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Analysis of Agricultural and Price Policies Applied to Hibiscus and Peppermint Produced in Egypt

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Abstract

The Government of Egypt has been intervening in the pricing of agricultural commodities over different periods of time, either directly or indirectly, in order to, in addition to rationalizing hard currency spending on food, and trying to increase the proceeds of foreign currency and ensure a return to the country's treasury. However, such intervention may lead to some imbalance between world prices (2) and domestic prices (border prices, and export prices (1) (FOB), or import prices (2) (CIF)). It is worth mentioning that the successes achieved in the production and marketing of medicinal and aromatic plants at both the national and international levels acts as the motivation for developing the cultivation and trade in these plants in order to improve their competitiveness in the face of competing countries, where they are used as raw materials for processing a large number of products, in addition to exporting to foreign markets, which contribute to increasing national income. However, despite the achieved developments, medicinal and aromatic plants' share in plant production value does not match the potentials such plants can achieve to Egypt's agricultural production, where it reached some LE 436.36 million accounting for 0.48% of the total value of plant production, estimated at LE 899.68 billion in 2012 (9). Therefore, the research focused on estimating the policy analysis matrix for hibiscus and peppermint in order to measure the coefficients of protection, such as the Nominal Protection Coefficient for tradable inputs, the Effective Protection Coefficient, in addition to measuring Domestic Resource Cost, financial profitability for hibiscus and peppermint's farmers, and the country's economic profitability from hibiscus and peppermint (3,4).

Key words: Analysis of Agricultural, Price Policies, cost insurance and freight, Nominal Protection coefficient of tradable input (NPcI)

Introduction

The Government of Egypt has been intervening in the pricing of agricultural commodities over different periods of time, either directly or indirectly, in order to ensure stability thus food security for limited income categories, in addition to rationalizing hard currency spending on food, and trying to increase the proceeds of foreign currency and ensure a return to the country's treasury. However, such intervention may lead to some imbalance between world prices (2) and domestic prices (border prices, and export prices (1) (FOB), or import prices (2) (CIF)). It is worth mentioning that the successes achieved in the production and marketing of medicinal and aromatic plants at both the national and international levels acts as the motivation for

developing the cultivation and trade in these plants in order to improve their competitiveness in the face of competing countries, where they are used as raw materials for processing a large number of products, in addition to exporting to foreign markets, which contribute to increasing national income. However, despite the achieved developments, medicinal and aromatic plants' share in plant production value does not match the potentials such plants can achieve to Egypt's agricultural production, where it reached some LE 436.36 million accounting for 0.48% of the total value of plant production, estimated at LE 899.68 billion in 2012 ⁽⁹⁾. Therefore, the research focused on estimating the policy analysis matrix for hibiscus and peppermint in order to measure the coefficients of protection, such as the Nominal Protection Coefficient for tradable inputs, the Effective Protection Coefficient, in addition to measuring Domestic Resource Cost, financial profitability for hibiscus and peppermint's farmers, and the country's economic profitability from hibiscus and peppermint ^(3,4).

Research Problem

Despite the fact that medicinal and aromatic plants have numerous advantages that allowed them to be competitive exports plants for which demand is growing day-to-day in international markets due to the increasingly growing international trends toward safe food and drugs, in addition to the sector's large capacity to absorb a large number of labor at the agricultural, processing, or commercial level, and the great care devoted by the Government to exporters, medicinal and aromatic plants' production and marketing sector still suffers fluctuations in production, and deficiency in marketing. Such problems resulted in increasing the sharp competition these plants face in international markets. Therefore, it was necessary to shed light on the agricultural policies applied in Egypt in order to identify their impacts on hibiscus and peppermint farmers, as well as on the country.

Research Objective

The research aims to analyze agricultural and price policies using Policy Analysis Matrix (PAM) in order to identify their impacts on both the farmer and the country; and to define the country's role that seeks to achieve efficiency of resources' use through estimating the volume of transformations resulting from the country's adoption of economic liberalization policy; in addition to identifying the core of such policies, either protection policies, direct tax policies (such as tax on agricultural land), or indirect tax policies (such as implicit tax on production or exports). The research also aims to measure distortions in domestic prices to assess their diversion from international prices. Therefore, the research shall study the Policy Analysis Matrix for hibiscus and peppermint produced in Egypt.

Methodology and Sources of Data

The research relied on descriptive and quantitative statistical analysis using mathematical and statistical tools, in addition to applying some economic and statistical analysis methods to express some economic variables and to estimate the Policy Analysis Matrix for hibiscus and peppermint in order to measure the coefficients of protection, such as the Nominal Protection Coefficient for tradable inputs, the Effective Protection Coefficient, in addition to measuring Domestic Resource Cost, financial profitability for hibiscus and peppermint's farmer, and economic profitability for the country from hibiscus and peppermint. As for the data, the research depended on data published by the Ministry of Agriculture and Land Reclamation; Food and Agriculture Organization of the United Nations; in addition to some studies related to the study subject.

Results and Discussion

Estimation of Protection Coefficients, Domestic Resource Cost, and Financial and Economic Profitability form Hibiscus and Peppermint

Competitive ability is defined as the degree of flexibility that allows the economy to adapt to the expected structural changes, either at the domestic or international level. Usually, nominal and effective protection coefficients are used in the agricultural sector to identify the domestic pricing policy applied to agricultural crops, which allows us to compare domestic farmgate prices to international prices expressed by the border prices that are very close to farmgate prices, whether such crops are export or import crops. Estimation results shall help us identify the country policies applied to various crops, either protection policies, direct tax policies (such as tax on agricultural land), or indirect tax policies (such as implicit tax on agricultural exports, and compulsory delivery of agricultural crops as what have been applied in the past) ⁽¹⁾.

The research shall estimate the Nominal and Effective Protection Coefficients; Domestic Resource Cost, financial profitability for hibiscus and peppermint's farmers, and the country economic profitability from hibiscus and peppermint over the Period 2009-2013.

$$\text{Nominal Protection Coefficient of Tradable Outputs}^{(1)} = \frac{\text{Crop Revenue at Market Price (Financial)}}{\text{Crop Revenue at Shadow Price (Economic)}}$$

$$\text{Nominal Protection coefficient of tradable Inputs}^{(2)} = \frac{\text{Inputs' Value at Market Price (Financial)}}{\text{Inputs' Value at Shadow Price (Economic)}}$$

1- Nominal Protection coefficient of tradable out put (NPco)

2- Nominal Protection coefficient of tradable In put (NPcI)

In case the value of this coefficient is greater than one, it means the farmer received a subsidy. In case it is less than one, it means the farmer pays implicit taxes. Finally, in case the coefficient equals one, this means that the applied agricultural policy is fair.

$$\text{Effective Protection Coefficient}^{(1)} = \frac{\text{Value Added of the Crop at Market Price (Financial)}}{\text{Value Added of the Crop at Shadow Price (Economic)}}$$

$$\text{Comparative Advantage Coefficient or Domestic Resource Cost Coefficient}^{(2)} = \frac{\text{Domestic Resources' Value at Shadow Price}}{\text{Value Added of the Crop at Shadow Price (Economic)}}$$

A value less than one for this coefficient indicate that the country enjoys a comparative advantage in producing the crop, and vice versa.

Economic Surplus⁽³⁾ = Economic Profitability - Financial Profitability

$$\text{Economic Surplus Ratio} = \frac{\text{Economic Surplus}}{\text{Financial Profitability}} \times 100$$

$$\text{Percent of Economic Surplus for the Farmer/The Country} = \frac{\text{Net Financial Revenue Per Feddan for the Farmer}}{\text{Net Economic Revenue for the Country}}$$

Policy Analysis Matrix is applied to each of the following: efficiency of agricultural resources use; profitability for agricultural producers; prices of production resources and agricultural production inputs; prices of agricultural land and labor resources' services; and net revenues to production of main agricultural commodities, in order to compare between crop revenues and costs evaluated in terms of market prices, i.e., financially, and those evaluated in terms of shadow prices, i.e., economically⁽⁴⁾.

1. *Estimation of Protection Coefficients, Domestic Resource Use, and Financial and Economic Profitability of Hibiscus Produced in Egypt*
- *Nominal Protection Coefficient*

Results presented in Table (3) indicate that Nominal Protection Coefficient for hibiscus produced in Egypt over the period 2009-2013 amounts to 1.01, indicating that hibiscus farmer in Egypt receives about 99% of the product's value in international price, which means that the country subsidizes and protects the farmer by 99%, while increases the tax burden on consumers. In other words, domestic price of hibiscus (farmgate price) is higher than the international price.

As regards the Nominal Protection Coefficient for Tradable Inputs, it reached 1.12, indicating that the prices of inputs paid by hibiscus producers are lower compared to the international prices of corresponding inputs, i.e., hibiscus producers in Egypt receive implicit subsidy.

Effective Protection Coefficient

Results presented in Table (3) indicate that Effective Protection Coefficient for hibiscus produced in Egypt over the period 2009-2013 amounts to 0.99, indicating that hibiscus farmer in Egypt receives an implicit subsidy estimated at 99%, and the consumer incurs a tax burden. In other words, domestic price of hibiscus (farmgate price) is higher than the international prices.

(1) Effective Protection Coefficient (EPC)

(2) Domestic Resource Cost (DRC)

(3) Economic Surplus (ES)

Comparative Advantage Coefficient or Domestic Resource Cost Coefficient

It is also clear from the results presented in Table (3) that Comparative Advantage Coefficient or Domestic Resource Cost reached 0.36, which is less than one, indicating that Egypt enjoys a comparative advantage in the production of this crop, and that the cost required for adding a value equivalent to one Egyptian Pound represents LE 0.36/feddan. This comparative advantage can be benefited from in increasing Egypt's exports of hibiscus to foreign markets.

Economic Surplus

Results in Table (3) show that the economic surplus for hibiscus produced in Egypt during the study period (2009-2013) reached LE 156.23/feddan, indicating that the country's economic profitability is higher than the farmer's financial profitability by 4.77%. The calculated ratio of net revenue per feddan for the farmer to net revenue per feddan for the country assured this result, where it reached 0.95%.

Based on the results achieved from applying Policy Analysis Matrix to hibiscus produced in Egypt over the period 2009-2013, it is clear that the international price of hibiscus is higher than the social price (economic price), indicating hibiscus producers in Egypt receive an implicit subsidy. Such subsidy is reflected in the form of lower cost of tradable inputs due to lower prices compared to equivalent international prices. The calculated Domestic Resource Cost Coefficient returned a value less than one, indicating that Egypt enjoys a comparative advantage in hibiscus production, despite the fact that producers still get domestic prices that are less than the corresponding international prices, which calls for integration between the Government and the private sector to enhance hibiscus producers' ability to export the crop, although this action requires conducting studies on foreign markets and satisfying the required quality standards.

2. *Estimation of Protection Coefficients, Domestic Resource Use, and Financial and Economic Profitability of Peppermint Produced in Egypt*

- *Nominal Protection Coefficient*

Results presented in Table (6) indicate that Nominal Protection Coefficient for peppermint produced in Egypt over the period 2009-2013 amounts to 1.01, indicating that peppermint farmer in Egypt receives about 99% of the product's value in international price, which means that the country subsidizes and protects the farmer by 99%, while increases the tax burden on consumers in the same time. In other words, domestic price of peppermint is higher than the international price.

As regards the Nominal Protection Coefficient for Tradable Inputs, it reached 1.12, indicating that the prices of inputs paid by peppermint producers are lower compared to the international prices of corresponding inputs, i.e., peppermint producers in Egypt receive implicit subsidy.

- *Effective Protection Coefficient*

Results presented in Table (6) indicate that Effective Protection Coefficient for peppermint produced in Egypt over the period 2009-2013 amounts to 0.99, indicating that peppermint farmer in Egypt receives an implicit subsidy estimated at 99% while the consumer incurs a tax burden. In other words, domestic price of peppermint (farmgate price) is higher than the international prices.

Table 1: Estimated Total Production Cost and Revenue per Feddan of Hibiscus (Financial and Economic) Produced in Egypt for the Study Period's Average (2009-2013)

Item	Cost and Total Revenue (LE)	
	Financial Value	Economic Value
First: Production Inputs		
Seeds' Price	160	160
Manure	80	80
Chemical Fertilizers	366	366
Pesticides	-	-
Miscellaneous	166	83
Total Production Cost	772	689
Second: Domestic Resources		
Labor Cost	761	761
Cost of Animal Work	-	-
Cost of Mechanical Work	268	134
Total Labor	1029	895
Land Rent	1000	1000
Third: Total Product		
Main Product	6077	6016.23
Secondary Product	-	-
Total Revenue	6077	6016.23

Source: Calculated from Table (2) in the Annex

Table 2: Results of Estimating Agricultural Policy Analysis Matrix for Hibiscus Produced in Egypt Produced in Egypt for the Study Period's Average (2009-2013)

Item	Cost and Revenue (LE/Fed)				Net Revenue (LE)
	Revenue	Inputs	Domestic Resources		
			Total Work	Land	
Financial Assessment	6077	772	1029	1000	3276
Economic Assessment	6016.23	689	895	1000	3432.23
Policy Impact	60.77	83	134	-	(156.23)

Figures between brackets are negative

Source: Calculated from Table (1) in the Annex

Table 3: Results of Calculating Nominal and Effective Protection Coefficients, and Comparative Advantage for Hibiscus Produced in Egypt for the Study Period's Average (2009-2013)

Indicator	Value
Nominal Protection Coefficient for Outputs (NPCO)	1.01
Nominal Protection Coefficient for Outputs (NPCI)	1.12
Effective Protection Coefficient (EPC)	0.99
Comparative Advantage Coefficient or Domestic Resource Cost Coefficient (DRC)	0.36
Economic Surplus (ES)	156.23
Economic Surplus Ratio (%)	4.77
Net Revenue per Feddan for the Farmer/the Country	0.95

Source: Calculated from Tables (1) & (2) in the Annex

Comparative Advantage Coefficient or Domestic Resource Cost Coefficient

It is also clear from the results presented in Table (6) that Comparative Advantage Coefficient or Domestic Resource Cost Coefficient reached 0.22, which is less than one, indicating that Egypt enjoys a comparative advantage peppermint production, and that the cost required for adding a value equivalent to one Egyptian Pound represents LE 0.22/feddan. This comparative advantage can be benefited from to increase Egypt's exports of peppermint to foreign markets.

- Economic Surplus

Results in Table (6) show that the economic surplus for peppermint produced in Egypt during the study period (2009-2013) reached LE 184.4/feddan, indicating that the country's economic profitability is higher than the farmer's financial profitability by 2.11%. The calculated ratio of net revenue per feddan for the farmer to net revenue per feddan for the country assured this result, where it reached 0.98%.

Based on the results achieved from applying Policy Analysis Matrix to peppermint produced in Egypt over the period 2009-2013, it is clear that peppermint's international price is higher than the social price, indicating that peppermint producers in Egypt receive an implicit subsidy. Such subsidy is reflected in the form of lower cost of tradable inputs due to lower input prices compared to corresponding international prices.

The calculated Domestic Resource Cost Coefficient returned a value less than one, indicating that Egypt enjoys a comparative advantage in peppermint production, despite the fact that producers still get domestic prices that are less than the corresponding international prices, which calls for integration between the Government and the private sector to enhance hibiscus producers' ability to export the crop, although this action requires conducting studies on foreign markets and satisfying the required quality standards.

Table 4: Estimated Total Production Cost and Revenue per Feddan of Peppermint (Financial and Economic) Produced in Egypt for the Study Period's Average (2009-2013)

Item	Cost and Total Revenue (LE)	
	Financial Value	Economic Value
<i>First: Production Inputs</i>		
Seeds' Price	343	343
Manure	209	209
Chemical Fertilizers	382	382
Pesticides	59	59
Miscellaneous	293	146.5
Total Production Cost	1377	1230.5
<i>Second: Domestic Resources</i>		
Labor Cost	996	996
Cost of Animal Work	-	-
Cost of Mechanical Work	332	166
Total Labor	1328	1162
Land Rent	1368	1368
<i>Third: Total Product</i>		
Main Product	12815	12686.9
Secondary Product	-	-
Total Revenue	12815	12686.9

Source: Calculated from Table (2) in the Annex

Table 5: Results of Estimating Agricultural Policy Analysis Matrix for Peppermint Produced in Egypt Produced in Egypt for the Study Period's Average (2009-2013)

Constraints	Cost and Revenue (LE/Fed)				Net Revenue (LE/Fed)
	Revenue	Inputs	Domestic Resources		
			Total Work	Land	
Financial Assessment	12815	1377	1328	1368	8742
Economic Assessment	12686.9	1230.5	1162	1368	8926.4
Policy Impact	128.1	146.5	166	-	(184.4)

Figures between brackets are negative

Source: Calculated from Table (4) in the Annex

Table 6: Results of Calculating Nominal and Effective Protection Coefficients, and Comparative Advantage for Peppermint Produced in Egypt for the Study Period's Average (2009-2013)

Indicator	Value
Nominal Protection Coefficient for Outputs (NPCO)	1.01
Nominal Protection Coefficient for Outputs (NPCI)	1.12
Effective Protection Coefficient (EPC)	0.99
Comparative Advantage Coefficient or Domestic Resource Cost Coefficient (DRC)	0.22
Economic Surplus (ES)	184.4
Economic Surplus Ratio (%)	2.11
Net Revenue per Feddan for the Farmer/the Country	0.98

Source: Calculated from Tables (4) and (5) in the Annex

Conclusion

The successes achieved in the production and marketing of medicinal and aromatic plants at both the national and international levels acts as the motivation for developing the cultivation and trade in these plants in order to improve their competitiveness in the face of competing countries, where they are used as raw materials for processing a large number of products, in addition to exporting to foreign markets, which contribute to increasing national income. However, despite the achieved developments, medicinal and aromatic plants' share in plant production value does not match the potentials such plants can achieve to Egypt's agricultural production, where it reached some LE 436.36 million accounting for 0.48% of the total value of plant production, estimated at LE 899.68 billion in 2012.

Findings revealed that Nominal Protection Coefficient of tradable output and input for hibiscus and peppermint produced in Egypt over the period 2009-2013 amounted to 1.01 and 1.12, respectively, indicating that the Government subsidizes and protects producers of both crops while increasing the tax burden on consumers. In other words, domestic prices of both crops (farmgate price) are higher than the international prices. The calculated Nominal Protection Coefficient amounted to 99%, indicating that producers receive implicit subsidy, whereas consumers incur implicit tax.

It was also found that Comparative Advantage Coefficient or Domestic Resource Cost for hibiscus and peppermint amounted to 0.36 and 0.22, respectively, (which is less than one), indicating that Egypt enjoys a comparative advantage in the production of the two crop, and that the cost required for adding a value equivalent to one Egyptian Pound represents LE 0.36/feddan and LE 0.22/feddan, respectively. Such comparative advantage can be benefited from in increasing Egypt's exports of hibiscus and peppermint to foreign markets.

Finding also revealed that the economic surplus for hibiscus and peppermint produced in Egypt during the study period (2009-2013) amounted to LE 156.23/feddan and LE 184.4/feddan, indicating that the country's

economic profitability is higher than the farmer's financial profitability by 4.77% and 2.11%, respectively. The calculated ratio of net revenue per feddan for the farmer to net revenue per feddan for the country verified this result, where it reached 0.95% and 0.98% for the two crops, respectively.

In the light of the achieved results, the research offered the following set of recommendations:

1. It is important to identify the obstacles facing exports of medicinal and aromatic plants to foreign markets such as the high prices of inputs and quality of output, and try hard to overcome such obstacles, in addition to conducting studies on the main import markets.
2. Activating the cooperation between the Government and the private sector to boost the export ability of medicinal and aromatic plants' producers so as to raise their incomes such that they abide to quality standards, in addition to developing the marketing infrastructure for medicinal and aromatic plants through providing storage and transport facilities, and marketing information.
3. Creating production and economic entities to promote medicinal and aromatic plants' producers cultivate their plants in newly reclaimed lands in order to increase the area planted with such important crops.

Ethics

All the authors read and approved the manuscript and no ethical issues involved.

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Annexes**Table 1:** Financial and Economic Estimation of Total Production Cost and Total Revenue per Feddan for Hibiscus and Peppermint Produced in Egypt

<i>Agricultural Inputs & Outputs</i>	<i>Conversion Factor</i>
First: Production Inputs	
Seeds	1
Manure	1
Irrigation	0.7
Chemical Fertilizers	1
Pesticides	1
Second: Domestic Resources	
Value of Labor	1
Machinery (Rent)	0.5
Animal Work	1
Other Expenses	0.5
Land (Rent)	1
Third: Outputs	
Hibiscus	0.99
Peppermint	0.99

Source: FAO, *Comparative Advantage and Competitiveness of Crops, Crop Rotation and Livestock Products in Egypt*, Regional Office for Near East, Cairo, November 1999.

Table 2: Total Revenue and Cost of Hibiscus Production Over the Period 2009-2013 (Value in Egyptian Pound)

Year	Labor Wages	Value of Animal Work	Machinery (Rent)	Value of Seeds	Value of Manure	Price of Chemical Fertilizer	Value of Pesticides	Other Expenses	Rent	Total Revenue	Total Cost
2009	1010	-	395	239	213	349	-	236	1000	7015	2344
2010	580	-	163	97	40	359	-	120	1000	4632	2321
2011	663	-	226	115	47	388	-	139	1000	5254	2531
2012	766	-	275	170	48	349	-	165	1000	6790	2810
2013	786	-	279	179	50	387	-	170	1000	6695	2925
Average	761	-	268	160	80	366	-	166	1000	6077	2586

Source: Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Bulletin of Agricultural Economics, Different Issues.

Table 3: Total Revenue and Cost of Peppermint Production Over the Period 2009-2013 (Value in Egyptian Pound)

Year	Labor Wages	Value of Animal Work	Machinery (Rent)	Value of Seeds	Value of Manure	Price of Chemical Fertilizer	Value of Pesticides	Other Expenses	Rent	Total Revenue	Total Cost
2009	904	-	275	321	157	342	96	210	1271	10806	3576
2010	835	-	300	322	181	354	57	205	1218	12219	3472
2011	940	-	380	362	200	402	64	235	1356	14237	3939
2012	1132	-	351	360	255	399	36	253	1500	13858	4286
2013	1167	-	352	348	252	415	42	561	1493	12953	4366
Average	996	-	332	343	209	382	59	293	1368	12815	3928

Source: Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Bulletin of Agricultural Economics, Different Issues.