Medicinal and Aromatic Crops in Egypt : A Study in Medical Geography

Mohamed Nour Eldin Elsabawy

Professor of Medical Geography,Geography Department,
Minia University, Minia, Egypt

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Abstract

This paper is interested in the study of geographical distribution of medicinal and aromatic crops in Egypt. Its considered one of the most important untraditional agricultural commodities which can be used as a base for Egyptian national income development. Paper consists of Two main topicss. The first one explains the geographical and environmental factors influence on the growth of Medicinal and Aromatic crops like physical and human factors. The second topic explains the geographical distribution of crops in Egypt, either in the Delta Nile, Upper Egypt, or Sinai peninsula. Through three points the first one deals with development of crops production. Egypt is considered as one of the most important producers of aromatic and medicinal crops in the Middle East, because of its suitable environment to cultivate it. The land of Assuit, Minia, Monofia, Fayoum, Bani-Suife Sinai and Behera governorates are considered the main producers for many crops like coriander, cumin, caraway, Bardakoush, anise and other kinds of medicinal crops. The second point is interested in the study of productive governorates map. The third point deals with economics of medicinal and aromatic crops in Egypt especially after The Egyptian government (ministry of agriculture) leave the farmers cultivate their lands as they liked without control, So farmers preferred the crops which acquired more profits to them.

Keywords *: Medical geography, Medicinal, Aromatic, Crops, Egypt*

1- Introduction

This study uses quantitative, qualitative and statistical analysis in the geographical factors concerned with the Ecology of some crops and their identity. The study also is interested in the study of Geographical distribution of these crops which are concentrated in Sinai, and some Delta places and middle Egypt governorates like Fayoum, Bani-Souafe, Minia and Assuit. The study also uses the production criteria standards to identity the feasibility of cultivating such crops and the possibility of their cultivation expansion. It covers some selective regions in Egypt to study the role of geographical factors in production.

2- Geographical Factors

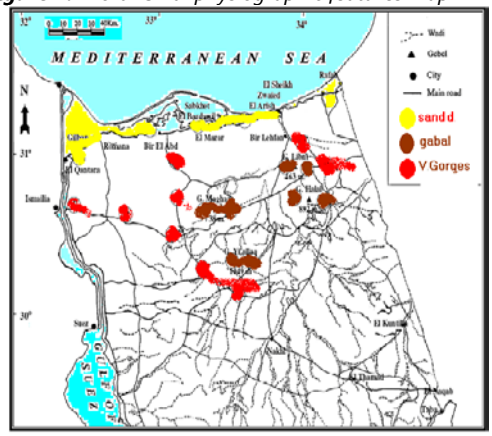
2.1- The impact of physiographic features

The land of Egypt in General and Sinai peninsula is unique in its natural diversity due to its geographical location at the meeting point of three continents (Asia, Africa, and Europe), the desert and the Mediterranean Sea, and the Rift Valley. Different climatic, phyto-geographic, and zoo-geographic zones converge here, creating great biological multi-diversity (Mendelssohn H,& 1999.,

p:3). The region served as an important crossroads for international trade from early antiquity, between Mesopotamia and Egypt, and the East (Asia) and West (Europe); this added to the diversity of the materials used as medicines (Lev E., 2002,:pp159).

North Sinai consists of three main districts ; the Mediterranean coastal district, the anticlines district, and the inland district (Zahran M.A, (1992. P:424). These districts comprise five main habitats; salt marshes, sand dunes, sand plains, wadis, and gorges. Figure(1)

Figure 1. *North Sinai physiographic features map*



ElFayoum lands are light soils, which is the most convenient for cultivating the aromatic and medical herbs, as fennel, anise, caraway, coriander, black cumin. According to the advancement in the irrigation processes, and the drainage affect the cultivation process which lowered the level of ground water, so it is affect negatively to all crops.

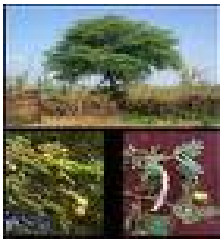
Figure 2*. The most prominent species growing in different habitat types in Sinai Peninsula*

A. monosperma

L. shawii

F. Arabica

T. hirsute



T. nilotica

Z. album

Figure 3. *Types of some plants growing in Salt marsh*

A.Macrostachyum

H. alopecuroides

H. strobelaceum

Figure 4. *Types of some plants growing in gorge*

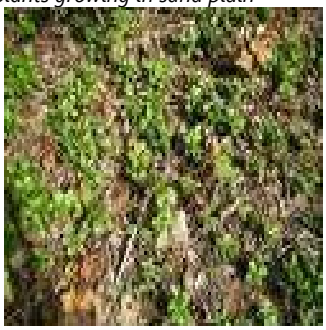
A. herbaalba

A. sinaica

B. undulat**a**

Figure 5. *Types of plants growing in sand plain*

H. hirta



N. procumbens

2.2-The impact of Climate Change

Seasonal variations has impact on availability of active principles in medicinal plants. According to principles of Western Herbal Medicine, therapeutic efficacy varies during different times or seasons of the year. The constituent and active principles vary quantitative at different seasons of the year and the majority of plant materials are usually best collected during the dry season, when the herbs are at peak maturity and concentration.

Like all living members of the biosphere, (Crops) are not immune to the effects of climate change. Climate change is causing noticeable effects on the life cycles and distributions of the

world's vegetation, including wild Crops. Some of them are endemic to geographic regions or ecosystems particularly vulnerable to climate change, which could put them at risk.

Although scientists do not know whether climate change poses a more prominent or immediate threat to MAP species than other threats, it does have the potential to exert increasing pressures upon medicinal and aromatic plant species and populations in the coming years. The possible effects on CROPS may be particularly significant due to their value within traditional systems of medicine and as economically useful plants. The future effects of climate change are largely uncertain, but current evidence suggests that these phenomena are having an impact on CROPS and that there are some potential threats worthy of concern and discussion (Cavaliere C.,2009.,P: 44). Some studies have demonstrated that temperature stress can affect the secondary metabolites and other compounds that plants produce, which are usually the basis for their medicinal activity. (Zobayed S.M., 2005;P:977).

2.3-The Impact of Human Activity

Different types of human impacts including urbanization, agriculture, mining and quarrying, over collection, and over cutting of woody species threaten biodiversity of North Sinai. (Ayyad M.A, 2000.p:265).

Figure 6. *Most of the threatened species in North Sinai which are mainly growing in Mediterranean coastal district and anticlines district*

A. fragrantissima *A. Santolina* *A. tortilis* *A. stipularis*

A. pachyceras *A. hierochuntica* *A. sinaica* *T. polium*


C. spinosa


C. montanus


C. colocynthis


E. alata


J. phoenicea


P. sickenbergeri


S. herbaalba,


T. leucocladum

2.4-The impact of Curative Behavior

North Africa has one of the oldest and richest traditions associated with the use of medicinal plants. which are important for the people, especially in rural areas, as in many places they are the only source of medicine available. The demand for medicinal plants is currently increasing in both developed and developing countries for the growing recognition that natural products have fewer or even no side effects. For others it would be their accessibility and affordable costs that would tip the scales. However, overexploitation can also lead to the extinction of some species. An important product is the compilation by all five North African countries –Egypt, Libya, Tunisia, Algeria, and Morocco- of a compendium on medicinal plants with scientific information on the plants and description of their traditional usage, together with an online database (Sonsoles S, 1978 P:1006) .

The study of sick people behavior in treatment from diseases which they suffer from is considered as one the interests of the study of medical geography. Many peoples in rural areas prefer the ethnomedicine, and medical pluralism. Through the study in 1995 about Behavioral dimension in the study of Medical Geography, with applied study in the Egyptian village "Toukh Elkhail" Minia, province, the percentage of population sample depends on traditional medicine was 71.2%, over than 95.5 from this percentage used CROPS, like boiled green mint to treat headache , Caraway and anise for diarrhea , Cumin and mint for constipation , and boiled barley for kidney pain, about 12.5% from the sample drink the Guava paper for cough (Elsabawy,M.N., 2004.P:26) .

In another study through A survey was conducted by the Information Unit affiliated to the Egyptian Cabinet about the prevalence of use of plants and herbs as medications and revealed that about 23% of peoples in the conducted sample sought for a medical advice at a herbalist's and bought herbs or plants instead of medicines either due to their available costs, or believing to the common concept that Natural means Safe (Kandil.R.A.,2007.). In the Poison Control Center of Ain Shams University Hospitals, a preliminary study was done in the information unit for estimation of number of cases intoxicated by poisonous plants admitted during the period from 2003-2007. The study showed that the number of cases exceeded 120 cases from which many cases admitted to the in patient ward more than 24 hours. The result of this study proved that the magnitude of the

problem of Plant Intoxication - although so critical- is not well studied in Egypt requiring more effort to assess the exact extent of the problem (Qotb I.A., 2008.) .

2.5-Environmental Hazards

Correlation between diversity and impact of environmental factors has attracted many ecologists. (Cramer M.J,2005.pp:209-218). Species richness, and measurement indices showed significant differences among habitats. Gorges are the most diverse habitats in North Sinai followed by wadis. Plains have intermediate diversity followed by sand dunes. The lowest diversity indices were recorded at salt marsh habitats. Arid conditions with high salinity and poor drainage limit the number of taxa able to survive, and decrease species diversity. In contrary with the hypothesis that species richness decreases with increasing altitude (Acar C., et al., 2004.,PP:477-499

3-Geographical Distribution in Egypt

3.1- Development of production

There are 342 species of medicinal plants that are wild collected in Egypt. there are 200 species of wild medicinal flora in Egypt, of which only 20 are also under cultivation. The trend of CROPS cultivated area in Egypt was increasing during the period from (1990-2005).with growth rate reached to 2.5% of the average 57.4 thousand feddans.. This development in not only in the cultivated area, but also in the total production value of the aromatic plants in Egypt (thousand L.E.) which increased during the study period. The export value of aromatic plants showed too an increasing trend during the study period with significant annual rate and annual growth rate 9.1% of the average of 111 million L.E. Table 1 show the development of total cultivated and production of CROPS in Egypt (Shabbara H M.&Akila E. T., 3(8): 2007., 748).

Table 1: *The development of total cultivated area, total production value and export value of medicinal and Aromatic plants in Egypt through the period from (1990-2005) ([1])*

Years	Total medicinal and aromatic area (thousand Feddans)	Production value (thousand L.E.)	Exports value (million L.E.)[1]
1990	*43.28*	150514	44.8
1991	*47.23*	272531	56.1
1992	*40.18*	178755	57.6
1993	*53.41*	235784	51.3
1994	*57.40*	289168	69.6
1995	*56.00*	428068	72.4
1996	*64.21*	472548	87.4
1997	*52.30*	438511	74.2
1998	*68.41*	499007	74.8
1999	*65.13*	497702	83.53

([1]) **Source:** data collected and computed from the Ministry of Agriculture and land Reclamation, Economic Affairs Sector, central division for agricultural planning, different issues.

2000	*52.91*	435022	90.8
2001	*55.14*	435310	111.34
2002	*62.17*	433375	133.86
2003	*64.15*	485269	156.4
2004	*66.27*	523418	161.6
2005	*70.00*	572463	166.7
Average	*57.4*	396715.3	93.28

Figure 7. *The development of total cultivated area, and total production Value in Egypt through 1990 to 2005)*

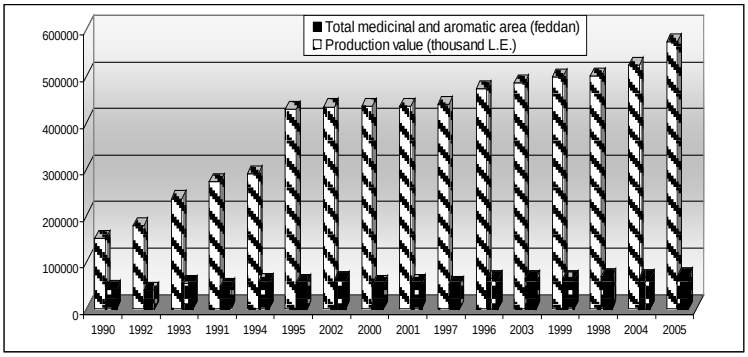


Figure 8*. Quantity and value of Egyptian aromatic & medicinal plants exports to the world countries through 1990-2005.*

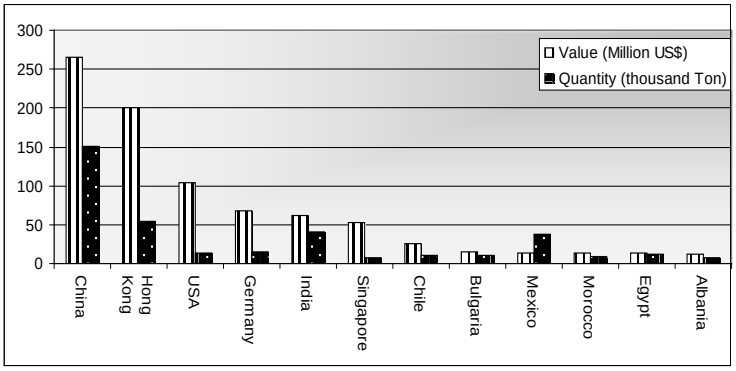
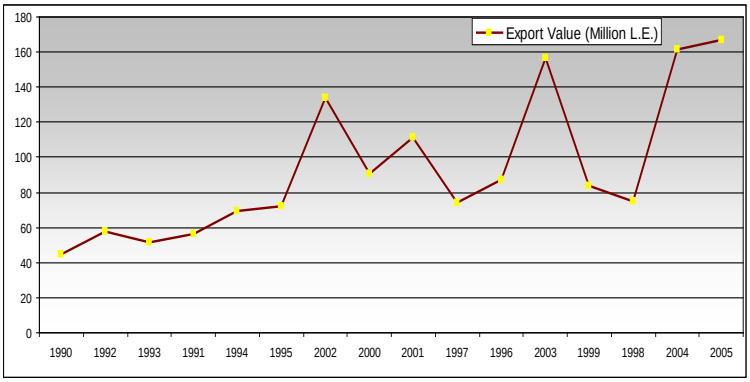


Figure 9. *The development of total export value of medicinal and Aromatic plants in Egypt through the period from (1990-2005)*



3.2- Productive Governorates map

The geographical distribution map of the cultivated areas of CROPS showed that the concentration of these plant cultivation is in the middle and upper Egypt governorates, especially Elfayum, Bani-Souif, Minia, Assuit , and sahara desert. There are some sites in Egyptian eastern,Western desert, and Sinai Peninsula.

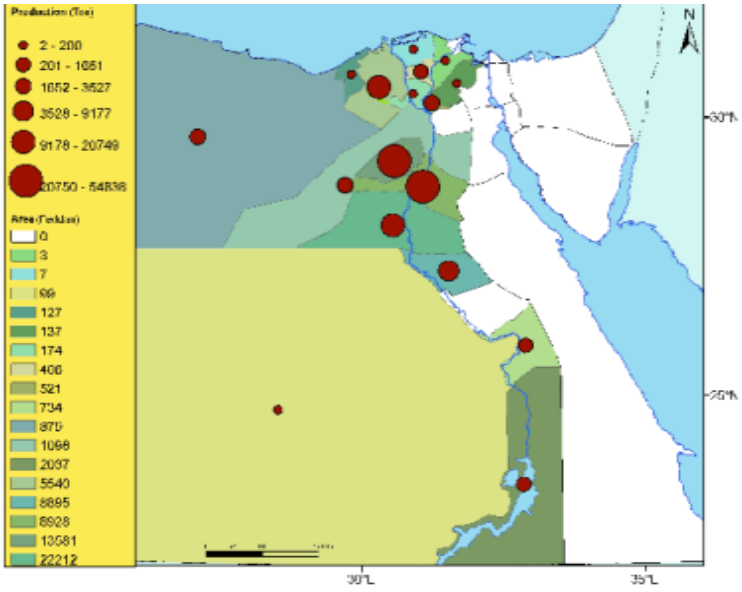
Table (2) *Cultivated area and the total production for aromatic and medical herbs for Egypt (year 1998)([2])*

Governorates	**Production (Ton)**	%	**Total Area (Feddan)**	%
Alexandria	**102**	**0.06**	**127**	**0.19**
Behaira	**16791**	**10.15**	**5540**	**8.11**
Algharbeya	**1057**	**0.65**	**406**	**0.59**
Kafr El sheikh	**9**	**0.005**	**7**	**0.01**
Dakahleya	**4**	**0.002**	**3**	**0.004**
Sharkeya	**113**	**0.07**	**137**	**0.2**
Monofeya	**135**	**0.08**	**174**	**0.25**
Kaliobeya	**3293**	**1.99**	**521**	**0.76**
Lower Egypt Total	**21504**	**13**	**6915**	**10.12**
Giza	**3527**	**2.13**	**1098**	**1.61**
Beni Suef	**54838**	**33.16**	**8928**	**13.08**
Fayoum	**48730**	**29.46**	**13581**	**19.89**
Minia	**20749**	**12.55**	**22212**	**32.53**
Middel Egypt	**127844**	**77.3**	**45819**	**67.11**
Assiut	**9177**	**5.55**	**8895**	**13.03**

([2])Source: the central department of agricultural economics – ministry of agriculture.

Quena	**594**	**0.36**	**734**	**1.08**
Aswan	**1651**	**1**	**2037**	**2.98**
Upper Egypt	**11422**	**6.91**	**11666**	**17.09**
Total Valley Production	**160770**	**97.21**	**64400**	**94.32**
New Valley	**109**	**0.7**	**99**	**0.14**
Matrouh	**2678**	**1.62**	**879**	**1.29**
Nubareya/new lands	**1829**	**1.11**	**2899**	**4.25**
Total Outside The Valley	**4616**	**2.79**	**3877**	**5.68**
Total	**165386**	**100**	**68277**	**100**

Figure 10. *Cultivated area and the total production for aromatic and medical herbs for Egypt(year1998)*



The distribution of geographical cultivated areas of aromatic plants in main producing governorates during the period (1990-1997) compared by the period (1998-2004), it showed the concentration of these plant cultivation was at middle and upper Egypt governorates. And some Delta governorates as shown in table 2 and figure 10.

Table (3) *Production of Aromatic Plants in Egyptian productive governorates*

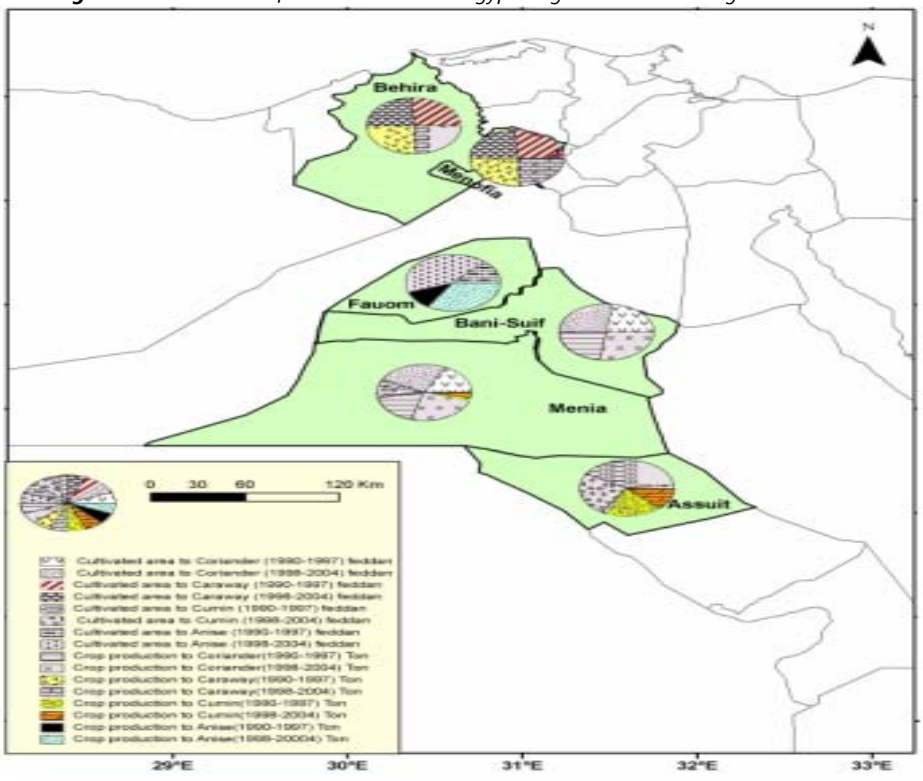
Governorate	1990-1997		1998-2004		1990-1997	1998-2004	Species
	feddan	%	feddan	%	ton	ton	
Minia	9336.8	92.9	13094	93	9336.8	13094	coriander
Assuit	300.9	3.4	123.9	0.4	300.9	123.9	coriander
Bani Souif	342.3	3	407.9	1.5	342.3	407.9	coriander
Minia	2143.6	26	3026.6	41.4	1071.8	1513.3	Cumin
Assuit	6028.8	72.8	3760	51.5	3014.4	1880	Cumin
Behera	507.9	16.8	483	18.5	507.9	483.3	Caraway
Monofia	497	16.5	465	17.8	497	465	Caraway
Minia	463	53.3	613	35.2	370.4	490.4	Anise
Fayum	349.3	40.2	1099.4	63	279.4	879.5	Anise

The average cultivated area at Minia governorate was 9336.8 Feddans which represented 92.9% of its average of total cultivated area in Egypt during the period (1990-1997). It increased to 13094 Feddans which represented 93% of its average of total cultivated area in Egypt during the period (1998-2004). The average coriander crop production was 9336.8 tons during the period (1990-1997) and increased to 13094 tons during the period (1998- 2004). In addition, the average cultivated area for coriander at Assuit governorate was 300.9 Feddans represented 3.4 % of the average of total cultivated areas of coriander in Egypt during the period (1990- 1997). And its production average reached to 300.9 tons during the same period. While the average cultivated area for coriander at this governorate was 123.9 Feddans represented 0.4% of the average of total cultivated areas of coriander in Egypt during the period (1998- 2004). And its production average reached to 123.9 tons during the same period. At Bani-souif governorate, the cultivated area with coriander was 342.3 Feddans represented 3% of the average of total cultivated area of coriander in Egypt during the period (1990-1997). It increased to 407.9 Feddans during the period (1998- 2004) represented 1.5% of the average of its total cultivated areas in Egypt. Furthermore, the coriander production average was 342.3 tons during (1990-1997), on the other side, it increased to reach 407.9 during (1998-2004).

While for cumin crop at Assuit and Minia governorates, its average cultivated area at Assuit was 6028.8 Feddans which represented 72.8% of its average cultivated area in Egypt during the studied period (1990-1997). It was decreased to 3760 represented 51.5 % of its average cultivated area in Egypt during the study period (1998-2004). The cumin production was from 3014.4 to 1880 tons during (1990-1997) and (1998-2004) respectively. In addition, the cumin crop cultivated area at Minia governorate reached 2143.6 Feddans represented 26% of the total average of its cultivated area in Egypt during the study period (1990-1997), its registered increase reached 3026.6 Feddans represented 41.4% of the average of total of its cultivated area in Egypt during the study period (1998-2004). The average production was 1071.8 tons during the period (1990-1997) and increased to 1513.3 tons during the period (1998-2004). Comparing that with caraway crop, it was seen that its cultivated area was concentrated at Monofia and Behera governorates, where, its average cultivated area was 507.9 Feddans at Behera represented 16.8% of the total cultivated area in Egypt for the study period (1990-1997), whereas, it decreased to 483 Feddans, represented 18.5% of the

total cultivated area in Egypt for the study period (1998-2004). Its average production was 507.9 tons during the period (1990-1997) and decreased to 483.3 tons during the period (1998-2004). Along with that, Caraway cultivated area reached 497 Feddans at Monofia governorate, represented 16.5% of the average of the total cultivated area in Egypt for the period (1990-1997) and decreased to 465 Feddans, represented 17.8% of the average of the total cultivated area in Egypt for the period (1998-2004). Its average production was 497 and 465 tons for the first and second studied periods respectively. As for anise crop, its cultivated areas were concentrated at Minia and Fayum governorates. In Minia governorate, its cultivated area was 463 Feddan, equivalent to 53.3% of the average of the total cultivated area in Egypt, during the studied period (1990-1997) and increased to 613 Feddan, equivalent to 35.2% of the average of the total of cultivated area in Egypt, for the period (1998-2004). While its average production in the governorate was 370.4 and 490.4 tons for the first and second studies periods, respectively. At the same time, Anise crop cultivated area at Fayum governorate was 349.3 Feddan represented 40.2% of the average of its total cultivated area in Egypt for the period (1990-1997) and increased to 1099.4 feddans, represented 63% of the average of its total cultivated area in Egypt for the period (1998-2004). Its production in the governorate was 279.44 and 879.52 tons for the first and second studied periods studied periods, respectively (Shabbara H M., 2007.P: 750).

Figure 11. *Production of Aromatic Plants in Egyptian governorates through 1990 -2005.*



3.3 Economics of medicinal and aromatic plants

According to the economic changes that the world goes through, nowadays and the moving to the international markets and the competition that depends upon the quality of the product and its compatibility with the required specifications. This made the producers able to prefer the crops and products which acquire a wide competition, effectively. Knowing the international market wants makes it easier to cope with the international trade. It is very important to study those crops.

The Egyptian government (ministry of agriculture) in the few last years, leave the farmers cultivate their lands as they liked without control, So farmers prefered the crops which acquired more profits to them. Many of farmers have been switching to the cultivation of medicinal and aromatic herbs. And there is a significant rise in the levels of their products, without the government policy, which reached to the highest levels of development. It was a good reason to study the production of medicinal and aromatic herbs in many lands in the upper Egypt, to show the biggest production per feddan, the production cost per feddan, the net profit, and the exports of these crops.

Some Sinia population from Bedouin, exerts planting of the opium poppy (Papaver somniferum) which is exclusively a domesticated annual plant. It is found today only in association with people, either in planted fields or in disturbed environments near cultivated areas. No wild progenitor of the plant is known, and firm evidence of the plant's origins is elusive. Most biogeographers regard Asia Minor or the adjacent Balkan region as the area in which the poppy was first domesticated for human use, perhaps early in the fourth millennium B.C.E. The cultigen probably spread eastward quickly. The Sumerians, who called it the "joy plant," grew it in Mesopotamia by 34oo B.C.E. (Simpson and Conner-Ogorzaly 1986, 391). They probably infused the capsules - the seed pods, also called poppy heads or bulbs - and stalks in water, mead, or wine to produce the potent analgesic tea the ancient Greeks called meconium (Husain and Sharma 1983). The earliest certain descriptions of the use of its latex - the thickened juice or sap collected by lancing unripe capsules - date to the fifth century B.C.E., when the physician and geographer Hippocrates discussed its medicinal uses in Anatolia. His Bronze Age culture anthropomorphized the poppy,dedicating it to the god of dreams (Hobbs J.J., 1998).

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