

(viii) The imposition of additional export taxes does not seem to have been the main cause of the present situation, especially for vetiver. In fact the tax on vetiver oil exports has been reduced to 5% of the export value since 1981, without any visible positive impact on the industry. On the other hand, the pricing policy of the Office de Commercialisation des Essences Aromatiques d'Haiti (OCEAH) may be at the root of the problem.

(ix) Internationally a substantial share of Haiti's essential oils is bought by one firm, Polarome. This situation makes it unwise to advocate the elimination of the Office as the sole marketing agent for Haiti's essential oils exports. Yet the Office's poor pricing performance makes it imperative to give the private processors a voice in its operational decisions. The functioning of the marketing board need not be carried out by OCEAH as they could easily be performed by OPRODEX.

(x) The possible areas of policy intervention that have been identified are as follows:

- Improvement in the capabilities of the marketing board to monitor the trends in the international environment. Creation of a processor's advisory group to guide the marketing board pricing decisions.
- Investigation of the possibilities of further downstream processing and of product diversification for both vetiver and lime oil.
- Furnishing of low interest loans to induce the processors to invest in energy saving equipment and to modernize processing methods especially in the case of lime.
- Investigation of the possibilities of growing vetiver in a way that minimizes the damage to soil resources.
- Investigations of the botanical or genetical properties of vetiver to evaluate the possible ways of improving yields per hectare.

INTRODUCTION

Essential oils exports are a relatively recent phenomenon in the country's economic history. Contrary to traditional products such as sugar and coffee, which have been exported since colonial times, the first exports of essential oils took place only 50 years ago. Essential oils display some other interesting, distinguishing features. While traditional agricultural exports such as coffee, cotton and sugar have stagnated or disappeared, the growth of essential oils has been rather remarkable: exports amounted to 555 kg worth \$1,431 in 1932-33. By 1950, the exports volume was 84 tons and it generated \$615,600 of foreign exchange. For 1982, Haiti exported 215 tons of essential oils for \$5.1 million. Not only has the volume and amount of essential oils exports risen but there has also been much product diversification, with some of the early products such as petit grain, neroli and sweet basil disappearing. On the other hand vetiver and amyris were not exported until 1943-44.

A second distinguishing characteristic of essential oils is that they are not primary products per se, since there is a fair amount of industrial transformation. To be sure, it is a relatively simple process which takes place in rudimentary plants, some of which are really make shift operations. Still, these units are producing an output which is internationally competitive, a result that was achieved without the help of the fiscal incentives embodied in the industrial promotion laws since essential oils production preceded the first industrial promotion law of 1949.

Not only is the Haitian essential oil product internationally competitive, but Haiti is a major producer of some of them. Indeed, Haiti is the only producer of amyris, the largest producer of vetiver and the second largest producer of lime. This is in marked contrast with other agricultural exports for which the country is at best a marginal producer, being thus a text book case of the competitive supplier unable to influence price and/or volume transacted. With respect to vetiver, amyris, and even lime to lesser degree, Haiti can influence prices and quantity transacted. Indeed, this may be linked to the problems experienced in the case of vetiver since 1979, an issue that will be more thoroughly investigated in the second chapter of this report.

It should be pointed out that if Haiti is a significant producer of these products, the buying side of the market is fairly concentrated also, not only because the bulk of Haitian essential oils exports goes to the United States but also because within the United States one firm plays a determinant role. The theoretical issue of reaching an equilibrium under bilateral monopoly conditions is thus very relevant to our analysis given the existence of a governmental marketing office that enjoyed monopoly selling privileges and given that this office replaced a producer's association endowed with similar characteristics. The question of the proper policies and rationale for the existence of this office, given this strategic setting, are critical points that will also be discussed in this report.

Given the success, relative to the other agricultural export products, of the essential oils sector, one must be prudent in recommending public policy measures, or public policy intervention since it is not certain that they will

not do more harm than good. Yet, if caution is warranted with respect to marketing and pricing issues, there may be room for technological improvements induced by public policy measures. One of the fascinating aspects of the essential oils sector is that all the plants look very much the same, thus testifying to a phenomenon of mimicry with respect to the industry's pioneers. If the plant's layout and the design and fabrication of the stills tell a lot about industrial demonstration effects, the same elements are also testimony to the backwardness of much of the process. While one must be very careful not to advocate mindless modernity and in so doing induce a shift towards a more capital intensive profile, the fact that the essential oils sector is extremely energy intensive makes one very aware of the potential energy savings that might come in the wake of technological improvements. For instance, only one out of the 10 plants that we visited made an attempt at thermal isolation to conserve energy. Since most of these plants use wood as a source of energy, accelerated deforestation has been an unfortunate by-product externality of the production process. Thus, ways to improve energy efficiency and or to enhance chemical recovery must be an absolute priority of public policy in this sector.

At this point we must also indicate that beyond purely technical issues such as energy efficiency or the possibilities of using the tremendous amount of vegetal waste generated, one must be careful to distinguish among the various products. This report will deal essentially with the three main products: vetiver, lime and amyris. The fourth one, bitter orange, will not be treated here because this product is exported by two plants under rather peculiar arrangements. In one case (Marnier L'Apostole) the plant is a wholly

owned subsidiary of the buyer and furthermore the raw material (bitter orange) is grown on a small plantation owned by the firm. In the second case, the Haitian producer, Guacinal, has a long term-contract with the foreign buyer (Cointreau) and also grows its own supply on a 100 hectare plantation. Thus the peculiarities of the marketing arrangements, for both input and output, are the main reasons for excluding this product. The other three really represent the bulk of essential oils exports: 99% from 1960 to 1975 and 87% in 1980-82. As seen in table 2 and Graph Ia, vetiver oil is the main product, accounting for over 50% of the total value during the 1950-1980 period, followed by lime and amyris. The relative importance of lime was the greatest in the 1965-1974 decade, when it amounted to around a third of the total value of these exports. Since 1980 the relative weight of lime oil exports has doubled as compared with the 1975-79 period. Since 1975, amyris oil exports have represented about 10% of the total export value.

It is both the tendency to lump all the products together and the importance of vetiver which induce observers of the industry to talk about the "crisis" in the essential oils sector since 1979. The aggregate export value did fall by 30% or so between 1980-82 and 1975-79; but this reflected the severe drop (52%) in the export value of vetiver oil, while lime oil exports rose by almost a third, and amyris went up 7% during the same period. Indeed the elucidation of what elements precipitated the decline in vetiver oil exports is one of the main objectives of this report. In particular, the issue of the incidence of the tax burden will be of primary concern.

Despite this significant growth since 1950, essential oils, including

vetiver, remain relatively minor export items. The peak period average for essential oils exports was \$7.3 million in 1975-79, declining to \$5 million in 1980-82. For the same periods, vetiver oil exports averaged \$5.3 million in the former and \$2.5 million during the latter period. While these amounts are unlikely to have produced a tremendous impact at the national level, the fact that the essential oils activity is disproportionately located in the southern peninsula, around Les Cayes, places these numbers in a significantly different perspective. In other words, it is the tremendous regional impact of the vetiver centered economic activity that really makes this problem a serious policy matter.

The following report aims at establishing the basic facts about essential oils production and analyzing the main policy issues involved. The first chapter discusses the performance of the sector since 1950, and describes the main features of the industry by focussing on each individual product. The second chapter analyzes the main policy issues: taxation, pricing and marketing as well as the optimal institutional framework. The concluding chapter includes a delineation of possible areas of intervention for the Mission.

CHAPTER I - THE EVOLUTION OF THE ESSENTIAL OILS SECTOR SINCE 1950

The essential oils industry started in Haiti in 1930-32 in the wake of the dedicated efforts of a French agronomist, Mr. Henri Ganot, who successfully began to export in 1932-33 by selling 555 kg of petit grain for \$1,431. For the next decade or so, petit grain was the only essential oil exported. In 1940-41 the country started to export neroli, to which were added lime, basilic and lemon grass the next year. In 1943-44, vetiver and amyris joined the list of exported essences. By fiscal year 1944-45, there were 39 distilleries in operation in the country and they contributed to the export of almost 40 tons of essential oils valued at close to \$400,000.¹ Table 1 documents the rather remarkable, if erratic, growth path of these exports. As can be seen in Graph I, the growth of the total value of all essential oils was almost exponential, in nominal terms. The total value tripled between 1955-59 and 1965-69 and tripled again between the latter period and 1975-79. The average amount for 1980-82, the most recent period, represented a 30% decline over 1975-79, although it still amounted to more than twice the average amount for 1965-69. While on a general upward trend since 1950-54, the physical volume of these exports did not show the same strong trends. As also evidenced in Graph I, the absolute volume of essential oils has been falling since the peak of 1970-74 when, on average, 300,000 kg were exported. 1974 represents the record year of the whole period with almost 400 tons of

¹ An informative description of the early history of essential oils is to be found in two short articles written by the late L. Déjoie in Numbers 14 and 15 of the Bulletin de la Chambre de Commerce d'Haiti dated April-June and July-September, 1945.

Table 1
TRENDS IN ESSENTIAL OILS EXPORTS 1950-1982

	<u>Volume Kg.</u>	<u>Value \$</u>	<u>Unit Price \$ per Kg.</u>
1945	39,561	367,000	9.27
1950	84,676	615,600	7.27
1951	88,085	985,439	11.18
1952	117,354	1,165,684	9.93
1953	84,934	572,715	6.74
1954	97,176	789,615	8.12
1955	125,829	1,052,065	8.36
1956	119,425	840,142	7.03
1957	90,684	579,827	6.39
1958	70,000	677,219	9.67
1959	105,166	690,663	6.56
1960	105,555	1,217,722	11.53
1961	165,502	1,474,000	8.90
1962	187,025	1,514,507	8.09
1963	118,529	1,059,849	8.94
1964	114,187	844,769	7.39
1965	166,418	1,215,462	7.30
1966	238,999	2,003,124	8.38
1967	287,682	2,714,162	9.43
1968	269,639	2,744,388	10.17
1969	304,829	3,075,178	10.08
1970	205,875	2,658,402	12.91
1971	298,955	3,049,103	10.36
1972	316,132	3,316,162	10.48
1973	333,200	3,697,881	11.09
1974	394,426	6,522,011	16.53
1975	225,519	4,881,579	21.64
1976	329,934	8,248,504	25.00
1977	262,828	6,440,129	24.50
1978	310,738	9,700,340	31.21
1979	280,640	7,458,918	26.57
1980	241,603	5,406,378	22.37
1981	192,070	4,614,747	24.02
1982	215,308	5,187,139	24.09

Source: 1945: Pan American Union, Foreign Commerce of Haiti 1941 - 1947, table & page 19. 1950 to 1955: BNRH, Rapport Annuel du Departement Fiscal pour l'Exercice octobre 1954, septembre 1955, page 26. 1956 and 1958: OEA; CEPAL; BID - Tripartite Mission, Cuentas Nacionales de Haiti. All other years: Administration Generale des Douanes, Annual Report.

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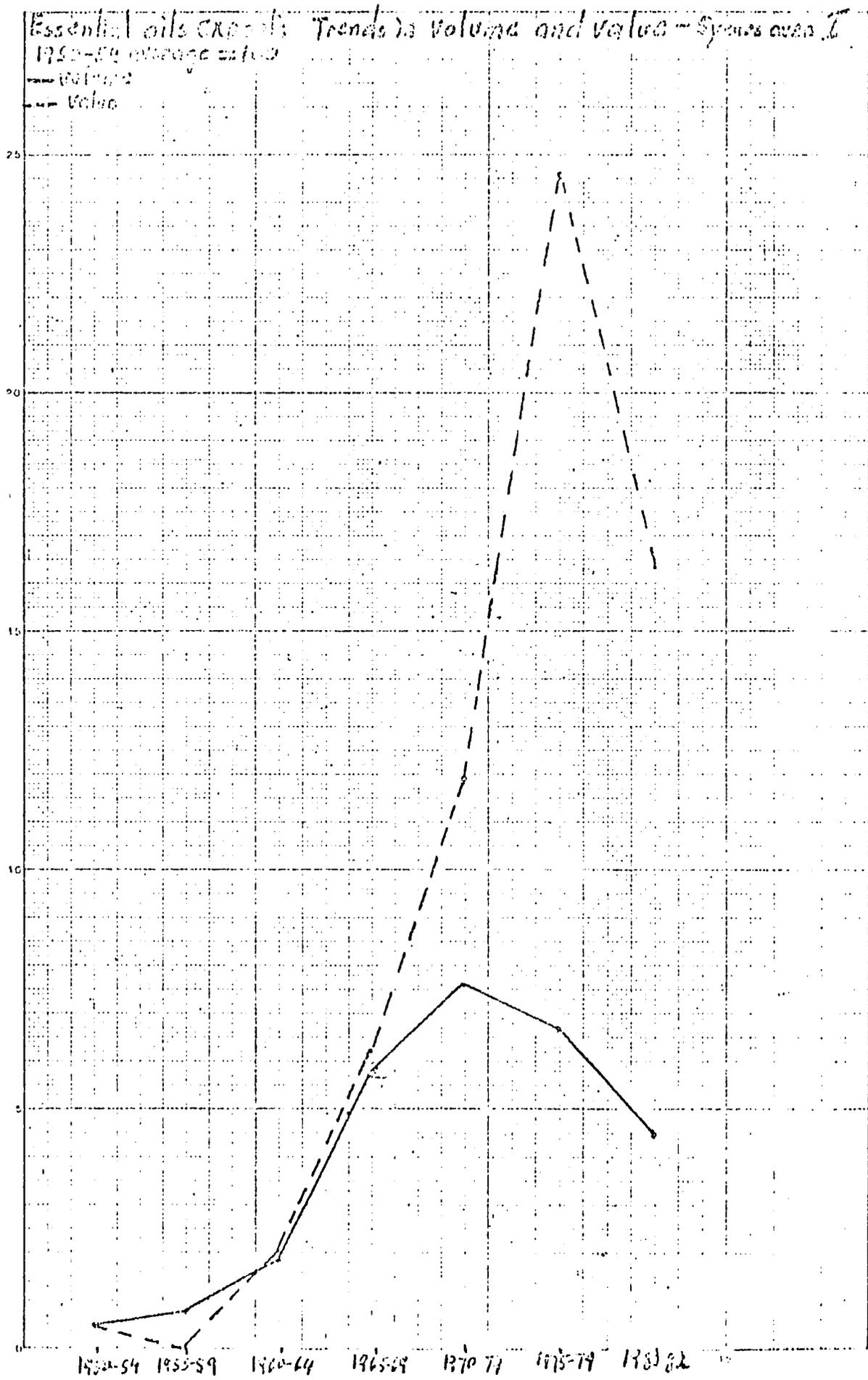


Table 2
ESSENTIAL OILS EXPORTS: SHARE OF 3 MAIN PRODUCTS

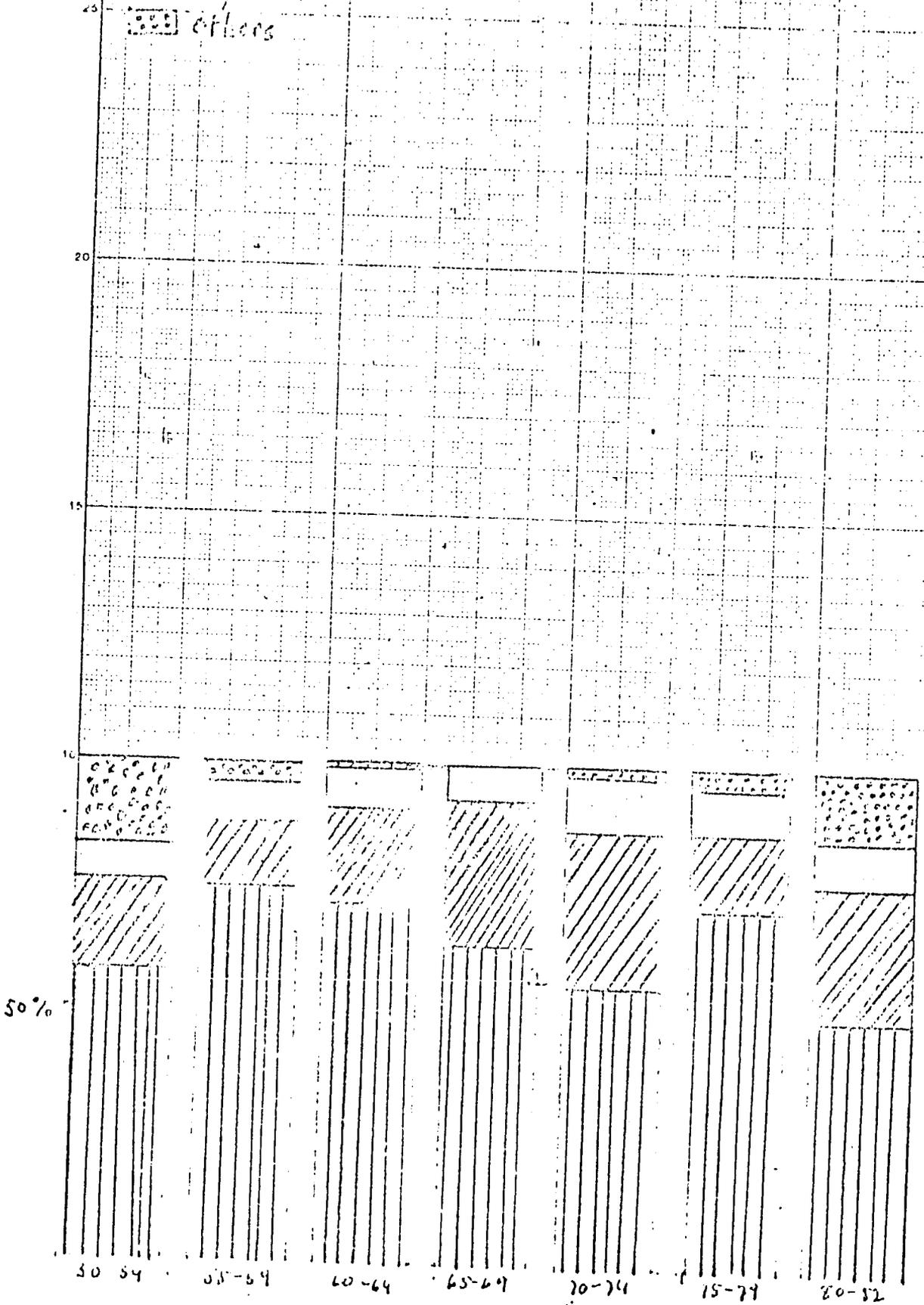
	<u>Total Value</u> \$	<u>Vetivert</u> % of Total	<u>Lime</u> % of Total	<u>Amyris</u> % of Total	<u>3 Products</u> % of Total
1945	367,000	25.3	29.2	15.4	69.9
1950	615,600	55.2	12.8	18.7	86.7
1951	985,439	68.2	9.6	3.5	81.3
1952	1,165,684	51.7	13.3	1.7	66.7
1953	572,715	46.0	30.0	9.5	85.5
1954	789,615	69.0	16.0	6.3	91.3
1955	1,052,065	80.0	6.0	6.4	92.4
1956	840,142	--	--	--	--
1957	579,827	72.3	8.9	13.9	95.6
1958	677,219	74.8	18.4	6.6	99.8
1959	690,663	69.8	22.4	7.2	99.4
1960	1,217,722	79.8	15.1	5.0	99.9
1961	1,474,000	71.1	17.3	11.5	99.9
1962	1,514,507	70.2	19.6	10.0	99.8
1963	1,059,849	70.7	24.0	5.1	99.8
1964	844,769	71.4	20.5	7.9	99.8
1965	1,215,462	70.0	21.7	8.1	99.8
1966	2,003,124	57.6	25.6	16.7	99.9
1967	2,714,762	61.0	32.7	6.2	99.9
1968	2,744,388	63.2	32.1	4.5	99.8
1969	3,075,178	68.3	27.6	4.0	99.9
1970	2,658,402	55.9	40.4	3.4	99.7
1971	3,099,103	53.0	40.6	5.7	99.3
1972	3,316,162	61.9	18.2	18.4	98.5
1973	3,697,881	64.8	22.9	22.3	99.0
1974	6,522,071	50.8	35.1	13.2	99.1
1975	4,881,579	73.0	14.9	7.2	95.1
1976	8,248,504	78.0	14.4	6.7	99.1
1977	6,440,129	68.8	17.6	9.5	95.9
1978	9,700,340	78.4	11.3	8.5	98.2
1979	7,458,918	62.2	17.2	17.2	96.6
1980	5,406,378	50.6	30.6	14.2	95.4
1981	4,614,747	46.3	23.4	20.4	90.1
1982	5,187,139	53.7	27.9	12.3	93.9

Source: Same as Table 1.

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Essential Oils Exports: Share of main products - 5 years average

- Vertical lines: Ylang-ylang
- Diagonal lines: Lime
- Horizontal lines: Anise
- Stippled: Others



total export. Since then, export volume has declined, with 1975-79 being, on the average, 8% lower than the preceding period. Exports during 1980-82 were 23% lower than in 1975-79. In other words, since 1965-69, the strong performance of the essential oils export value is a result of increasing unit price rather than output growth.

There is a general tendency to analyze the trends in essential oils at the most aggregate level. This can be informative and is furthermore justified by some other peculiarities of these products. The first one is that all essential oils share the characteristic of being high unit value, low volume intermediate products whose market is the cosmetic industry (soap, perfume, fragrance and so forth). Lime is an exception, playing an important role in the soft drink industry, as well as in the cosmetic industry. A second interesting aspect is that many producers are involved in more than one product. Of the 52 factories identified by A. Eisenloeffel² in 1970, 10 were involved in all 3 products while 11 others were producing 2 products, vetiver and lime being the most common combination. As of May 1983, there are 30 producers according to the Office de Commercialisation des Essences Aromatiques d'Haiti, (OCEAH) (see table A). Two of them are involved in all 3 products, and 8 produce 2 products, with 6 producing both lime and vetiver. A third reason is that the bulk of the production is sold to one firm, a situation prevailing since 1970 when Eisenloeffel warned of the danger implicit in buyer's concentration.³ The fact that one buyer is

² Arend Eisenloeffel, Report on a Technical Assistance Mission for the Essential Oils sector of the Economy of the Republic of Haiti, UNIDO Ref ID/OA - 321, Haiti, November 1970, Table II, pages 85-87.

³ Eisenloeffel wrote: "The present situation where two U.S.A. importers purchase almost all of the Haitian essential oils puts Haiti in a weak position." Ibid., page 7.

Table A
LIST OF ESSENTIAL OILS PRODUCERS, 1983

<u>Name</u>	<u>Location</u>	<u>Amyris</u>	<u>Lime</u>	<u>Vetiver</u>
Delain	Gonaïves	x		
LAB	Port-au-Prince	x		x
SOGEDECOSA+	Arcahaie	x	x	x
Gerard Manuel+	Miragoane	x	x	x
Ganot	Fond des Negres	x		
Guacimal*	Cap Haïtien		x	x
Chamblain+	Ducis (Les Cayes)		x	x
Geprodagin	Jacmel		x	x
Papeocot+	Les Cayes		x	x
F. Darbouze++	Port-Salut		x	x
Marc Jeune+	Les Cayes		x	x
Leon Jeune	Gressier		x	x
Gerard Constant++	Les Cayes			x
M. Daguilh	Les Cayes			x
Frank Leger+	Les Cayes			x
Gerard Olivier	Les Cayes			x
Brierre Menelas	Camp Perrin			x
Entrasa	Port-au-Prince			x
HEPHA	Port-au-Prince			x
Minoterie d'Haiti	Port-au-Prince			x
Seneque Pierre	Les Cayes			x
A. Policarp	Les Cayes			x
Guy Déjean	Gonaïves		x	
SONATRASA	Port-au-Prince		x	
UNAROME			x	
Armand Raphael	Maïssade		x	
Citrus Products			x	
Charles Verna	Cayes		x	
Charité Louis			x	

Source: Office de Commercialisation des Essences Aromatiques d'Haiti (OCEAH),
 May 1983

Note: Some active producers are not included (such as the one we visited in Cavaillon or another vetiver plant we saw in Camp Perin) on the other hand, some names reported here are not bona fide producers. They may be exporters, securing their oil from other producers and being in business either because they had an export quota or because they in fact are financiers "warranting" the producer. Such appears to be the case for A. Policarp and S. Pierre for instance. Finally, some are not really producing currently for a variety of reasons such as death (Ganot, HEPHA) or financial difficulties (Entrasa, Sonatrassa) or some other reasons (Leger, Minoterie).

*Also produces bitter orange, has long term arrangement with Cointreau.

+ Firm visited, interview with owner or manager.

++ Visited plant, no interview with responsible officer.

involved in all three products may also explain the branching out of producers into other essential oils. Indeed, once one is involved in vetiver for instance, it is relatively easy to diversify into lime since one is dealing with the same buyer, thus sparing the entrepreneur the trouble of looking for a market. This reinforces what one would call the technical externality in the equipment use since all three oil products are generated through a steam based distillation process. Therefore, the boiler, which is the most expensive piece of equipment, may be used for distillation of more than one product.

Be that as it may, one must still carefully distinguish each of the three main products in the framework of public policy intervention. The fact that Haiti is the leading producer of vetiver and the sole producer of amyris certainly implies a different marketing strategy than for lime. Furthermore, while similar, the production processes are not identical and the level of energy use is widely different from one product to the other. Last, the industrial organization context varies a great deal from one product to the other. As we shall see, vetiver production seems to suffer from a persistent excess capacity, a feature that may introduce a greater level of instability in that sector as compared to the others. Thus, we will proceed now to analyze each of the three main products, describing for each the production process, the source of inputs, and investment and production costs.

A. VETIVER

Vetiver oil is extracted from the dried roots of the vetiver, whose scientific botanical name is *vetiveria zizanioides stapf*, a plant belonging to the gramineae family. The roots are yellowish or brown and appear in a very dense pattern, which makes vetiver particularly suitable as an erosion control plant if it is not harvested. Conversely, given that these dense roots have to be extracted for processing, the harvesting of vetiver makes it an environmental hazard contributing to erosion. The plant had been known in Haiti for many years before Louis Dejoie started producing vetiver oil in 1942-43. Because of his efforts vetiver developed and flourished in the Les Cayes areas. The tremendous expansion of vetiver may be grasped by considering both the number of factories in operation and the cultivated area. Between 1943 and 1958, there were three plants in operation in the country, all of them located around Les Cayes (Déjoie, Boucart, and Ganot). In 1970, Eisenloeffel counted 31 plants with an aggregate capacity of 380 to 500 tons.⁴ Output averaged 99 tons per year in 1965-69 and 107 tons in 1970-74. Since then, the number of plants has declined. In 1979, D. Torres identified 23 units while in 1982, Schwob reported 25 factories in operation.⁵ Today, according to OCEAH, there are 19 plants in operation, although there are considerable uncertainties as to the precise number--(see note on Table A). Today's

⁴ Ibid., page 84.

⁵ Doryanne Torres, Production et Commercialisation de la Racine de Vetiver, SENACA DARNDR, March 1979, page 8, footnote 1. Roger Schwob, Situation et Problèmes de l'Agro-Industrie des Huiles Essentielles en Haiti, International Trade Center, UNCTAD - GATT - ITC/DIP/65, June 25, 1982, page 24.

installed capacity is put at around 1,200 drums of 450 pounds by most observers interviewed in connection with this research. This would be equivalent to 245 tons of installed capacity for an export volume that averaged 111 tons yearly in 1975-79 and 72 tons in 1980-82. World exports are estimated at 300 tons per year, clearly indicating Haiti's tremendous weight in this market.⁶

A greater uncertainty surrounds the actual surface of agricultural land devoted to vetiver. Quoting Ernest Guenther, Igolen puts the area under cultivation at 1,600 hectares in 1950 and estimates it at between 2,700 and 3,400 hectares in the late 1960's.⁷ D. Torres puts the figure at 7,300 hectares in 1979, close to the 7,500 hectares quoted by Schwob.⁸ Because of the difficulty of estimating with relative accuracy the area under cultivation, all estimates work backward from the export volume using a set of assumptions: a conversion ratio, which tells how many tons of roots, the input, must be distilled to produce one unit (pound or gallons) of oil and the yield per hectare.

⁶ The 300 tons figure is from Lucien Loisy, Les Huiles Essentielles dans la Republique d'Haiti - Rapport de Mission 11 janvier au 5 février 1977, page 9. See also UNIDO, Report of the Workshop on the Essential Oil Industry, UNIDO/IO 502, April 27, 1982, table 5g, page 32.

⁷ Georges Igolen, Rapport sur l'Amélioration des Conditions de Production et de Commercialisation des Huiles Essentielles Haitiennes, IDAI, 1968, page 10. Igolen's estimate is not too far from FAO's for the southern Peninsula: 2,600 hectare in 1971-73. See FAO, Enquetes et Demonstrations Agricoles dans la Penninsule Sud-Haiti, AGS/DP/HAI/71/513, Rome 1973, table 26, page 19.

⁸ D. Torres, Production et Commercialisation de la Racine de Vetiver, Op. Cit., page 13. R. Schwob, Situation et Problèmes de l'Agro-Industrie des Huiles Essentielles en Haiti, Op. Cit., page 13.

For the conversion ratio, the standard parameter is usually put at 1 to 1.5% but this is subject to extremely wide variation. This ratio depends on the age of the roots at harvest time and also on the sophistication of the extraction process.⁹ The optimal age of the roots is put at 18 to 24 months, but in Haiti it is common for peasants to harvest after 6-8 months, thus multiplying their income by 3 over the same 24 months period. Curiously, if the roots stay in the ground too long, the yield also drops significantly. The current situation is that some vetiver has been in the ground too long because the reduction in output since 1979 has obviously caused a reduction in the demand for the roots. Some producers in Les Cayes report that they have experienced a drop from 3.5 gallons of oil to 2 gallons per ton due to the poor performance of the over-aged roots. Vetiver harvested during the rainy season does show a lower yield due to increased water content. Therefore 1% represents the most probable yield. On average 100 tons of roots will produce 1 ton of oil. The average annual vetiver oil exports of 72,224 kg over the 1980-82 period implies that the volume of root harvested was 7,200 tons per year. In addition to the conversion ratio, one must estimate the yield of roots per hectare to get the area under cultivation. Again, estimates range from 1.5 tons to 2 tons per hectare. We have decided to work with the latter figure which is the estimate most generally accepted.

⁹ See Igolen, Rapport sur l'Amélioration des Conditions de Production et de Commercialisation des huiles Essentielles Haïtiennes, Op. Cit., pages 23-25. He reports yields varying from .8% to 2.1%. FAO, Enquêtes et Démonstrations Agricoles dans la Peninsule Sud-Haïti, Op. Cit., reports a yield of 1 drum (450 pounds) for 16 tons of roots which is about 1.2% (page 27).

For 1980-82, the export of 72,224 kg was produced from a harvest of 7,200 tons of roots grown on 3,600 hectares. But in fact, the depressed market for the finished product suggests that the area planted might have been far larger than this figure which indicates only the area harvested. The uncertain nature of our estimates is vividly illustrated by the fact that our estimated area is about twice the one estimated for 1950, while the average export volume of 1980-82 is more than four times the one recorded in 1950. An explanation might be that in 1950 only 877 hectare were harvested out of the 1,600 hectare reportedly planted, given that there has been no significant improvement in the yield per hectare over that time.

If we accept the figure of 3,600 hectare as a meaningful approximation of the area harvested for vetiver, we can move on to a rough count of the peasant families involved in this crop. FAO, in the context of the EDAPS Project, had calculated that 42,000 families were involved in the exploitation of 55,000 hectares in the Les Cayes "arrondissement". The average family farm was thus 1.35 hectares, with 70% of them under 1.29 hectares. Dividing 3,600 hectares by 1.35 yields 2,666 as the number of peasant families growing vetiver.¹⁰ In fact it is not unreasonable to suppose that the actual number is higher than that because the growing pressure of an expanding population on a relatively fixed supply of land has, without doubt, resulted in a smaller average farm size. Additionally, the well known pattern of crop diversification in the Haitian agricultural sector would imply that only part

¹⁰ FAO, Op. Cit., pp. 15 and 16, for average farm size.

of the farm acreage is allocated to vetiver. The heavy concentration of vetiver crop production in and around Les Cayes translates into a significant regional impact, especially given the relative lack of other economic alternatives.

Obviously, the socio-economic impact of vetiver production depends not only on the extent of the crop but also on the economic return to the peasants. As the peasant's decision is governed by the behaviour of relative prices, one must have some idea of how the farmer's price of vetiver behaves over time with respect to other alternative crops to really understand production decisions. Furthermore, one might want to relate the price of the oil to the farmer's price to find out about any distortions that might worsen the pattern of income distribution. There we face an immediate apparent paradox. As shown by Table 3 and Graph III, after an initial fall from 1950 on, the price of vetiver oil stabilized at around \$15 per kg from 1955 to 1970 when it started rising before really shooting up during 1975-79. Since 1979 it has declined but still remains at an average level which is almost twice the 1970-74 level. Paradoxically, the price of the root has not followed the same pattern. Indeed, it is not easy to continuously keep track of the price of roots since no public sector entity collects such price data. The earliest price record we have is the one provided by Bauman and Alphonse: G.50 to G.55 per kg (US\$.10 to US\$.11 per kg.).¹¹ Interestingly, these authors mention

¹¹ H. Bauman and D. Alphonse, Rapport de la Commission d'Investigation sur l'Aspect Agricole des Possibilités de Développement Économique de la Plaine du Sud Ière Partie, June 1960.

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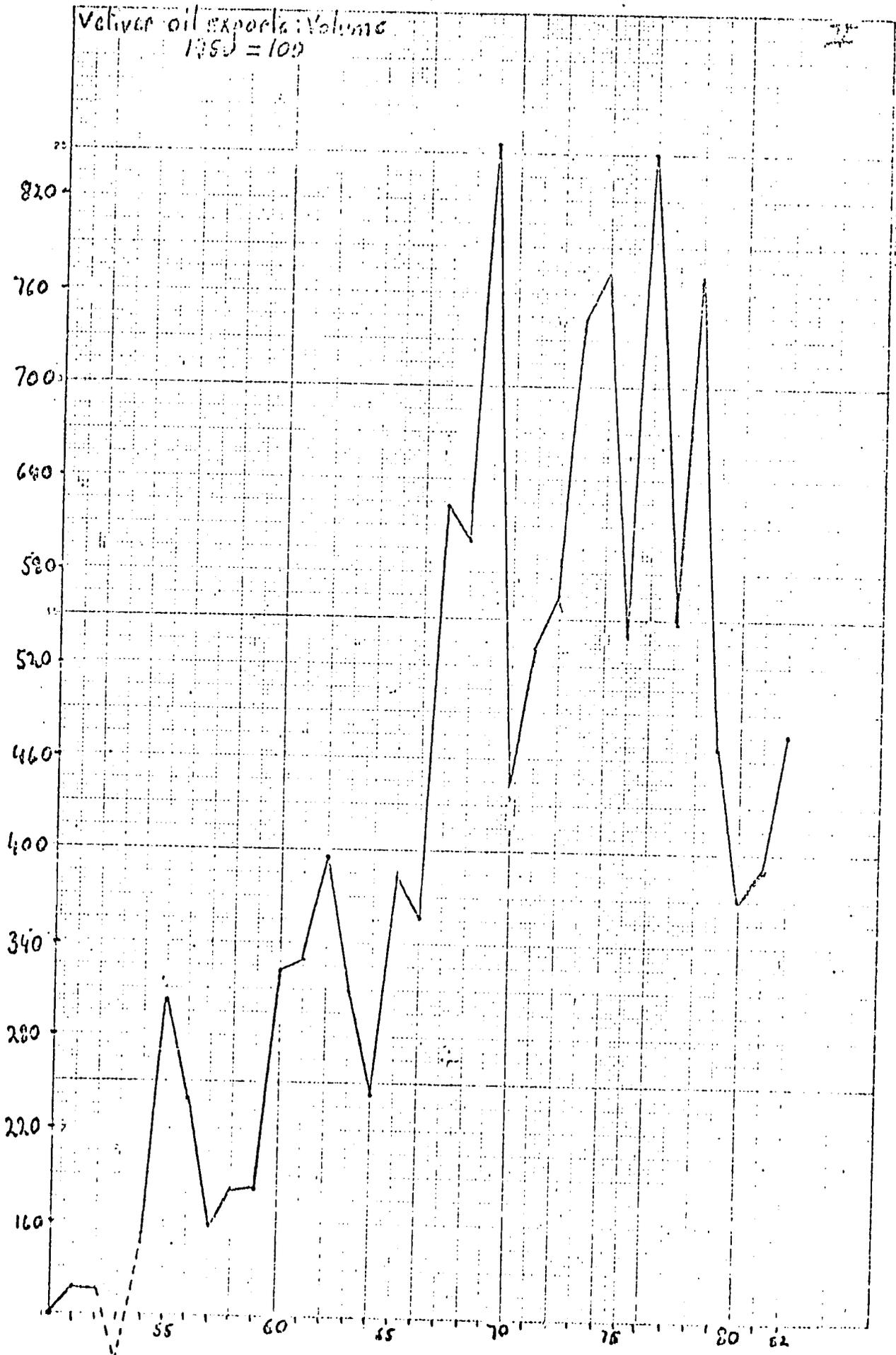
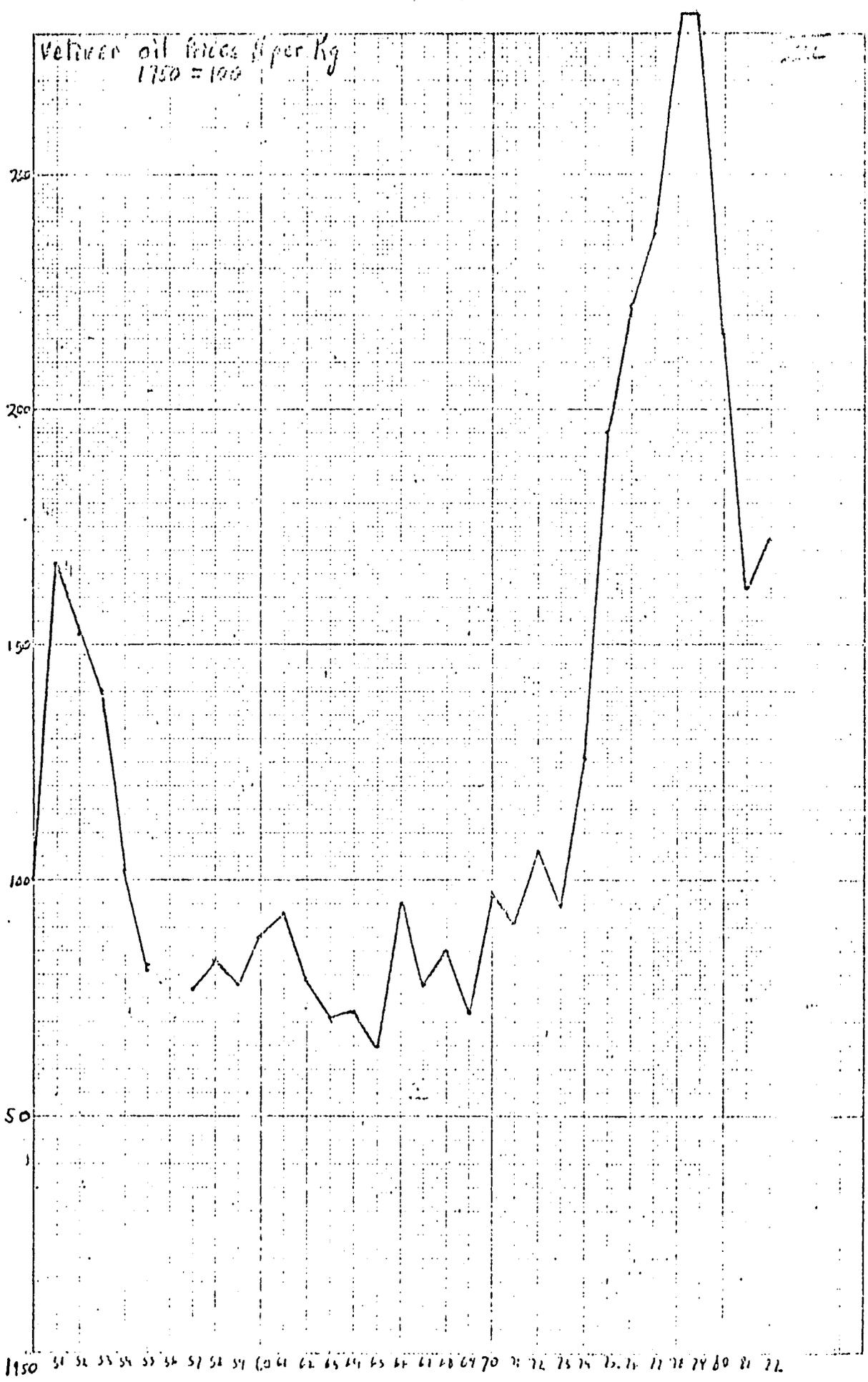


Table 3
TRENDS IN VETIVER OIL EXPORTS - 1945,1950-82

	<u>Volume (kg)</u>	<u>Total Value (\$)</u>	<u>Unit Price \$ per kg.</u>
1945	4,000	93,200	23.00
1950	17,545	339,980	19.37
1951	20,683	672,240	32.50
1952	20,387	602,892	29.57
1953	9,670	263,576	27.25
1954	27,336	544,965	19.93
1955	53,422	845,051	15.81
1956	41,700	--	--
1957	27,976	419,397	14.99
1958	31,200	507,000	16.25
1959	31,750	482,163	15.18
1960	56,469	971,960	17.21
1961	57,998	1,048,176	18.07
1962	68,827	1,053,725	15.45
1963	54,434	750,245	13.78
1964	42,813	603,227	14.08
1965	67,507	851,857	12.61
1966	62,736	1,154,999	18.41
1967	109,156	1,656,035	15.17
1968	104,986	1,736,137	16.53
1969	150,466	2,103,093	13.99
1970	78,599	1,487,767	18.92
1971	93,062	1,642,837	17.65
1972	99,146	2,053,526	20.71
1973	130,084	2,397,861	18.43
1974	135,579	3,318,615	14.47
1975	94,221	3,564,580	37.83
1976	149,225	6,434,504	43.11
1977	96,183	4,435,528	46.11
1978	135,833	7,611,993	56.03
1979	82,537	4,646,514	56.29
1980	65,158	2,739,066	42.03
1981	67,906	2,137,866	31.48
1982	83,609	2,788,644	33.35

Source: Same as Table 1

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the decline in output and a shift towards other crops. This is rather curious because vetiver oil exports had been on a marked, if irregular growth path up to 1979. And one is forced to acknowledge that this expansion trend (see table 3 and Graph III) implied a similar one for the roots themselves.

This evident rise in the output of the roots makes also puzzling the apparent behaviour of price because it appears that the latter fell in nominal terms between the early 1960 estimates of Bauman and Alphonse and further ones available for 1970-71. FAO, based on circa 1971 data puts the price at US 8 cents per kg at the factory gate and at US 5 cents per kg at farm's gates;¹² yielding \$75 per hectare. This is broadly consistent with Eisenloeffel data. "The vetiver roots after drying and cleaning, are sold at about 6-8 c/kg in the field and bought at the factory for about 8-12 c/kg, depending on the distance between the field and the factory. Returns to the farmer per ha. vetiver is therefore \$60-100/year."¹³ Today's price is widely put at \$130 per ton at the factory, which amounts to 13 cents per kg, that is virtually the same price that prevailed 10-12 years ago. Since all these values are in nominal terms, they seem to indicate a reduction in the real purchasing power of the farmers.

Faced with a stagnant nominal price, farmers expanded output to the extent suggested by the growth of exports. Why would they keep on growing vetiver in

¹² FAO, Enquêtes et Démonstrations Agricoles dans la Peninsule Sud-Haiti, Op. Cit., page 24.

¹³ Eisenloeffel, Report on a Technical Assistance Mission for the Essential Oils Sector of the Economy of the Republic of Haiti, Op. Cit., page 13-14.

such a situation especially at a time when the price of corn, millet was going up very rapidly? A second source of the puzzle is that we know that output expansion at the oil level was realized by expanding the number of plants rather than the size of the original ones. This suggests that there might have been increased competition to buy the roots. We do not claim to have the final answer, but we may suggest the following. The first element of our explanation is that the land on which vetiver is grown has little alternative use since it is widely known to be rocky, unproductive and unsuitable for other crops. All observers seem in agreement on this point.¹⁴

Interestingly enough, this is in contrast to the situation in Indonesia where apparently vetiver competes with food for the best lands.¹⁵ The only resource involved that has a positive opportunity cost is labor. But given population growth and a lack of employment opportunities, the expanding labor supply is hard pressed to productively employ itself. Thus, it might make sense to spend the time on vetiver, however low the returns. This explanation appears even more plausible when we remember that the southern part of the country is the major source of migration to Port-au-Prince. In other words,

¹⁴ Igolen writes, "Le paysan réserve généralement le sol des plaines à des cultures plus riches, et le sol des mornes, plus ou moins érodé à celle du vetiver." Rapport sur l'Amélioration des conditions de production et de commercialisation des huiles essentielles Haïtiennes, Op. Cit., page 11. D. Torres echoes the same point: "Dans la Plaine, le rapport budgétaire moyen de la culture de ce produit, incite les paysants à s'y adonner sur des terres d'un faible potentiel agricole, impropres à la culture de la canne à sucre, des vivres ou du tabac, ou donnant des rendements non satisfaisants à leurs yeux." Production et Commercialisation de la Racine du Vetiver, Op. Cit., page 11.

¹⁵ If. UNIDO, Reports of the Workshop on the Essential Oil Industry, UNIDO/IO.502, April 27, 1982, page 92.

for a (growing?) proportion of the labor force in the southern Peninsula the scarcity of jobs in the non agricultural sector and the unavailability of good land suitable to grow cane or corn or millet means that the alternative is either to migrate or to engage in marginal agricultural endeavors.¹⁶

The plentiful supply of labor and the scattered state of vetiver production explain the very complicated nature of the marketing network which is supplying the various factories. Except for the factories located near a producing center, such as Chamblain's in Ducis, peasant producers seldom sell directly to the processor of the roots. It does not pay for them to travel long distances with a few kilos of vetiver to sell to the factory, especially since a mule might be needed to carry the bales. The poor conversion ratio of 1% means that enormous quantities of roots must be processed while the production of roots is spread among numerous small plots, thus complicating the gathering process. Therefore, it is in the interest of both the buyer and the seller to work through an intermediary. What is interesting is that this need gives rise to a variety of marketing mechanisms, some of which include the assumption of risk by some agents. For instance, it is not uncommon for a peasant to sell the vetiver in the ground to someone else that will dig it, clean it and sell it, employing a few other people in the process. Alternatively, the peasant will enter into an agreement to share the digging,

¹⁶ Torres invokes other arguments to explain the growing of vetiver. She says that vetiver is a ready source of cash that is relatively immune from shifts in the weather. Second vetiver represents an insurance against unforeseen events such as deaths, birth, wedding and so forth. See Production et Commercialisation de la Racine de Vetiver, Op. Cit., pages 17-18.

cleaning and selling with a few other people, splitting the sale proceeds with them.¹⁷ But beyond the fascinating diversity of the arrangements, what is of importance is the fact that the system seems to be efficient in the sense that it performs its social role by making the best use of the plentiful labor supply. Another issue is whether it is just; that is, whether or not the grower is getting its fair share from the intermediaries or from the plant owners.

One must carefully distinguish between functional specialization and social stratification. It does not seem that the intermediaries, "spéculateurs" or "businessmen" belong to a different social category from the growers.* They do not appear to be wealthier. They just perform a different task from which they receive a normal return. The task that they perform is a useful one given the scattered nature of the production, the difficulty of communication and the enormous tonnage that must be moved.

If we turn now to the price paid by the factories, it must be appreciated that the vetiver cost is the main operating cost entering into vetiver processing. According to Eisenloeffel¹⁸ it represented 53% of the total

¹⁷ Ibid. Contains a description of these various marketing arrangements. She has recently completed a Ph.D. Dissertation on the topic in the Geography Department at the University of Bordeaux in France. Although this writer was promised a copy, we had not received it at the time of writing.

¹⁸ Arend Eisenloeffel, Report on a Technical Assistance Mission for the Essential Oils Sector of the Economy of the Republic of Haiti, Op. Cit., page 88. Eisenloeffel's data includes depreciation.

* Verification of this point would require a large scale socio-economic survey.

when vetiver cost \$80 a ton (8 cents/kg). In our interviews we found that at the cost of \$130 per ton (13 cents per Kg - factory yard) vetiver represents 57% of the total cost, excluding depreciation of plant and equipment. This, of course, reflects, once again, the huge amount of material input required for processing.

The equity problem stems from the perception that vetiver oil making is an enormously profitable operation. The data provided by Eisenloeffel indicates that an investment of \$35,000 would generate sales of \$270,000 at a cost of \$150,000 leaving thus a profit before tax of \$120,000 which is 340% of investment.¹⁹ This kind of rate of return is sure to attract new entrants and that might explain the persistent excess capacity that we mentioned before as one of the durable features of the industry.

At today's costs, it is estimated that the production of 1 drum of vetiver would cost around \$4,800, that is around \$10.66 per pound, using wood as a fuel. If we add \$1,000 for other costs (banking, export tax, transportation and so forth) it will bring the cost of production to \$12.88 per pound. At today's net price of \$18 per pound, that would suggest an operating profit of \$5 or so per pound, before taxes and excluding depreciation and managerial remuneration.

19 Ibid.

B. LIME

The production of lime oil began in 1938 when L. Déjoie used a cane grinder to crush fresh lime fruits and then processed the juice so obtained to extract the oil. Depending on the season, the fruit's maturity, the grinder's condition, and so forth, the yield varied from 4 to 7 pounds of oil per ton of fruits. Commercial export of the new product started in 1941-42 when 2,396 kg were sold for a value of \$26,467. Thus was launched a new essential oil whose output depended on a two step production process: first the grinding of the fresh fruits, and second, the extraction of the oil through steam distillation. It seems that the technology spread rapidly because by 1945 there were 17 plants in operation all over the country²⁰.

As can be seen in Table 4 and Graph IV, the exported volume more or less stagnated between 1950 and 1959 before going up sharply in 1959 and reaching a new plateau. Indeed, on the average, the 1960-64 period represented twice the comparable volume of 1950-59. Between 1964 and 1971, the volume exported rose in a rapid and rather smooth fashion. Although 1974 represented the highest volume ever exported with 139 tons, after 1971 the export of lime oil showed a year to year instability which is in marked contrast with the 1964-71 period. Furthermore, despite two excellent performances in 1976 and 1980, the volume of lime oil exported has been on a downward trend. Thus, the period 1975-79

²⁰ Information extracted from the two Déjoie's articles mentioned before: Aperçu sur la Situation Actuelle des Huilles Essentielles en Haiti, Bulletin de la Chambre de Commerce d'Haiti, No. 14 and 15, Op. Cit.

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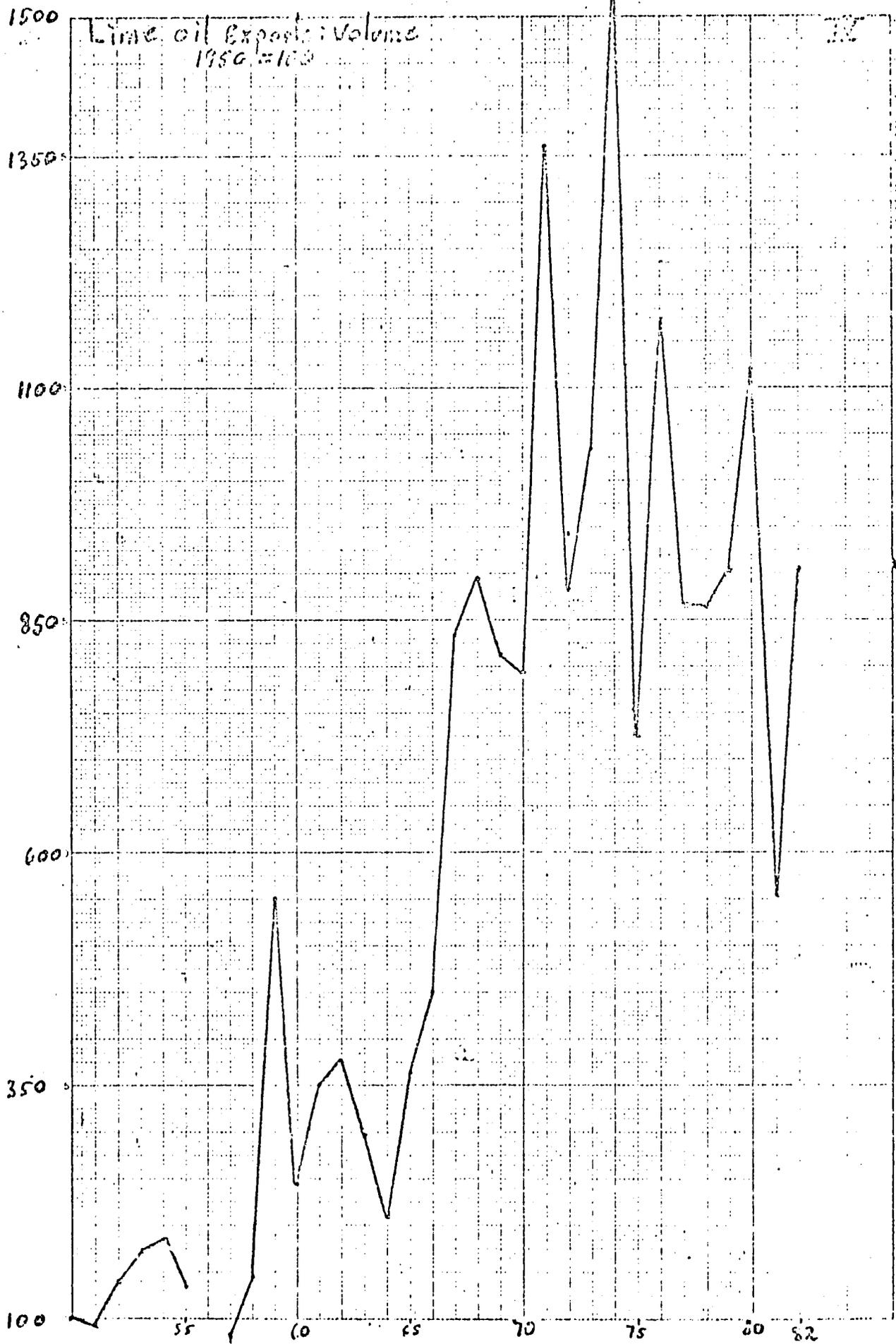
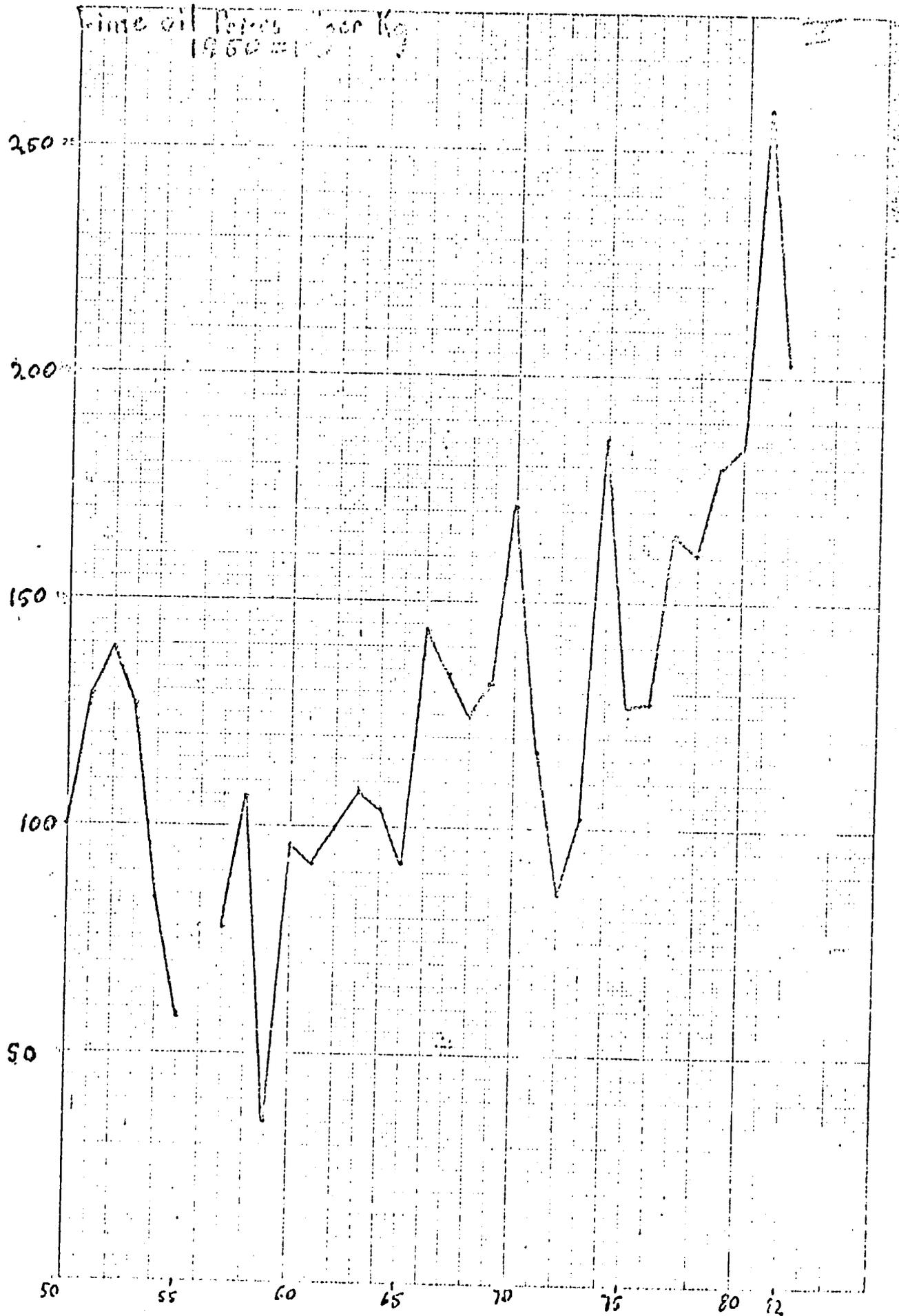


Table 4
TRENDS IN LIME EXPORTS 1945, 1950-82

	<u>Volume (Kg)</u>	<u>Total Value \$</u>	<u>Unit Price \$/Kg.</u>
1945	10,000	107,200	10.72
1950	8,944	78,834	8.81
1951	8,346	95,035	11.38
1952	12,670	156,190	12.32
1953	15,347	172,069	11.21
1954	16,888	126,488	7.48
1955	12,396	63,526	5.12
1956	--	--	--
1957	7,463	51,900	6.95
1958	13,200	125,000	9.46
1959	49,228	155,081	3.15
1960	21,657	184,554	8.52
1961	31,415	256,180	8.15
1962	33,499	297,960	8.89
1963	26,764	254,819	9.52
1964	18,810	173,859	9.24
1965	32,399	264,848	8.17
1966	40,310	513,496	12.73
1967	74,679	887,901	11.89
1968	79,861	882,096	11.04
1969	72,723	849,039	11.67
1970	71,159	1,075,677	15.11
1971	121,870	1,261,311	10.34
1972	79,041	604,298	7.64
1973	92,695	847,251	9.14
1974	139,299	2,295,078	16.47
1975	64,860	731,451	11.27
1976	105,469	1,190,743	11.28
1977	77,680	1,135,321	14.61
1978	77,282	1,099,027	14.22
1979	81,080	1,288,314	15.88
1980	100,948	1,654,513	16.38
1981	47,374	1,081,440	22.82
1982	80,911	1,451,983	17.94

Source: Same as Table 1.

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was about one-fifth lower than 1970-74 while 1980-82 further declined 5% as compared with the preceeding period. As a result, Haiti has been loosing its international market share. In fact, for the American market which absorbs the bulk of our exports, over 95%, the situation has worsened in an acute manner. For the period 1971-73, Haiti furnished 21.4% of American imports on average while for 1978-80, the comparable figure was 12.1%, that is a 43% decline over the former period.²¹

This deterioration of the volume of lime oil exports may have been concealed, to a certain extent, by the improvement in nominal prices which have been rising since 1976. The behaviour of lime oil prices on the external market since 1950 may be summarized as follows (see Graph V). During 1955-59, prices fell by more than a third as compared with the previous period. Then, in 1960-64 there was a slight price recovery but it was not before 1966-73 that average nominal prices would reach a level comparable to that of 1950-54, when they hovered around \$11 per kg (despite the plunge in 1972 and 1973). Since 1960-64, the average nominal price has been on a rising, if erratic, trend. Average exports in 1975-79 were 14% higher than in 1970-74 while exports in 1980-82 were 41% above those in the previous period. The data suggest that real prices must have been maintained if not improved over the last 5-7 years. One interesting question is why has this not brought forward a greater supply response. In fact, as mentioned above, Haiti's output has been

²¹ U.S. Department of Commerce data as quoted in R. Schwob, Situation et Problèmes de l'Agro Industrie des Huiles Essentielles en Haiti, Op. Cit., table 7, page 71.

falling since 1974. This is an apparent paradox that should be probed carefully.

The key element here is that lime oil production appears to be a very profitable operation. Eisenloeffel's data indicates a profit of \$2.65 per pound. It is based on a cost of \$.50 per 14 kg tin of fruits and a price of \$7.50 per pound of lime oil. The input cost (i.e. the price of the fresh fruits) accounts for 86% of the operating cost, including depreciation.²² By comparison with vetiver, lime oil production is not that energy intensive as the distillation time is only 6 hours, compared with 36 hours for vetiver. Fragmentary evidence gathered through interviews for this paper suggest little variation in the basic parameters. The 14 kg tin of fresh fruits now costs \$.70, a 40% increase over Eisenloeffel's estimate and the raw material cost still accounts for 85% of the direct cost of producing the oil. Bringing in all the indirect charges (banking costs, taxes, freight, broker's commission, etc.) would raise the total cost of producing one 400-pound drum of lime oil to \$3,291, that is \$8.22 per pound (63% of this total is the lime's cost). As today's lime oil price has risen also by around 40% to \$10.50 a pound, this leaves the profit, excluding depreciation, income taxes and owner's remuneration at \$2.27 per pound. Yet, there has been a tremendous reduction

²² See A. Eisenloeffel, Report on Technical Assistance Mission for the Essential Oils Sector of Economy of the Republic of Haiti, Op. Cit., table, page 89.

in the number of lime oil's processors from 40, as reported by Eisenloeffel, to 17 today.²³

It should be pointed out however that the reduction in numbers from 40 to 17 may distort what has happened in reality. Some new firms have entered lime production since 1970, indicating that the number of failures is greater than indicated. Entry can easily be understood given that the capital requirements of the industry are relatively modest. Thirty thousand dollars is estimated as the amount of investment needed to build a plant (20 drum capacity). On the other hand, the reasons for failures might be linked with problems on the input side, or the quality of the output. Turning to the latter first, the most common lime oil producing technique involves a two step process: first grinding the fruits and then the distillation of the juice. As it happens, such a process is both wasteful of the inputs and inefficient because of the low quality of the oil.²⁴ It is wasteful because the lime juice itself is wasted even though there is a growing market for concentrated frozen lime juice. Furthermore the oil obtained is of lower quality than what could be obtained using a cold pressing process. According to UNIDO, an investment of \$1.5 million would be needed to process 5-6 tons a day of fresh fruits. The

²³ Loisy in 1977 was already struck by this contradiction of an apparent high yield with a high rate of financial failure for both lime and vetiver oil. See L. Loisy, Les Huiles Essentielles dans la Republique d'Haiti - Rapport de Mission, 11 January to February, 1977, page 7.

²⁴ See for Instance UNIDO: Enquête Industrielle SI/HAI/77/80/Haiti, DP/ID/SER. B/202 - Octobre 9, 1977, Page 186.

total value of output was estimated at \$800,000.²⁵ Clearly such an investment is out of the reach of most processors. By the same token the current production method suggests that quality control and the inability to defend one's market position are problems that may help explain failures.

At the input level, the supply of the lime is constrained by the need to have fresh fruits so that the speed of transportation from the grower to the processor is critical. This is in contrast to vetiver where one may stockpile the roots for up to a month without serious problems. With lime, freshness is of paramount importance. Furthermore, the extraction yield is very low, about one half of one percent (.5%) which implies that 200 tons of fruits must be processed to obtain one ton of oil.²⁶ This again, implies that tremendous amounts of raw material must be rapidly collected and processed. Using the average figure of oil output for 1980-82, one can estimate the volume of fresh fruits needed at 15,282 tons. Now the yield per hectare of land of the lime tree is put at between 10 and 30 tons. While the trees start to produce after

²⁵ Ibid.

²⁶ R. Van Bokkelen indicates that Haiti's yield is among the lowest, compared with 4.1% in Trinidad, 5.4% in Jamaica and so forth. See his thesis: Les Essences Aromatiques Haitiennes: Culture, Transformation et Commercialisation, Damiens FAMV, 1980, page 17. Igolen quotes yields of 2.8% to 3.7% see: Rapport sur l'Amélioration des Conditions de Production et de Commercialisation des Huiles Essentielles Haitiennes, Op. Cit. pp. 33-34. Eisenloeffel, Report on a Technical Assistance Mission for the Essential Oils Sector of the Republic of Haiti, Op. Cit., estimates yields at .3% to .5%, considering the last figure the normal one.

4-5 years, optimal output is not reached before the 10th year.²⁷ Using 20 tons per hectare as an average, the data suggests that lime is produced on some 800 hectares. The real surface planted in lime is probably somewhat larger.²⁸ Given the inexistence of plantations, and given the small scale of output on miniscule farms, the gathering of the needed volume must pose serious logistical problems that may put some processors out of business by raising the cost of doing business. Indeed one implication of the widespread low volume output of lime at the farmer's level means that the marketing network for lime is as complicated as the one for vetiver roots, so that farmgate prices might be lower than the that paid by the processor (without any injustice implied). Additionally, it is not unreasonable to suppose that the requirement of getting fresh fruits will dictate the buying of a truck for the processors not located in high producing areas, so that the operating costs and trouble of using a truck on poor quality roads may constitute another serious managerial problem.

²⁷ See Van Bokkelen, Op. Cit., page 9 for a discussion and also Eisenloeffel, Op. Cit., page 17.

²⁸ Especially if one takes into account domestic local use. Van Bokkelen therefore puts the total area at 2000 ha. He might not be far from the mark, Op. Cit.

C. AMYRIS

Amyris oil exports were initiated in 1943-44 by the Duval House using the output of a plant located at Chalons, just outside of Miragoane. The plant is still in operation today although it now belongs to Mr. Gerard Manuel. The oil is extracted from a wild tree belonging to the Rutaceae family. Its scientific name is Amyris balsamifera and very little is known about it here in Haiti. The oil production process is rather peculiar as it involves some intriguing characteristics. First, only the main branches and the trunk should be used. Second, not all amyris trees are well-suited for the process. For example, it is reported that the wood from the Aquin area is totally inappropriate for oil extraction. Third, the wood must be well dried so that a drying period of 5 to 6 months is advised. Fourth, the wood must go through a two step transformation before processing: it is first chipped by hand and then it is mechanically pulverized into saw dust, (but not too thinly to avoid the formation of steam column during the extraction). Fifth, as amyris oil is extremely corrosive, only stainless steel can be used in the construction of the stills, which then may be used for both amyris and vetiver oil extraction. Last, the distillation time for amyris is very long, sometimes lasting 168 hours according to one informant.²⁹ When it is done with the use of fuel wood, this implies a serious deleterious impact on soil conservation. Table 5 reviews the technical conversion ratios for the essential oils.

²⁹ Van Bokkelen puts the distillation time of 96 hours when wood is used and at 72-84 hours when fuel oil is used. Ibid., page 19.

Table 5

TECHNICAL CONVERSION RATIO AND YIELD FOR ESSENTIAL OILS

	I	II	III	IV
Vetiver	100 - 1	36 hours	2 T/ha	3,800
Lime	200 - 1	6 to 8 hours	20 T/ha	764
Amyris	33 - 1	up to 168 hours		
Bitter Orange	250 - 1		10 T/ha	309

- I: Conversion ratio: Kg of raw materials needed per kg of oil.
II: Combustion Time
III: Agricultural yield: Tens per hectare of raw material.
IV: Total area under cultivation given 1980-82 average production level.

The production of amyris oil is subjected to another peculiar constraint. It seems that the tree takes up to 20 years to reach maturity and that the regeneration process is a spontaneous one. In other words, it would seem that one does not know how to grow amyris trees in the same way that one could have a plantation of, say, lime trees. This deserves more agricultural investigation because the adaptation of the species to the Haitian environment would make it a primary candidate to be used in reforestation efforts. Nonetheless, due to the fact that there has not been any systematic attempt at renewing the stock of amyris trees and to their long gestation period, the production of amyris oil is constrained by a finite and presumable dwindling stock of raw material. This has induced many observers to be rather skeptical about the future of this essential oil. But apparently there are unexploited reserves located in Tortuga Island, off the Northwestern Peninsula which is the main supplying area today (the Mole St. Nicolas area specifically). In other words, raw material supply does not seem to be operating now as a binding constraint to further output expansion. Indeed, a new producer, LAB, has just started an amyris plant in Port-au-Prince.

One must keep the above discussion in mind when analyzing the trend in amyris exports and prices since 1950. As can be seen in table 6 and Graph VI, the year to year volume of amyris exports shows variations around two distinct trends. Up to 1974, the trend is a rising one. 21,668 kg were exported on average in 1950-54. The figure for 1955-59 was 32,341 kg. The next period, 1960-64, registered a 69% increase over the previous one and in 1965-69 exports rose 72% over the preceding period. Then, exports more or less stagnated with 1970-74 exports only 3% above those of 1965-69, even though

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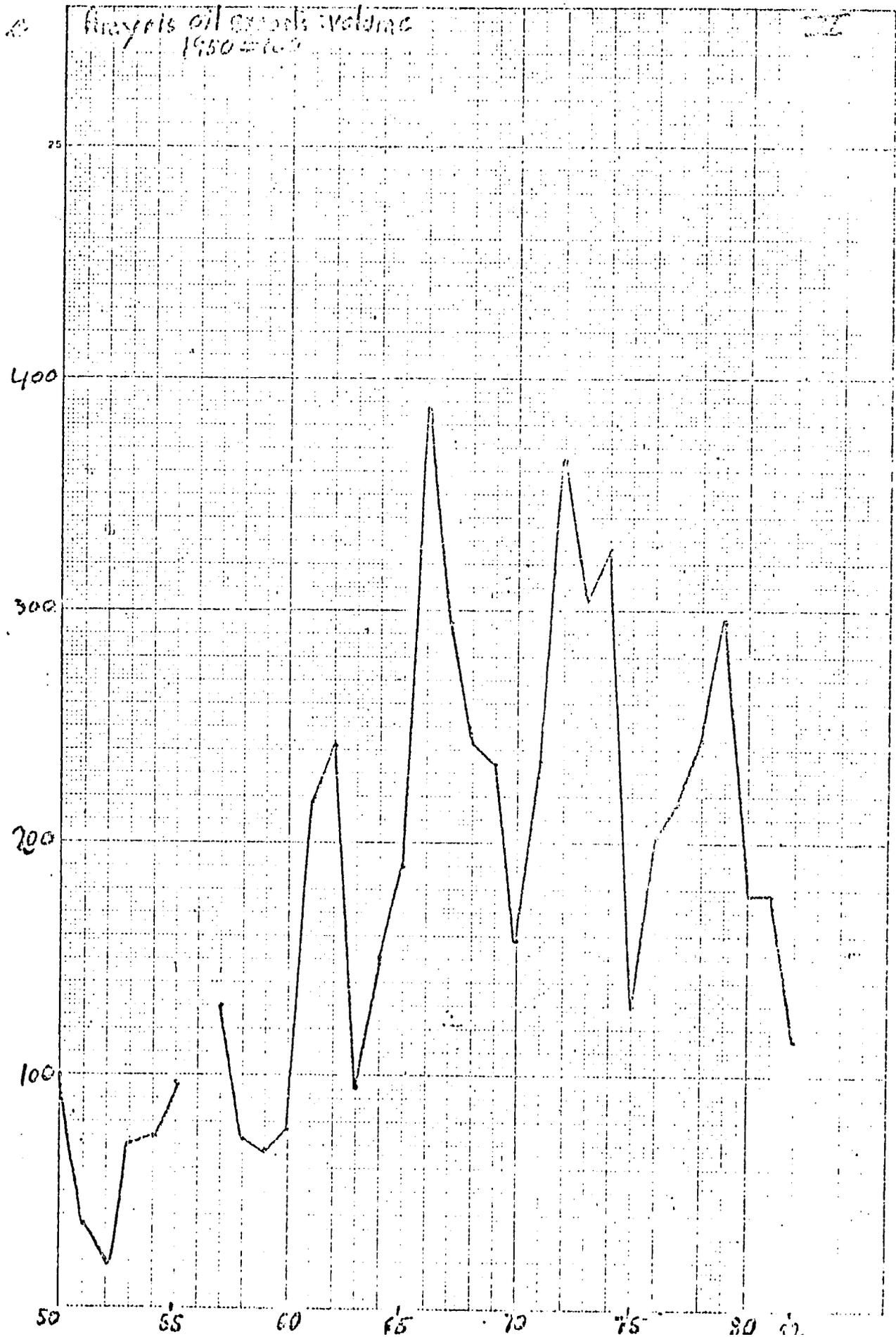


Table 6
TRENDS IN AMYRIS OIL EXPORTS - 1945, 1950-82

	<u>Volume (kg)</u>	<u>Total Value \$</u>	<u>Unit Price \$/Kg.</u>
1945	10,000	56,800	5.68
1950	34,986	115,225	3.29
1951	12,322	35,272	2.86
1952	10,208	20,454	2.00
1953	24,770	54,806	2.21
1954	26,056	49,922	1.91
1955	34,308	68,199	1.98
1956	--	--	--
1957	45,697	80,734	1.76
1958	25,200	45,000	1.78
1959	24,160	50,418	2.08
1960	27,287	60,895	2.23
1961	76,066	169,664	2.23
1962	84,517	152,822	1.80
1963	33,331	54,784	1.64
1964	52,564	67,562	1.28
1965	66,512	98,756	1.48
1966	135,953	334,629	2.46
1967	103,834	170,090	1.63
1968	84,773	126,038	1.48
1969	81,635	123,045	1.50
1970	55,756	91,040	1.63
1971	82,490	179,669	2.17
1972	127,889	612,092	4.78
1973	106,750	418,100	3.91
1974	114,677	860,928	7.50
1975	45,685	354,401	7.75
1976	71,079	560,071	7.87
1977	76,071	613,739	8.06
1978	85,694	831,808	9.70
1979	103,786	1,287,907	12.40
1980	62,733	770,396	12.28
1981	62,931	944,868	15.01
1982	40,325	641,550	15.90

Source: Same as Table 1.

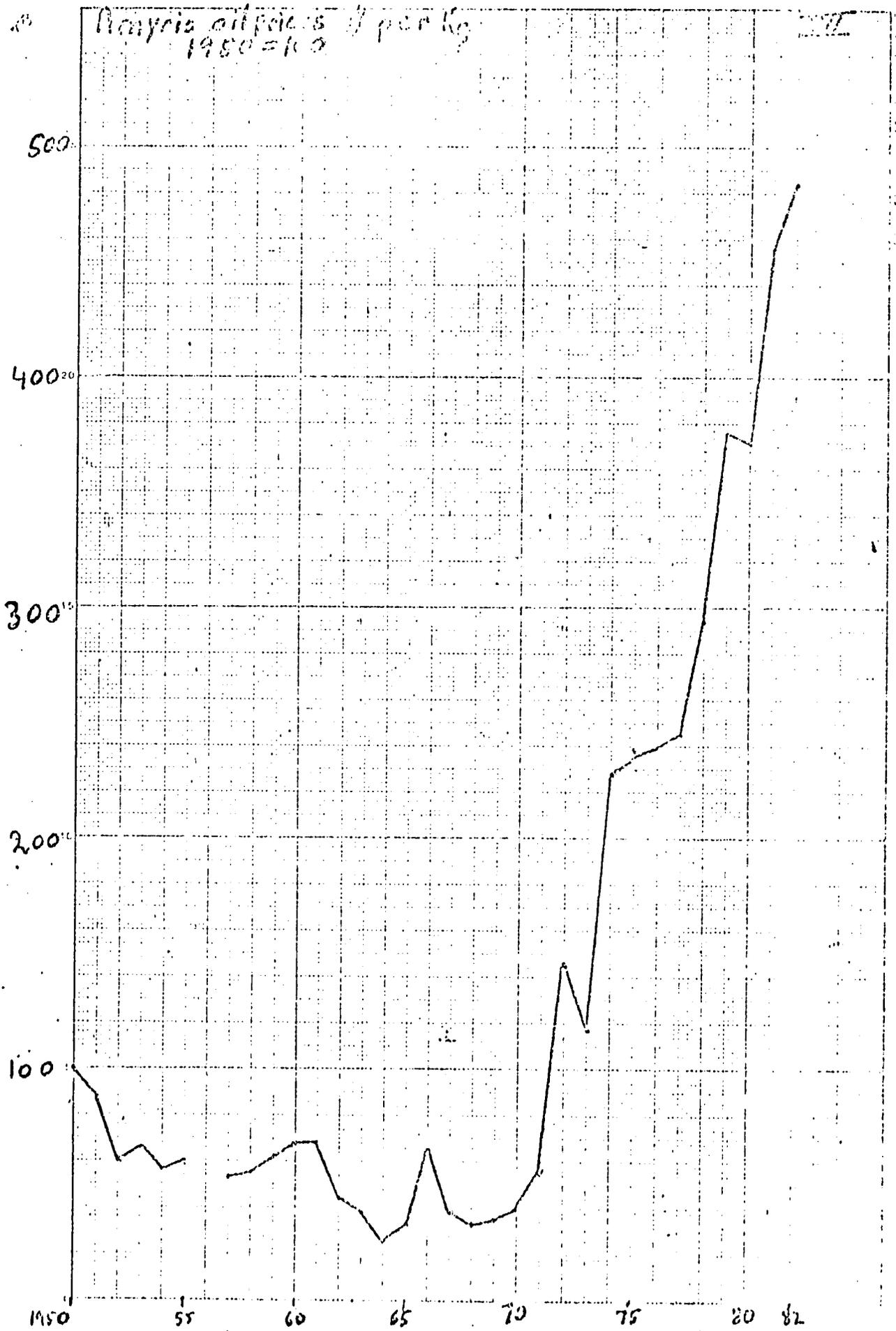
1972-74 represented the highest 3 years' average of the whole period. Since then, we have had a declining trend because 1975-79 represented a 21% drop compared with 1970-74. 1980-82 is 27% lower than 1975-79. In fact, this last three years' average is of the same magnitude as the 1960-64 average and represents a 43% drop compared to the peak period 1975-79.

Interestingly enough, this volume behaviour is inversely related to the price trend. Between 1950 and 1971, there is a continuous fall in nominal prices, with 1964 the lowest point of the whole period. In 1950-54, average price is \$2.45 per kg, dropping to \$1.90 in 1955-59, to \$1.83 in 1960-64 and to 1.71 in 1965-69. Then, beginning in 1971, prices began a dramatic ascent. The average of 1975-79 of \$9.15 per kg is more than twice the one for 1970-74 which, itself, is also more than twice the previous five years average. 1980-82 is 56% above 1975-79.

Given that Haiti is the only exporter of the oil, it is not difficult to explain the two trends in terms of one another. The continuous output expansion up to 1970 has consistently pushed the nominal price down. Then, an Association of essential oils producers which came into being in 1969, was instrumental in limiting output, thus reversing the fall in prices. It is important to note that none of the two amyris oil exporters we talked to had negative comments about the OCEAH, which has inherited the old association's functions. Furthermore, the small number of exporters makes coordination of output decisions easy. (One processor said that his plant is producing at only half its installed capacity to keep prices high. He reported that processors are aware of the need not to push prices too high to avoid

substitution by cheaper or synthetic products. He added that he had a stockpile of a year or so of wood, so that he could readily expand output). In conclusion then, it appears that the decline in average yearly exports since 1975-79 reflects a conscious marketing decision rather than a supply constraint.

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CHAPTER II - PUBLIC POLICY AND ESSENTIAL OILS EXPORTS

Analysis of the public policy issues involved in the essential oils sector is hampered by many factors. First, there is an extreme polarization of views which reflects the real opposition of interests. For instance, processors with direct access to the international market have different interests from those who do not.

Second, while there are many public entities involved in the essential oil sector, their respective areas of jurisdiction are not always clearly defined. For example, the sale of one drum of oil requires an export permit from both the Ministry of Commerce and OPRODEX (Office de Promotion des Denrées Exportables). At another level IDAI is involved in this sector because its chemical laboratory is the only one empowered to perform the analysis required for quality control purposes. Once these analyses are completed, the sealed drums are stored in a warehouse belonging to SEN (Société d'Équipement National) a subsidiary of IDAI. At the production level, it should be pointed out that the public owned flour mill, Minoterie d'Haiti is also involved since it owns one of the largest vetiver oil making facilities in the country. Minoterie has also contemplated the growing of vetiver over an area of some 1,000 carreaux (1,290 hectares) to supply its plant. This project is now dormant since the plant has been idled for the past few years. Finally the most important public entity involved is OCEAH which was created in May 1975 and granted the monopoly of exports in October of the same year. Since 1981, however, vetiver producers are allowed to

negotiate their own export contracts although the sale must still be registered and processed with OCEAH.

Third, in the discussion of public policy matters, there is a great tendency to confuse issues that should be analytically kept separate. For example, the question of the purpose, proper role or function of OCEAH tends to be mixed with discussions of the possible disincentive effects of export taxation, while there are no logical connections between the two. An elimination of the export taxes levied on essential oils is indeed quite compatible with the continued operation of OCEAH. Conversely, the abolition of the office need not imply a change in the fiscal treatment of essential oils exports. There is also a confusion of the problems raised by the export levy and the pricing policy followed by OCEAH with respect to vetiver oil. We shall therefore have to treat these issues separately. Along the same line of arguments, even if one concludes that OCEAH's policies have produced undesirable consequences, in itself this need not imply the elimination of the Office. In point of fact this observer finds no grounds on which to advocate the elimination of OCEAH, although ample evidence of its misguided policies will be presented in this chapter. The main reason that justifies OCEAH, or some public sector body empowered with similar attributes, is the existence of monopoly power on the international buying side. And, interestingly enough, private sector representatives seldom advocate the closing of the office even if they are keenly aware of its sins (of both omission and commission).

Finally, we must keep in mind that the problems are not the same for all three products under analysis. Indeed, if the depressed market for Haitian

vetiver oil can be linked to a shortsighted pricing policy, the stagnation of lime oil exports reflects much more an absence of strategy, a passivity which resulted in a shrinking share of the American market. Policy analysis must therefore deal with each commodity separately. This is unfortunately too often overlooked as the problems of vetiver are allowed to dominate essential oils policy discussions.

A) TAXATION ISSUES

We have been unable to clearly pinpoint when the export of essential oils were first taxed. In 1970, Eisenloeffel was the first observer to raise the issue. He mentions an excise duty of \$0.03 per kilogram and a 2% export tax on the cost and freight value. Of the 2% export levy, half was earmarked for IDAI's quality control and product development program. There was also apparently a \$2.10 to be paid for stamps and consignments but it is not mentioned if this was for each drum, each shipment or what. Furthermore, it is not clear whether or not all essential oils were treated on the same basis or if this taxation applied only to vetiver.¹ Be that as it may, it appears that at some point in the early 1970's the export tax on essential oils was put at 5% of the cost and freight value. The situation was to change radically in 1975 with OCEAH's creation.

¹ Arend Eisenloeffel, Report on a Technical Assistance Mission for the Essential Oils Sector of Economy of the Republic of Haiti, August, 1969, November, 1970, page 19.

In October 1975, a new levy was introduced in addition to the 5% export tax. Labelled "Compte Defense Nationale" (National Defense Account) it consisted of an ad valorem rate of 2% on the cost and freight value of vetiver oil exports. For the other products, the rate was slightly lower as it was fixed at 1.5%. Then in 1978, on top of the 2% ad valorem rate, an additional levy was added for vetiver. It was a specific tax per pound, the value of which increased with the export price. When the price reaches \$21.50 per pound the value of the additional tax was \$1 per pound; it moved to \$2.50 per pound when the price was \$24.00 per pound, to reach a maximum of \$3.50 per pound when the price rose to \$28.50 per pound. In other words, as of 1978, vetiver oil export taxes was made of 3 components: a 5% custom taxes, a 2% ad-valorem levy and the specific component mentioned above. On top of this, various other charges (banking, SEN lab analysis, freight, OCEAH's operating commission, etc) had to be paid by the processor. As of 1978, for the other products, the ad valorem component of the "Compte Defense Nationale" was raised to 3% of the cost and freight value while a specific levy per pound of oil was also added. It was fixed at \$.25 for lime and bitter orange and at \$.15 for amyris.

Table 7 describes the tax situation for 1978-82. The table has been constructed by adding all taxes paid (customs plus all components of the National Defense Account) and dividing the result by the export value of the year. Notice that processor's net revenues were lower still as other charges were added. For instance in 1979, vetiver oil processors received 78.5% of the value exported. For lime oil, it was 83.8% for the same year. With respect to vetiver, beginning in 1981 the National Defense Account tax has not

Table 7
EFFECTIVE RATE OF TAXATION FOR ESSENTIAL OILS EXPORTS - 1978-82
% of Export Value

	1978	1979	1980	1981	1982
Vetiver	19.0%	18.8%	10.3%	4.8%	4.8%
Lime	11.5%	11.2%	10.5%	10.2%	10.1%
Amyris	11.1%	10.6%	10.3%	9.9%	9.8%
Bitter Orange	12.1%	10.7%	11.2%	9.7%	9.8%

Source: 1978, IMF: La Fiscalité en Haiti, September, 1979, page 113, table 34. OCEAH for other years.

been collected, with the consequence that for both 1981 and 1982, processors received 89% of the export value, net of all taxes and charges.

Generally speaking, Table 7 casts serious doubts about the validity of the attempts at explaining essential oils problems, or more specifically the vetiver oil crisis, by focusing on the disincentive impact of taxation.² For all products, the rates described in table 7 can hardly be considered excessive. Coffee producers in Haiti would be ecstatic if the coffee export tax was lowered to these levels. For vetiver one may flatly assert that if taxes were the problem, vetiver oil production should have been booming by now, even making allowance for a lag in processor's response to the significant drop in the real rate of taxation that occurred both in 1980 and 1981.

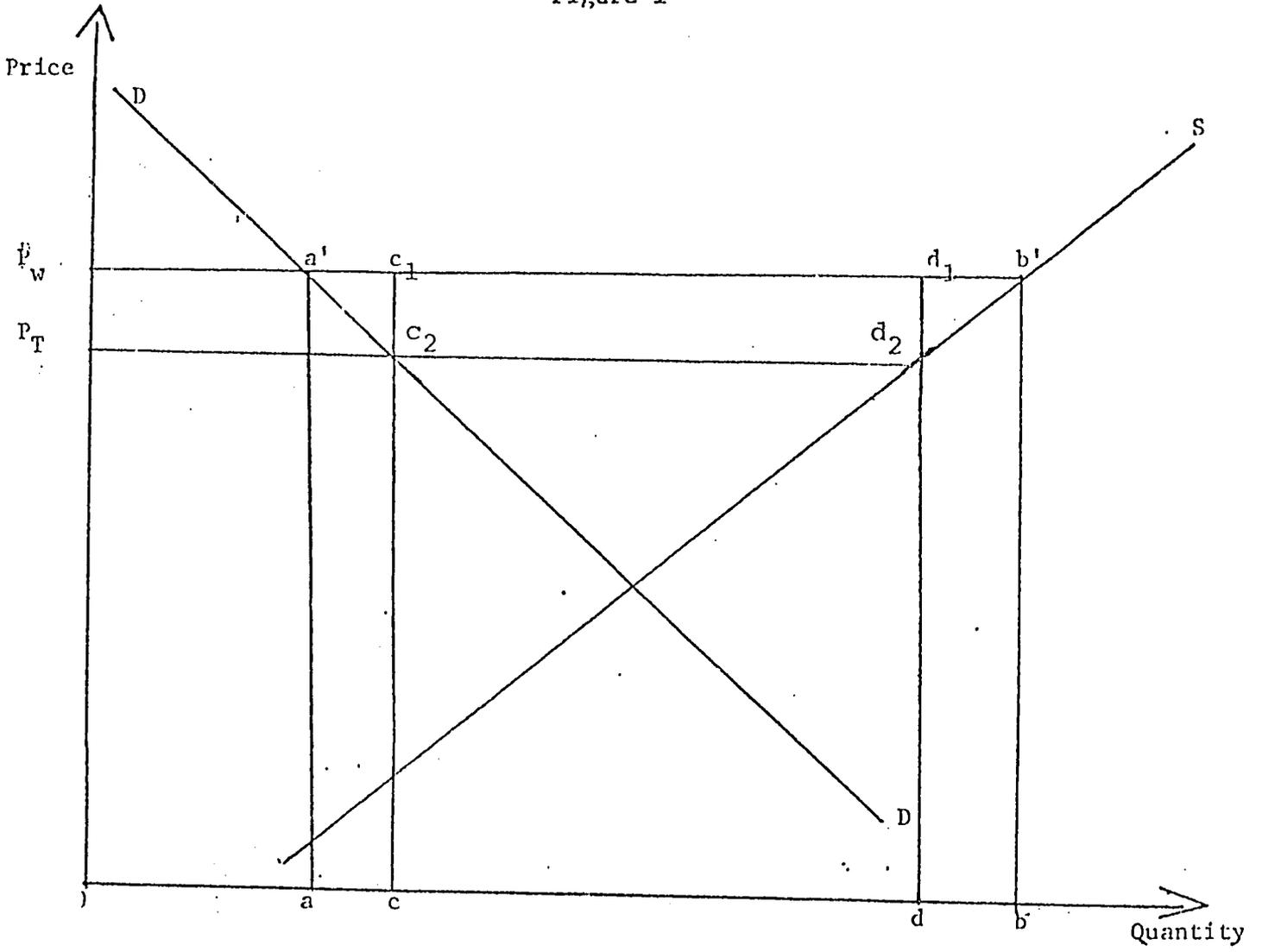
² A typical statement of this line of analysis is to be found in U.S. AID, Food and Agriculture Sector Strategy for Haiti, February, 1982, especially pages 82 and 115.

The negligible incidence of the export taxes on the output trends may be substantiated in another way. Economic theory recognizes two cases in ascertaining the impact of export taxes. The distinction, hinges on the relative size of the exporting country as a world supplier. Consider the case of coffee in Haiti: the country is a very small producer with less than 1% of world exports, so that it cannot do anything to affect the international price. The latter is a binding constraint from which Haiti can't escape. In such a situation the full burden of the export tax will be born by the country. The effect of the export tax can then be analyzed in terms of its two components. The export tax is a production tax that discourages output while at the same time it constitutes an implicit subsidy to domestic consumption. Export volume will thus be reduced as a result of the interplay of these two factors. The situation is illustrated in Figure 1

P_w is the world price. At that price Haiti produces O_b of Coffee and consumes O_a thus freeing ab as export volume. Export revenues is the area $aa'b'b$. Now a tax T is imposed on coffee exports. As Haiti can't affect P_w , in order for the country to be able to keep on exporting, the internal price of coffee must be reduced. In other words, P_w will now include the tax T , so that the producer's price falls to P_T , the distance $P_T P_w$ measuring the export tax. At the lower internal price P_T , producers reduce output from O_b to O_d . But the lower price induces local consumption to expand from O_a to O_c . Consequently at the new price P_T , O_c will be consumed, O_d will be produced, leaving cd as the new quantity exported. It is obviously smaller than ab . The export tax will amount to $c_1 c_2 d_2 d_1$.

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Figure 1

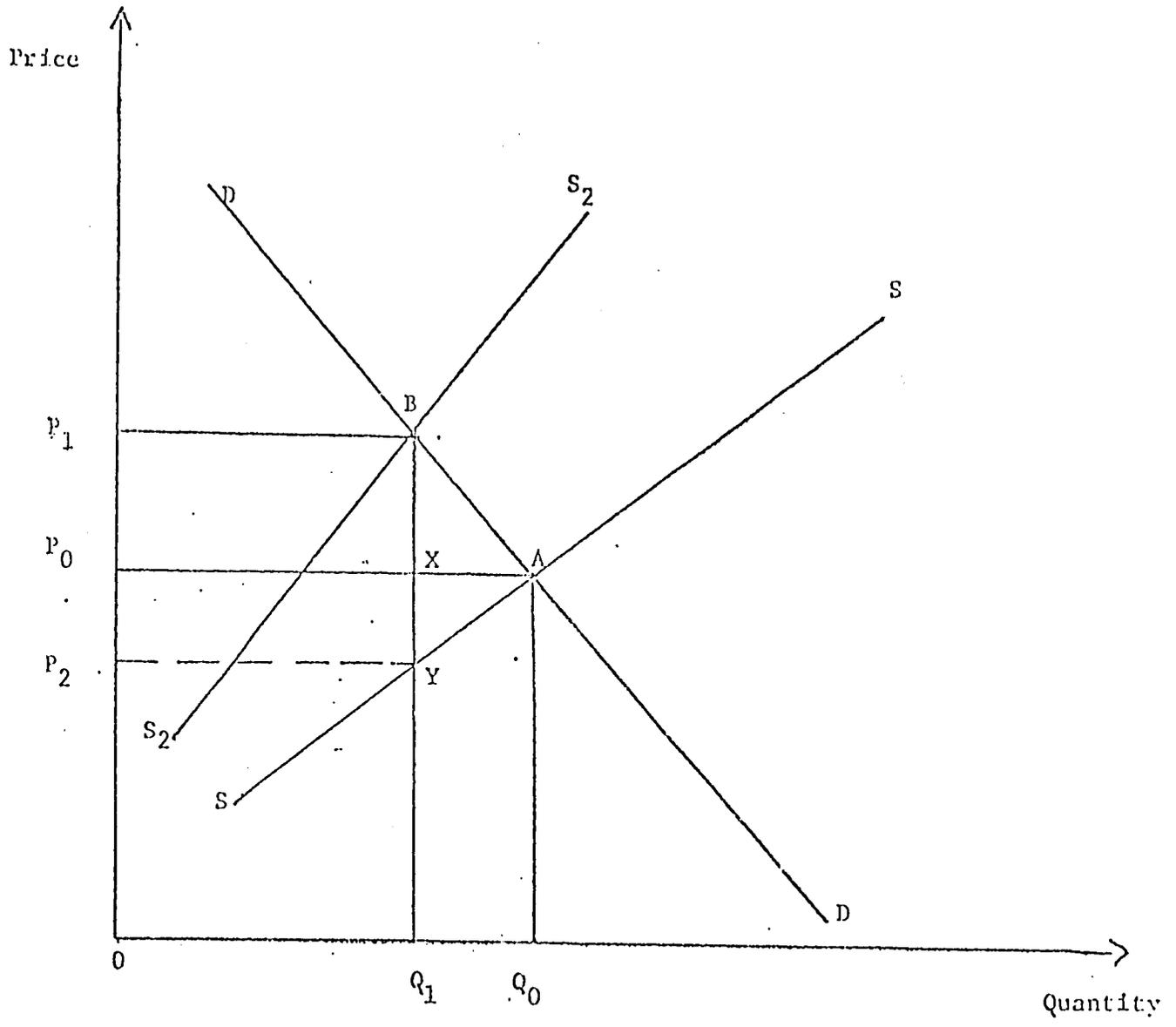


The other case that can be considered is radically different. Suppose that the country is no longer a small, insignificant exporter. Suppose that the country is a leading producer that can have an impact on both world price and the volume of world exports. Such is the case of vetiver, for which Haiti's exports represent at least half the world total. If Haiti is the dominant exporter, and it decides to impose an export tax, the impact of this may be analyzed with the help of Figure 2.

SS is the supply of vetiver and DD the American demand. Equilibrium is at point A with quantity Q_0 being sold at price P_0 per unit. Now Haiti imposes an ad-valorem export tax on vetiver oil. As it is such a big producer, the effect of that export tax is to shift the SS Supply line up to S_2S_2 by the amount of the tax. The equilibrium point moves to B and American buyers now pay P_1 instead of P_0 . Haitian producers received P_2 , the new price, net of the export tax. Both the higher price to American consumers and the lower price to Haitian producers contribute to decrease the quantity sold to America from OQ_0 to OQ_1 . How do we know that Haiti benefits from such a tax? It depends on whether or not the area OQ_1BP_1 is larger than the area OQ_0AP_0 . In turn this depends on the elasticity of the demand curve DD. The more elastic it is, the less Haiti gains. (Notice that the elasticity of the demand curve is affected by how flat or steep it is. The flatter the curve, the more elastic demand is). The extent of Haiti's gains depend therefore on the elasticity of American demand for Haitian vetiver oil. Notice that to the extent that vetiver oil is not consumed locally, the export tax will not have any domestic consumption effect. The critical difference in this case is that Haiti's dominant

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Figure 2



The amount of the export tax is represented by the area p_1BYP_2 . The consumer's burden is represented by the area P_1BXP_0 while the producer's one is P_0XYP_2 .

position as an exporter allows it to force part of the burden of the export tax upon the American consumer much in the same way that OPEC could force petroleum consumers to shoulder the bulk of the rise in petroleum prices in 1973.³ This ability to coerce the consumer is not unlimited however as substitution effects do take place in the longer run. The important point is simply that in and of itself the tax burden did not constitute the determining factor. We must turn now to the marketing strategy followed by OCEAH to find the key to the problem.

B) MARKETING AND PRICING ISSUES

A meaningful assessment of the marketing issues involved in essential oil exports must start with the acknowledgement of a simple fact of overwhelming importance: the heavy concentration of export sales to the American market. Additionally, in the United States itself, one buyer dominates the whole market. It is the New York based firm Polarome, a brokerage house owned and managed by the brothers Pierre and Eric Bruell. Of course, there are other firms such as Champon, Uhe, ARCO which are also involved in the trade, but they are of minor importance compared to Polarome. Strangely enough, OCEAH does not keep any statistics on this aspect of the business. It would appear that Polarome accounts for at least 80% of the market for amyris, vetiver and lime oil. This situation has caused

³ The IMF clearly mentions that Haiti's export position forces buyers to share in the burden of the export tax. See: La Fiscalité en Haiti, September 13, 1979, page 112.

concern among many observers and, as mentioned in the previous chapter, Eisenloeffel did warn that the existence of such a monopsonistic power would put the individual exporter at a disadvantage. The very existence of such a monopsony makes it difficult to accept policy recommendations aiming at the elimination of OCEAH. In such a situation, a rational strategy on the seller's side is to organize some form of countervailing power such as a centralized sales office. In other words, to protect oneself, as a seller, it makes sense to erect a monopoly in order to confront the monopsonist. As is well-known, the theoretical outcome of such a bilateral monopoly situation is unclear. However, as long as there exist such a monopsony, it would be indefensible to advocate the destruction of the countervailing monopoly that may help to redress the balance of commercial power in the favor of sellers. There is, thus, much justification for a centralized selling organization that can shield the individual processors, especially the smaller ones, from Polarome's monopsony. In order for this to be a first best solution, there is the implicit assumption that the selling organization will behave in a commercially sensible way. On this account, the least that can be said is that OCEAH's performance has been a dismal failure.

Indeed, confronted by such an overwhelming concentration of Haiti's market, common sense would dictate that OCEAH's first task would have been to implement an aggressive market diversification strategy to reduce Polarome's control. As the latter is only an intermediary between the exporters and the final users, one element of such a strategy might have been an attempt at negotiating directly with the end users. This would have implied longer term contracts to stabilize the commercial relationship and also one might have attempted to tap the technical expertise of the final consumers to improve

both the production process and the product's quality. Unfortunately, it does not appear that OCEAH has attempted to implement such a strategy. Or if it has, it was short-lived and did not bear any fruit. In other words, essential oils exports were left still dependent on access to the American market and subject to one buyer's policy. As shown by table 8, OCEAH's creation in 1975 did not at all affect the regional pattern of essential oil exports. Except for 1980, virtually, all Haitian lime oil has been sold the United States since 1959. For amyris, after declining since 1972, the share of the American market rose, (by almost 30% in 1976) in the wake of the office's creation. With respect to amyris then, not only has OCEAH's failed to diversify the market, it has actually reversed a three-year trend in that direction.

For vetiver, the situation is even more puzzling and raises grave questions. Consider the evidence presented in table 9. It describes the comparative evolution of the price received for vetiver oil exports to the United States with the same price in other markets. Because of data limitations, the ratio of the third column actually understates the divergence between the two prices. This is due to the fact that the American price is also included in the denominator. Thus, given the weight of exports to the United States, this implies that the difference between the American price and the non-American one might have been greater than what is indicated here. Be that as it may, table 9 shows clearly that beginning in 1966 there has been an obvious trend of the vetiver oil price received in the American market to fall as compared with the non-American price. It is very enlightening to compare table 9 and table 8. The latter indicates that between 1968 and 1975 the share of the American market has also been falling. This is a rational

Table 8
ESSENTIAL OILS EXPORTS TO U.S. AS % OF TOTAL EXPORTS

	<u>Amyris</u>	<u>Vetiver</u>	<u>Lime</u>
1955	88.6	80.9	99.6
1957	94.3	80.9	100.0
1959	82.2	60.2	100.0
1960	76.8	65.8	98.4
1961	76.5	49.4	92.8
1962	72.0	57.3	96.8
1963	85.9	42.8	94.2
1964	74.6	53.0	95.1
1965	70.8	51.9	95.4
1966	82.5	55.2	100.0
1967	78.2	67.0	100.0
1968	82.2	70.3	97.8
1969	77.8	69.4	97.9
1970	59.9	61.8	99.4
1971	70.7	55.0	99.5
1972	73.4	54.8	89.2
1973	63.2	53.2	99.3
1974	67.1	50.7	98.8
1975	55.1	48.1	97.6
1976	70.4	77.7	94.0
1977	85.7	100.0	98.1
1978	63.6	74.1	99.5
1979	76.6	76.4	99.3
1980	85.5	62.8	64.6
1981	74.3	60.4	98.3

Source: Same as Table 1.

Table 9
VETIVER: U.S. PRICE VS INTERNATIONAL PRICE

	<u>Int. Price</u>	<u>U.S. Price</u>	<u>Ratio US Price/Int. Price</u>
1955	15.81	15.98	1.01
1957	14.99	14.07	.93
1959	15.18	15.18	1.00
1960	17.21	15.36	.89
1961	18.07	17.60	.97
1962	15.45	15.68	1.01
1963	13.78	15.88	1.15
1964	14.08	14.10	1.00
1965	12.61	11.30	.89
1966	18.41	19.13	1.03
1967	15.17	14.58	.96
1968	16.53	15.87	.96
1969	13.99	12.73	.90
1970	18.02	18.20	.98
1971	17.65	16.09	.90
1972	20.71	18.84	.90
1973	18.43	18.50	1.00
1974	24.47	27.49	1.12
1975	37.83	37.85	1.00
1976	43.11	37.03	.85
1977	46.11	46.11	1.00
1978	56.03	58.11	1.03
1979	56.29	54.84	.97
1980	42.03	42.82	1.01
1981	31.48	31.45	.99

Source: Same as Table 1.

seller's reaction: faced with two markets with diverging prices, profit maximisation dictates that sales be made to the market with the higher relative price. As a result of this, in 1975, the United States accounted for a little under half of Haitian vetiver oil exports, the lowest share of the whole period.

Now, reversing a sustained trend, between 1975 and 1976, the share of the American market rose by 60% to reach 78% of the total. Yet table 9 indicates that between 1975 and 1976, vetiver oil prices in the United States fell 15% (at least) compared to the export price available elsewhere. The sharp rise in the American market share thus coincided with a strong decline in the relative American price. This result is counter-intuitive. Notice furthermore that 1976 was the first year OCEAH had total operational control of all essential oils exports. Its behaviour indicates an unacceptable level of commercial ineptitude.

We are therefore faced with the complete failure of OCEAH to tackle one of the most fundamental issues in essential oils exports. For two of the three commodities under analysis, the office has exercised a perverse influence as it reversed the trend that the private processors had wisely initiated. But, a look at another aspect of marketing would indicate that OCEAH's poor performance extended to other areas as well. Consider first the case of lime oil exports. In the previous chapter we indicated that Haiti's share of the American import market has been shrinking (for instance there was a drop of half between 1976 and 1980). OCEAH did nothing to reverse the trend or correct the situation. Even moreso, the price received by Haitians for lime oil exports has been consistently lower than the one received by the Mexicans

(the leading exporters) or even Peru. In 1975, the price received by Haiti amounted to 66% of the average American import price and 60% of the one received by Mexico (table 10). Haiti's relative price has somewhat improved with respect to other exporters but the trend is not consistent. One element

Table 10
U.S. IMPORT UNIT PRICE FOR LIME OIL
(\$ per pound)+

	1975	1976	1978	1979	1980	1981	1982*
Mexico	8.87	7.54	9.09	12.93	14.42	16.82	15.46
Haiti	5.32	7.52	7.02	7.87	9.21	10.28	10.29
Peru	7.08	7.13	8.45	11.44	12.23	11.99	10.77
Average	7.97	6.78	8.86	11.68	13.18	11.83	12.78

+ Data for U.S. Calendar Years.

* First 10 months only.

Source: U.S. Department of Commerce, U.S. General Imports, Publication FT 135 various years.

explaining this price differential has been mentioned previously when we noted that there were quality problems associated with the distillation process used here. However, the fact that the ratio of the lime oil price paid to Haiti to the average American import price is unstable would indicate the effects of other problems (The ratio was .66 in 1975, .84 in 1977, .67 in 1979, .70 in 1980 and .80 in 1982).

If, in the case of lime oil exports, it can be said that OCEAH has sinned by doing nothing, in the case of vetiver oil, the roots of the current situation must be found in an ill-conceived pricing strategy apparently aimed only at maximizing immediate tax revenues. As we have seen in the preceding section of this chapter, beginning in 1978, there was an additional levy that

was created and its level was linked to the export price of vetiver oil. OCEAH apparently sought to take advantage of the situation when in 1978 the price went very high in an expanding market. Unfortunately, the American demand fell in 1979 and the Office failed to adjust accordingly. As a consequence, the bottom fell out of the Haitian vetiver oil market and the industry has yet to recover. The explanation provided by OCEAH's officials is that the conditions of the international market, especially the recession, are the main cause of the current situation. This does not seem to fit the facts. But what are these facts?

The first one is that indeed there has been a reduction in the American market. Official U.S. Department of Commerce data indicate that American imports declined from 341,519 pounds in calendar year 1978 to 173,599 pounds in 1979. After a slight recovery in 1980 when imports reached 253,902 pounds, they fell again in 1981 to 132,760 pounds. For the first ten months of 1982, American imports amounted to 197,000 pounds. There has thus been an unmistakable weakening of import demand. But this can hardly explain why Haiti's market share fell so drastically as shown in table 11. Between 1978 and 1979, Haiti's market share fell by more than a third while Indonesia's

Table 11
SHARE OF HAITI AND INDONESIA IN THE U.S. VETIVER OIL MARKET+

	1978	1979	1980	1981	1982*
Haiti	73.4%	48.2%	51.1%	67.2%	40.3%
Indonesia	17.4%	38.8%	37.9%	17.4%	6.1%

+ Data for U.S. Calendar Years.

* First 10 months only.

Source: Same as table 10

doubled. Similarly, between 1981 and 1982 Haiti lost 40% of its market share. During that year the strong competition was provided by China, whose exports to America went from virtually nothing to 47% of the American import market in just one year. China thus displaced Haiti as the main supplier.

The second important fact is that the explanation for these momentous shifts in market shares is to be found in a simple comparison of American vetiver oil import prices from the various countries. As shown in table 12, Haiti's decision to maintain a high price in the face of a shrinking demand cost her very dearly given the decision of Indonesia to adjust prices downward.

Table 12
UNIT IMPORT PRICES FOR VETIVER OIL+
(\$ per pound)

	1978	1979	1980	1981	1982*
Haiti	30.77	29.57	20.15	14.60	19.55
Indonesia	24.88	16.91	11.21	8.84	16.24
Average Imp Price	30.46	25.52	18.15	15.68	15.13

+ Data for U.S. Calendar Years.

* First 10 months only.

Source: Same as table 10.

While, in 1978, Indonesia's price accounted for 81% of the Haitian one, the ratio dropped to 57% in 1979, 55.6% in 1980, 60% in 1981, and rose to 83% in 1982. Note that Haiti's vetiver oil is widely considered to be of very high quality and thus a far better product than Indonesia's. Evidently, however this quality differential is not enough to reduce the price elasticity of substitution between the Haitian and the Indonesian products. The data suggest that the quality differential can justify a Haitian price which is 15

to 20% above the Indonesian one. Beyond this, the buyer finds it attractive to switch back to Indonesia as a supply source. A similar analysis probably applies to China. For 1982, the Chinese price was \$9.03 per pound, which was 46% below the Haitian one. This clearly helped China grab almost half of the American market in just one year. Furthermore, this clearly indicates that the 25% boost in the Haitian price between 1981 and 1982 was not justified. In fairness, however, it should be stated that OCEAH cannot be held responsible for this last decision as Haitian individual processors have had the latitude to negotiate their own contracts since 1981.

It should be stressed that, at least between 1978 and 1980, the Haitian strategy has been especially unfortunate with respect to the American market to the extent that Indonesia appears to have designed a specific market penetration strategy for the United States. This is based on a comparison between prices received by Indonesia in the United States and the general export price for Indonesia's vetiver oil. Thus, from table 12, we see that for 1978, 1979 and 1980, Indonesia charged a price of \$24.88, 16.91 and 11.21 a pound for each of the years on the American market. On the other hand, UNIDO⁴ data suggest that the general export prices received by Indonesia for the same years were \$26.63, \$24.39 and \$18.48. This shows that the price charged by Indonesia to American customers was lower than the one charged to other customers. It is also interesting to note that while in 1978, Indonesian exports to the United States amounted to 63% of total Indonesian exports of vetiver oil, the ratio was 94% in 1980.

⁴ UNIDO, Report on the Workshop on the Essential Oil Industry, UNIDO/IO.502, April 27, 1982, page 88.

CONCLUSION AND POLICY RECOMMENDATIONS

We have seen that the present situation in the essential oils export sector directly stems from OCEAH's policies. In the case of lime oil, it is rather a failure of policy as export volume was allowed to stagnate while no improvements were made with respect to product quality. With respect to vetiver oil, the issue was not taxation but rather a misguided pricing strategy that attempted to keep prices at a high level in the face of both a weakening demand and a substantial price cut by an aggressive competitors. OCEAH's ineptitude in handling the vetiver oil situation is confirmed by the fact that while on the one hand it was attempting to keep prices high, on the other, it also allowed an expansion of capacity to take place. Indeed it was during the 1978-1979 period that Minoterie built its plant. Clearly it did not make sense to try to keep prices high while allowing an increase in available supply, especially in view of the softening demand.

This situation illustrates a serious policy dilemma. On the one hand, it would be rash to advocate the elimination of OCEAH as long as Polarome dominates the buying side of the market. Furthermore, many observers agree that it helps the cause of the small processors to have the Office take care of the marketing of their output. On the other hand the strategic position of the Office implies that any mistakes it makes will have serious consequences for the processors. One way out of the dilemma is to have the private processors exercise some degree of control over the Office's policies. In other words, the management of the office could be placed under a board where

the private sector would have a substantial presence, thus insuring some control over decisions. But, this in turn implies that the processors are able to overcome the factionalism which characterizes their ranks today. This is illustrated by the difficulty in reviving the old processor's Association in the wake of the vetiver oil crisis. Yet this might be a prerequisite since it would be difficult to formulate sensible policies without a coherent private sector involvement in the process.

On the other hand, OCEAH's functions could be performed, perhaps more efficiently, by OPRODEX. In fact, in July 1982, the Minister of Commerce and Industry did issue a "communiqué" to transfer OCEAH's attribution to OPRODEX. However, the administrative decision was never put into effect, in part because an administrative decision cannot supersede a law (in this case the one creating OCEAH). Such an approach has a lot of advantages: first it would reduce explicit administrative costs to the processor as there would be no need to collect the fee received by OCEAH. The value of the fee is 1.5% of the value of lime oil exports and 2% in the case of vetiver. OPRODEX has no such fee. A second advantage would be to reduce administrative fragmentation. Since OPRODEX is in charge of promoting exports based on the agricultural sector, OPRODEX could do the same for essential oils at less additional cost than having a separate office. Notice that even if OPRODEX were put in charge of the essential oils sector, there would still be the need for meaningful participation of the private processors in the formulation of pricing and marketing strategies. Private sector inputs could be channelled through an advisory group working with OPRODEX. From a foreign aid donor perspective, if all agricultural exports promotional efforts are concentrated in one institution, it may be worth it to develop a program to strengthen that

institution's capabilities because the positive effects would then be felt by all sectors.

Whatever the exact institutional arrangement that is arrived at, it is important that the functions of the centralized sales office not be diluted. Thus the current situation in a sense represents the worst of all possible outcomes. Indeed, on the one hand, OCEAH is unable to present a unified front to the monopoly power of the buyer given that individual vetiver oil processors are allowed to negotiate their own contracts. On the other hand, the private processors must still pay the 2% fee to OCEAH for a function it does not perform. This situation must change. The sales must be handled by one entity to prevent Polarome from playing one seller against another, but the centralized sales organization must be subject to some degree of private sector control to avoid pitfalls such as the one that occurred in 1979.

Beyond the proper institutional arrangement suitable for the effective promotion of essential oils exports, we must now define the other areas of substantive intervention. Given the tremendous regional impact of essential oils, especially vetiver, it is obvious that the effects will be felt mainly in and around Les Cayes. This is particularly important if the goal of decentralized economic activity away from the Port-au-Prince area (regional growth poles) is to be taken seriously.

At this point in the analysis, a product by product discussion makes policy analysis and recommendations more meaningful. Let us start with vetiver. Clearly the impact of the production of vetiver on soil protection

must be of paramount importance since it is likely that erosion control would be one of the top priorities of any sustained intervention in the South. It seems that there are ways to grow and harvest vetiver on mountain slopes that minimize the incidence of soil destruction. One way that is proposed is to grow the vetiver in rows along the contour lines and to alternate rows of vetiver with rows of trees. This is a problem that deserves attention and further agricultural research.

At another level, the processing of vetiver is extremely energy intensive and this also implies further negative impact on soil conservation as the steam is usually generated by burning wood. In fact, there may be a serious policy dilemma here. If Haiti has to regain its competitive position on the American market, it may have to practice a more aggressive price policy to remain in line with what China appears to be practicing. This in turn would push for the most economical way to process vetiver. Today the use of wood, as compared to fuel oil, results in a cost savings of about 30%. It is fair to say that many processors feel that, as it becomes scarcer, wood will lose its comparative advantage as an energy source. But there are still many inducements in using wood (actual equipment, ease of supply and so forth). Thus, one issue might be whether or not subsidized loans should not be made to processors to induce them to modernize their plants in order to be more energy efficient. As mentioned before, only one plant that we visited had invested in energy savings materials to insulate the equipment. This practice should be encouraged.

We should also be aware that energy efficiency could be improved if the yield of the roots were increased. Hence, one should aim at including farmers

to keep the roots in the ground for the optimal 24 months period instead of harvesting them at 6 or 8 months. But this, in turn, is linked with the possibility of getting income from other sources during the interim period. At this stage, it would seem that this is linked with more structural changes in the agricultural sector, changes that would go beyond the essential oils sector per se. Be that as it may, such a change in farmer's behaviour could be helped if the roots were paid according to their oil content rather than on weight alone. However, this solution would involve very serious logistical problems given the decentralized marketing network that collects vetiver from farmers for processors.

Another area that deserves investigation is the botanical or genetical side of vetiver growing. The objective here would be to identify whether or not yields of more than 2 tons per hectare are possible, and if so under what circumstances. As mentioned before, vetiver grows practically wild so that there may exist unexplored possibilities for increasing yields with the scientific application of fertilizer and serious genetic research. Such a program would make sense especially if it is integrated in a larger one targeted at the whole southern area.

A last area that should be explored with respect to vetiver oil is the possibility of integration further downstream. It is clearly out of the question to think about the full-fledged development of a cosmetic industry in Haiti. But the opportunities for further local processing of vetiver oil before export could well provide a way out of the current crisis. A first step might be the technical evaluation of what kind of other products could be

produced with the oil. Then a commercial feasibility study could be undertaken to identify markets and explore the possibilities of association with some of the industrial end users. Instead of exporting the raw oil, Haiti would now export a product incorporating a higher level of processing and therefore of value-added. Special care should be taken to insure that the process involved is as labor intensive as technically possible. A further step could be the provision of subsidized loans to facilitate the new investment in equipment, building and so forth. Perhaps such a program could also include a promotional and longer term technical assistance component. The financing part could conceivably be channelled through the newly created Development Finance Corporation. Notice that the package of incentives might be put together with an explicit aim at influencing locational choices in favor of the Les Cayes area.

With respect to lime oil, a program to revamp production could be done through the Development Finance Corporation (DFC) to the extent that cheap loans would be combined with other inputs (technical assistance and market development) to modernize part of this agro-industrial sector. Here, the option is to improve lime oil production through a cold pressing process. This would lessen the demand for wood implicit in the current steam distillation one. Furthermore, the development of a market for the lime juice (frozen concentrate) means that more product diversification of citrus by-products could be achieved. Again the same steps outlined for vetiver oil would have to be followed. Technical evaluation, market development, subsidized financing and so forth.

Lime oil production, however, is dependent upon the production of a fruit tree whose gestation period is fairly long, 5 to 8 years. Thus, an expansion

program would necessarily have to have a fairly long time horizon. On the other hand, it seems that some private interests are considering the possibilities to invest in lime plantations. This should be encouraged, especially if one result of this is to reconstitute the vegetal cover of some eroded slopes. The increment of output that could not be transformed locally could always be exported as there is a market for the fruits themselves. On the other hand, the possibilities for processing further downstream could also be explored, especially with the assistance of some of the end users..

A revamping of the essential oils sector implies more than the elimination of OCEAH or merely tinkering with the tax structure. That will clearly be insufficient. Active intervention is needed. Unfortunately it is not immediately self-evident that such intervention is justified at the national level given the marginal significance of this sector. On the other hand, in the context of a regional strategy centered on the southern region, there is much to say for such an active involvement. Additionally, given the DFC's commitment to agro-industrial development, it may make sense to provide it with additional resources targeted at this specific sub-sector. On the other hand, it would be self-deluding to believe that OCEAH, in and of itself, is the main issue. Its misguided actions might have precipitated the vetiver crisis but the effort needed to push essential oils exports to a higher level was beyond its reach. Indeed, it was not designed to do so. On the other hand, left to its own resources, the private sector might have also reached the limits of its possibilities. External help would have been needed anyway. The positive side is that in this case, at least there is something to build on: experience, expertise and entrepreneurial talent. This is not a bad starting point.

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