Acknowledgements

The following organisations and individuals contributed to the implementation of the 2002 coca survey in Colombia, and to the preparation of the present report:

Government of Colombia:
National Narcotics Office -DNE
Colombian Anti-Narcotics Police -DIRAN

UNODC:
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Juan Pablo Castro, Intern (Field Office)
Thibault Le Pichon, Management of Illicit Crop Monitoring Programme (Research Section)
Denis Destrebecq, Technical Supervision of Illicit Crop Monitoring Programme (Research Section)

The implementation of UNODC's Illicit Crop Monitoring Programme in the Andean countries and the Colombia survey in 2002 was made possible thanks to financial contributions from the Governments of the United Kingdom, France and Italy.

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SUMMARY

The Illicit Crop Monitoring Programme (ICMP) of the United Nations *Office on Drugs and Crime* (UNODC) presently covers the six countries where most illicit cultivation of the coca bush and opium poppy takes place (Colombia, Bolivia and Peru for coca; Afghanistan, Laos and Myanmar for opium).With illicit coca cultivation expanding steadily during the 1980's and 1990's, Colombia has become the country with the largest illicit coca growing area and cocaine production in the world.

UNODC implements an Illicit Crop Monitoring System (SIMCI) in Colombia since 1999, with the logistical support of the Colombian Anti-Narcotics Police (DIRAN), and in coordination with the National Narcotics Office in Colombia (DNE).

The 2002 census of illicit coca cultivation implemented by SIMCI covered the whole territory of Colombia. The methodology was based on the analysis of satellite images taken during the period August 2002 – January 2003, complemented with verification flights over coca growing areas. The reliability of the results is estimated at 90% (accuracy checks are still proceeding at the time of preparation of the present preliminary report, but the final figure should not vary significantly).

The results of the census show that, at the end of December 2002, about 102,000 hectares of coca were cultivated in 21 out of the 32 Colombian departments. This represents approximately 0.09% of the national territory's 1.14 million square km.

Although Colombia remains the country with the largest area under coca bush cultivation, ahead of Peru and Bolivia, the new figure reflects a decrease of about 43,000 ha (30%) since November 2001, when about 145,000 ha of illicit coca bush cultivation were reported by SIMCI. The decline recorded last year (about 18,000 ha, or 11 %) thus continued and accelerated in 2002. The national trend masks however important variations at department level, as well as within departments.

Very significant reductions in coca cultivation were recorded in the departments of Putumayo (- 33,000 ha), Meta (- 2,000 ha), and Caquetá (- 6,000 ha), where eradication activities implemented by the government took place in 2002. Other departments also show reductions attributed to abandonment of fields or voluntary manual eradication, such as Bolívar (-2,000 ha), Cauca (-1,000 ha) and Vichada (- 4,000 ha).

Guaviare has now become the most important coca-growing department of the country, with a total of about 27,000 ha of coca bush and a one-year increase of about 2,000 ha. The second ranking department, Nariño, recorded an even larger increase of about 8,000 ha.

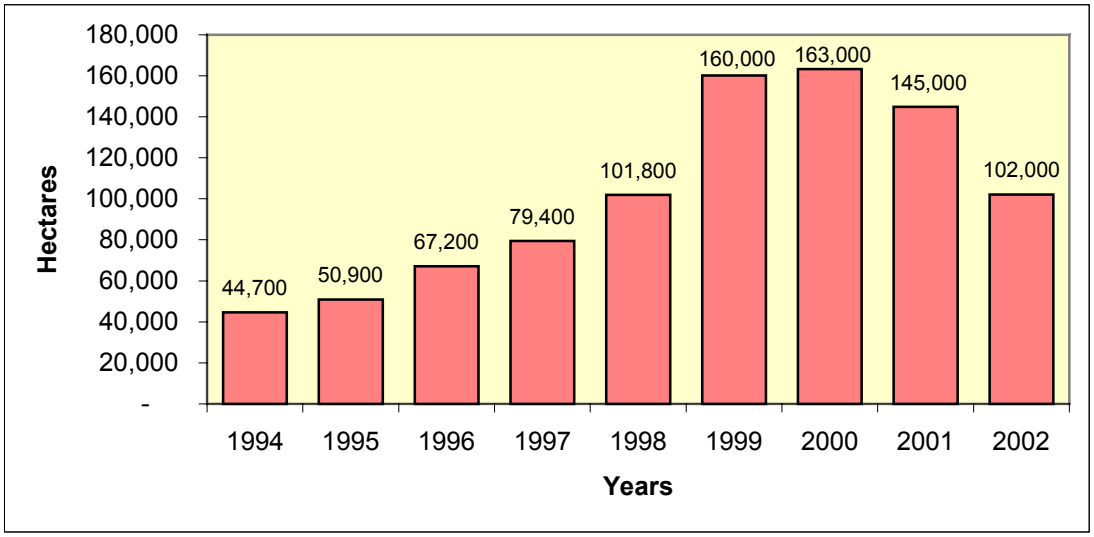
With an average of four harvests per year, the potential cocaine output of the 102,000 ha recorded in December 2002 is estimated at 480 metric tons (against 617 mt in November 2001). This figure does not represent the entire production for 2002, but the production potential of the hectares of coca bush under cultivation in December 2002. The actual production for the year 2002 is likely to have been higher, in the range between today's estimate (480 mt, Dec. 2002) and last year's (617 mt, Nov. 2001).

Illicit opium poppy cultivation is concentrated in the central and southern mountainous areas of the country, in Cauca, Nariño, Huila and Tolima. SIMCI has not yet established a reliable remote-sensing methodology for the detection of opium poppy. Based on visual reconnaissance, the DIRAN estimates that approximately 4,200 ha were under opium poppy cultivation in November 2002, which would translate in a reduction of about 1,900 ha compared with 2001. Based on an estimated average yield of 15kg/ha and two harvests per year, the potential opium production would have reached about 128 metric tons, equivalent to about 5 metric tons of heroin.

In 2002, the DIRAN carried out a large-scale eradication campaign. The DIRAN reported the spraying of 126,933 hectares of coca bush and 3,371 hectares of opium poppy in 2002. Compared with 2001, this represents increases of 45% and 67%, respectively.

The geographical information generated by SIMCI on land coverage (forest, water, pastures, licit crops, infrastructure, villages, etc.) also contributes to land use planning activities implemented by both governmental and private institutions, and to alternative development in particular. While the Government's coca eradication programme and related law enforcement measures reduce the area under illicit coca cultivation and drive down the economic incentive to plant new coca fields, sustaining the reduction in coca cultivation requires that farmers have socio-economic alternatives. UNODC also actively supports alternative development programmes in the coca growing areas of Colombia which aim at achieving this goal by complementing the eradication efforts of the Government.

Figure 1: Cultivation of coca bush in hectares, Colombia, 1994 - 2002



Remark: Estimates for 1999 and subsequent years come from the national monitoring system established by the Colombian government with the support of UNODC. Due to the change of methodology, figures for 1999 and after cannot be directly compared with data from previous years (based on US government surveys).

COCA SURVEY FOR 2002

Preliminary report, March 2003

1. METHODOLOGY (overview)

Uncertainties regarding the precise extent of illicit crop cultivation led Colombia to request UNODC's assistance in establishing a national Integrated Monitoring System for Illicit Crops (SIMCI) in 1999. The objective was to periodically provide reliable information on the location, extent and dynamics of illicit crops, using remote sensing technology. The project, which started in September 1999, is an integral part of UNODC's Illicit Crop Monitoring Programme that assists Member States by producing internationally comparable data on the illicit cultivation of drug crops in the context of the strategies adopted by the member states at the UN General Assembly's Special Session on Drugs in June 1998.

Transparent methods have been developed by SIMCI for the identification of coca crops and the establishment of annual national estimates on the area covered with illicit coca bush. Multi-temporal data and a Geographical Information System enable the analysis of trends and contribute to guide the implementation of drug control measures in Colombia.

The project has conducted four annual surveys of illicit coca bush cultivation in Colombia, from 1999 to 2002, covering different extensions of the national territory. From 2001 onwards, the survey covered the entire national territory, an area of approximately 1,142,000 km².

Table 1: Extent of survey coverage

Reference date of the survey	Survey coverage of national territory (%)
31 March, 1999	12 %
31 August, 2000	41 %
1 November, 2001	100 %
31 December, 2002	100 %

The monitoring of illicit coca bush cultivation is based on the interpretation and digital processing of Landsat and Spot satellite images. The interpretation of this type of images enables also the identification and classification of other important vegetation coverage, such as forest, pasture, other cultivations, as well as rivers, roads and populated areas. Each stage of the process is subject to quality control to ensure the reliability of the data.

SIMCI carried out reconnaissance flights over the entire coca growing areas of the country, to verify the results and undertake primary quality control. The level of confidence of the results is approximately 90%. However, more detailed quality control field work was still proceeding at the time of reporting, and will be reflected in the final survey report.

For the 2002 census, the project analyzed a total of 61 Landsat images and 2 SPOT images, taken between August 2002 and January 2003. The image acquisition window was shortened from 9 months in 2001, to 6 months in 2002 (August 2002 – January 2003). The shorter window contributes to increasing the accuracy and reliability of the results.

The different steps of the survey process can be summarized as follows:

- Identification and acquisition of LANDSAT and SPOT images, with as little cloud cover as possible. The images cover 100% of the national territory, equivalent to 1,142,000 km².

- Geometric correction of the images and geo-referencing to the national grid.

- Radiometric and spatial enhancement of the images for improved identification of the elements of interest, in this case coca crops.

- Identification of training samples of the different land use and vegetation types to be classified.

- Supervised classification of land use and vegetation according to the established legend.

- Manual, visual identification and delineation of all coca fields using the previously classified land use as base information.

- Corrections for spraying effects, cloud cover and temporal changes from date of image acquisition to the census date.

- Ground verification and quality control of the results.

- Incorporation of results in a spatial database system and superimposition of coca fields over the administrative map of Colombia.

The project has not yet been able to identify a reliable methodology for the identification of opium poppy due to the conditions prevailing in the mountainous poppy growing areas (almost constant cloud cover, small size of fields often interspersed with other crops). The medium-resolution Landsat and SPOT images cannot be used, and even the high-resolution IKONOS images and aerial photography are not always sufficient. There is a need to intensify the research in this field, also using the experience from the UNODC supported illicit crop monitoring projects in Asia.

Table 2: Geographical data

Total land size of the country	1,141,748 km^2
Percentage of total land size studied	100 %
Percentage of total land cultivated in coca	0.09 %
Area of influence	5,391,100 ha
Mean Coca cultivation density	1.89 coca ha/km^2
Satellite images processed in coca area	36 Landsat (3 duplicates) and 2 SPOT
Satellite images processed in non coca area	25 Landsat
Area covered by one Landsat image	3,240,000 ha
Area covered by one SPOT image	360,000 ha

2. FINDINGS

The 2002 census detected a total of 102,000 hectares of illicit coca bush as of 31 December 2002, distributed in 21 out of the 32 departments of the country. This represents 0.09% of the national territory. The so-called “area of influence” of coca cultivation covers 5,391,100 ha. The mean density of coca bush cultivation in these areas is 1.89 ha / km^2.

Table 3: Coca cultivation estimates and departments with illicit cultivation

Reference date of the survey	Coca bush cultivation estimates (ha)	Number of departments with illicit cultivation
31 March, 1999	160,000	12
31 August, 2000	163,000	21
1 November, 2001	145,000	22
31 December, 2002	102,000	21

The results of the 2002 census indicate a *decrease* in the area cultivated with coca bush of 42,736 ha (29.5 %) compared to the previous year’s census (1 November 2001).

The major coca growing departments are now, in decreasing order of importance, Guaviare, Nariño, Putumayo, Caquetá and Norte de Santander.

The most significant reductions were found in the departments of Putumayo (-33,395 ha), Caquetá (-6,104 ha). These departments were also subject to aerial eradication efforts in the second half of 2002.

Other departments with significant reductions in coca cultivation are Bolívar (-2,089 ha), Cauca (-1,019 ha) and Vichada (-4,256 ha). These departments were not subjected to government's eradication and the decreases they recorded in 2002 are attributed to abandonment or voluntary eradication.

Two departments, Nariño and Guaviare, show increases in coca cultivation of 7,637 ha and 1,828 ha respectively. Guaviare has now taken over Putumayo's position as the most important coca-growing department in the country.

Table 4: Colombia coca cultivation estimates (ha), 1999-2002

Department	Mar-1999	Aug-2000	Nov-2001	Dec-2002
Antioquia	3,644	2,547	3,171	3,030
Amazonas			532	784
Arauca	-	978	2,749	2,214
Bolívar	5,897	5,960	4,824	2,735
Boyacá	-	322	245	118
Caquetá	23,718	26,603	14,516	8,412
Cauca	6,291	4,576	3,139	2,120
Chocó	-	250	354	-
Córdoba	1,920	117	652	385
Cundinamarca	-	66	22	57
Guainía	-	853	1,318	749
Guajira	-	321	385	354
Guaviare	28,435	17,619	25,553	27,381
Magdalena	521	200	480	644
Meta	11,384	11,123	11,425	9,222
Nariño	3,959	9,343	7,494	15,131
Norte de Santander	15,039	6,280	9,145	8,041
Putumayo	58,297	66,022	47,120	13,725
Santander	-	2,826	415	463
Valle del Cauca	-	76	184	111
Vaupés	1,014	1,493	1,918	1,485
Vichada	-	4,935	9,166	4,910
TOTAL	160,119	163,289	144,807	102,071
Rounded Total	**160,000**	**163,000**	**145,000**	**102,000**
Level of confidence	80%	90%	90%	90%*

* expected

Table 5: Coca density per region

Region	Total area (km2)	2002 Coca Cultivation (ha)	Density (coca ha/km2)
Putumayo	15,802	23,164	1.47
Guaviare	19,674	44,772	2.27
Sur de Bolívar	8,071	6,404	0.79
Cauca-Nariño	5,586	16,094	2.88
Gabarra	2,418	8,041	3.33
Arauca	1,469	2,218	1.51
Sierra Nevada	626	998	1.59
Boyacá	265	380	1.43
Total	**53,911**	**102,071**	**1.89**
Country total	**1,141,748**		

2.1. DYNAMICS AND TRENDS OF ILLICIT CROPS

Comparison of the results of the 2001 and 2002 surveys show the high degree of mobility of coca cultivation, both within and across department boundaries.

The migration of coca cultivations might not only be related to eradication activities, but also to other factors such as the practice of fallow, the abandonment of fields or voluntary eradication.

However, a detailed multi-temporal GIS analysis has yet to be conducted in order to establish a cause-effect relation between the above mentioned variations and the factors that may have influenced the results.

Table 6: Annual variations by department (in %)

Department	1999 –2000	2000 –2001	2001 – 2002
Antioquia	- 30	25	- 4
Amazonas			47
Arauca		181	- 19
Bolívar	1	- 19	- 43
Boyacá		- 24	- 52
Caquetá	12	- 45	- 42
Cauca	- 27	- 31	- 33
Chocó		42	-
Córdoba	- 94	457	- 41
Cundinamarca		- 67	159
Guainía		55	- 43
Guajira		20	- 8
Guaviare	- 38	45	7
Magdalena	- 62	140	34
Meta	- 2	3	- 19
Nariño	136	- 20	102
Norte de Santander	- 58	46	- 12
Putumayo	13	- 29	- 71
Santander		- 85	12
Valle del Cauca		60	- 40
Vaupés	47	29	- 23
Vichada		89	- 46
TOTAL	**2**	**- 11**	**- 30**

2.2. NON-TRADITIONAL AREAS

Potential small coca fields have been detected in remote areas outside of the agricultural frontier in the departments of Guanía, Vaupés, Guajira, Chocó, Amazonas, as well as in traditional agricultural areas on the Atlantic coast, the coffee growing zone and the Andean region. Because thorough field verification has not yet been conducted in these areas, estimates on the coca cultivation areas in those non-traditional areas were not included to compute the results of the 2002 census.

This information on potential coca cultivation in the non-traditional areas could however be seen by drug control authorities as an early warning of the dynamics at play and of the possible expansion of coca cultivation, which would call for preventive measures.

Table 7: Coca cultivation in non-traditional areas

AREA	2001		2002	
	Date image	Coca Cultivation (ha)	Date Image	Coca Cultivation (ha)
Guainía	30-Aug-01	137	21-Nov-02	59
Guainía	28-Apr-01	157		
Vichada	08-Oct-01	-	28-Nov-02	-
Guainía	08-Oct-01	172		
Vaupés	08-Oct-01	67		
Amazonas	08-Oct-01	37		
Amazonas	08-Oct-01	27	21-Dec-02	-
Amazonas	08-Oct-01	86	22-Jan-03	149
Vichada	22-Apr-01	27	22-Jan-03	46
Vaupés	03-Jan-01	84	16-Sep-02	23
Amazonas	24-May-01	-	13-Jan-03	-
Amazonas	24-May-01	52	13-Jan- 03	88
Casanare	07-Nov-01	36		
Meta	16-Jun-01	162		
Guajira	06-May-01	-		
Boyacá-Casanare	29-Oct-01	-	04-Jan-03	28
Casanare-Meta	25-Jul-01	20	30-Sep-02	30
Cesar	01-Aug-01	7	24-Nov-02	26
Tolima-Cundinamarca	16-Jul-01	-	07-Oct-02	-
Atlántico-Magdalena	25-Sep-01	-	02-Jan-03	-
Sucre-Córdoba	07-Jul-01	438		
Antioquia-Caldas	07-Jul-01	64		
Quindío-Valle del Cauca	18-Apr-01	-	04-Oct-02	-
Urabá	18-Oct-01	175		
Chocó	18-Oct-01	55		
Total		**1,803**		**449**

2.3. YIELD AND PRODUCTION

Several known coca varieties are found in Colombia, such as the traditional "caucana", the Peruvian "Tingo Maria" and the Bolivian "la dulce". Yields vary from department to department, depending on, among other factors, the coca variety predominantly cultivated.

Field work indicates that high-yield varieties are beginning to be introduced by coca farmers, but the UN has not yet conducted a scientific and comprehensive study on coca leaf and cocaine productivity in Colombia.

To establish an estimate for the purpose of the present report, UNODC therefore relied on information available from other sources. The most comprehensive work on this topic so far has been done by the US government. The US estimate for the average cocaine yield per hectare of coca plants amounts to 4.7 kg/ha in Colombia in 2002.

Based on that ratio, the total coca cultivation of 102,000 ha recorded by SIMCI in December 2002 would have a potential cocaine production of about 480 metric tons. This represents a decrease of about 20%, compared to the potential cocaine production of 617 metric tons of the November 2001 coca cultivated area. It is important to note that this potential production figure does not represent the entire production for 2002, but the production potential of the hectares of coca bush under cultivation in December 2002. The actual production for the year 2002 is likely to have amounted to a figure between 480 mt (Dec. 2002) and 617 mt (Nov. 2001). The combination of factors at play during the year (multiple harvests, eradication operations, etc…) makes it very difficult to establish a more precise figure for the actual cocaine output of Colombia for the entire year.

The opium poppy growing areas are concentrated in the departments of Cauca, Nariño, Huila and Cesar. According to the DIRAN's estimates based on reconnaissance flights and spray operations, 4,253 hectares of opium poppy were under cultivation as of November 2002, compared to 6,200 hectares in 2001.

Previous estimates assumed Colombian farmers harvested three opium poppy crops per year. Recent US government studies on heroin production showed however that, in Colombia, opium poppy farmers cultivate two crops per year in all the growing regions but one (Nariño department).

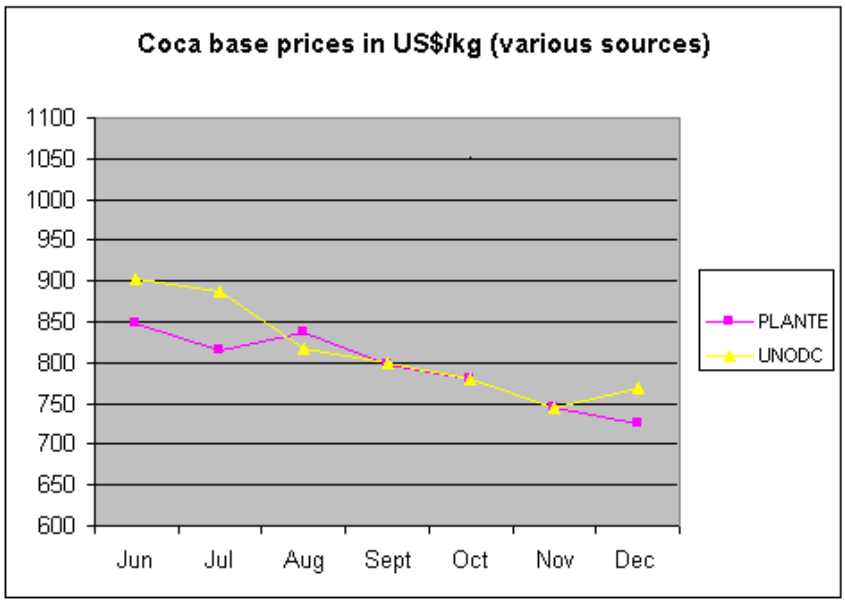
According to these studies, opium poppy fields yield between 13 and 17 kilograms of latex per hectare and per harvest, depending on the growing region. Assuming an average yield of 15 kilograms per hectare, and 2 harvests per year, the total potential opium latex production would be around 128 metric tons. Based on a conversion rate of 24 kg of opium latex for one kilo of pure heroin (US study), the total potential heroin production in Colombia would amount to about 5 metric tons.

2.4. PRICES

Prices of coca base and opium latex are collected by field technicians through direct interviews of farmers in the various coca growing departments. Besides UNODC, price information is collected by PLANTE – the government's alternative development authority, and each institution focuses on certain departments: UNODC in Caquetá, Putumayo, Guaviare, Sur de Bolívar and Meta ; PLANTE in Caquetá, Vichada, Norte de Santander, Nariño, Meta, Guaviare, Cauca, Putumayo and Bolívar.

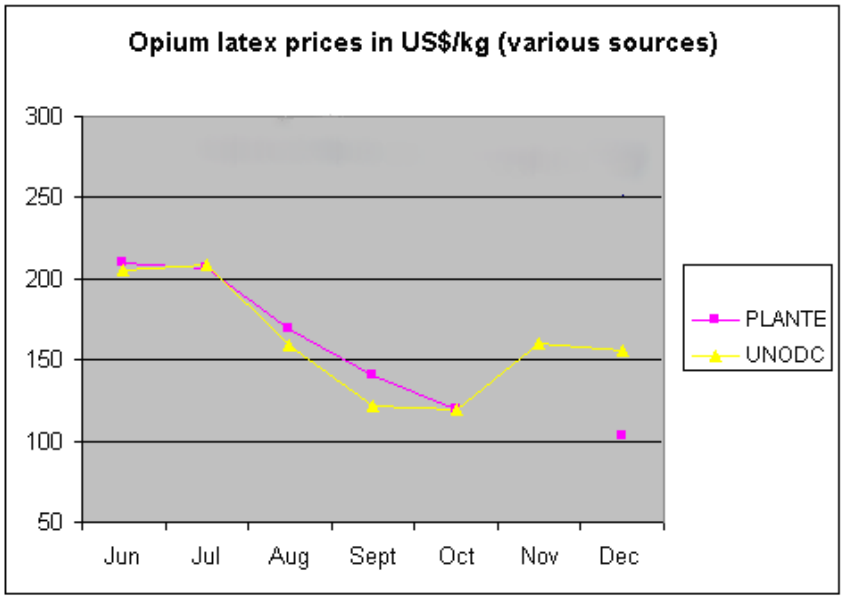
During the latter half of 2002 coca base prices fell slowly, but steadily.

Figure 2



Opium latex prices also recorded declines, although the two sources of information differ somewhat for the later months.

Figure 3



2.5. ERADICATION

Reports indicate that the government's eradication programme had a record year. The DIRAN sprayed a total of 126,933 hectares of coca and 3,371 hectares of opium poppy.

This corresponds to an increase of 45 percent for coca and 67 percent for opium poppy, as compared to 2001.[1]

Table 8: Aerial spraying – hectares by department and year

Sources:	Environmental Audit of the National Narcotics Bureau						Antinarcotics Police Department			
Department	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003***
Guaviare	3,142	21,394	14,425	30,192	37,081	17,376	8,241	7,477	7,207	11,870
Meta	729	2,471	2,524	6,725	5,920	2,296	1,345	3,251	1,496	1,274
Caqueta	-	-	537	4,370	18,433	15,656	9,172	17,252	18,567	1,060
Putumayo	-	-	-	574	3,949	4,980	13,508	32,506	71,891	-
Vichada	-	50	85	-	297	91	-	2,820	-	-
Antioquia	-	-	684	-	-	-	6,259	-	3,321	-
Cordoba	-	-	264	-	-	-	-	-	734	-
Vaupes	-	-	-	-	349	-	-	-	-	-
Cauca	-	-	-	-	-	2,713	2,950	741	-	-
Norsantander	-	-	-	-	-	-	9,584	10,308	9,186	6,734
Nariño	-	-	-	-	-	-	6,442	8,216	17,962	11,521
Santander	-	-	-	-	-	-	470	-	-	-
Boyaca	-	-	-	-	-	-	102		-	-
Bolivar	-	-	-	-	-	-	-	11,581	-	-
Total	**3,871**	**23,915**	**18,519**	**41,861**	**66,029**	**43,111**	**58,073**	**94,153**	**130,364**	**32,458**

* until 11 March 2003.

[1] Source: International Narcotics Control Strategy Report - INCSR

Figure 4

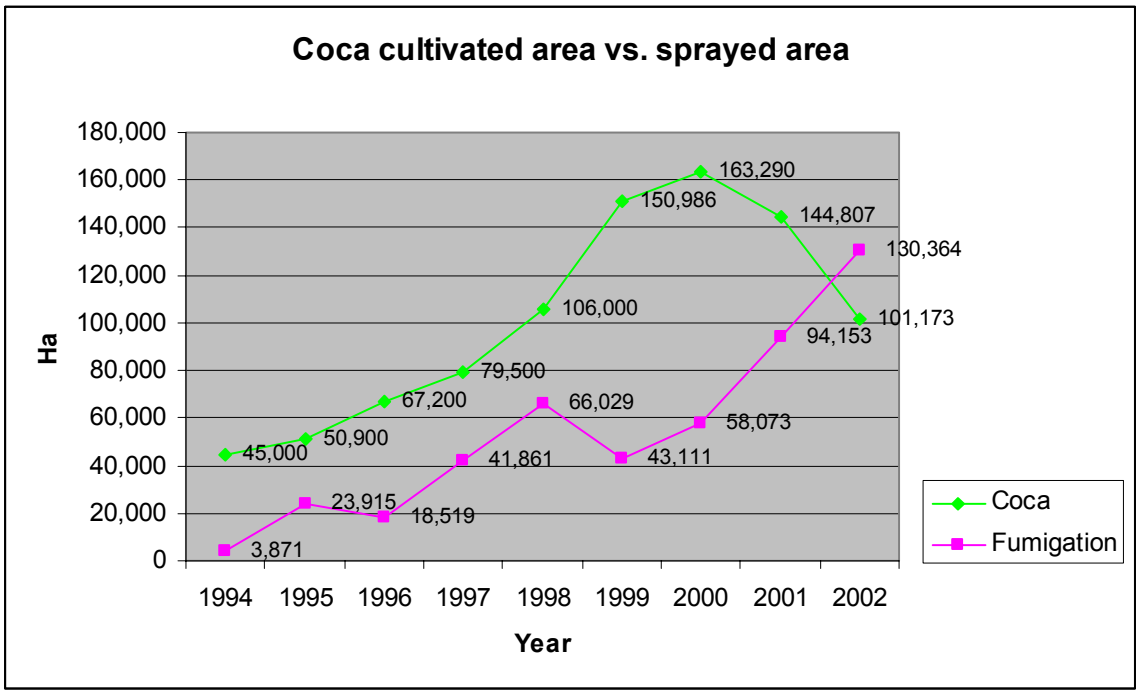
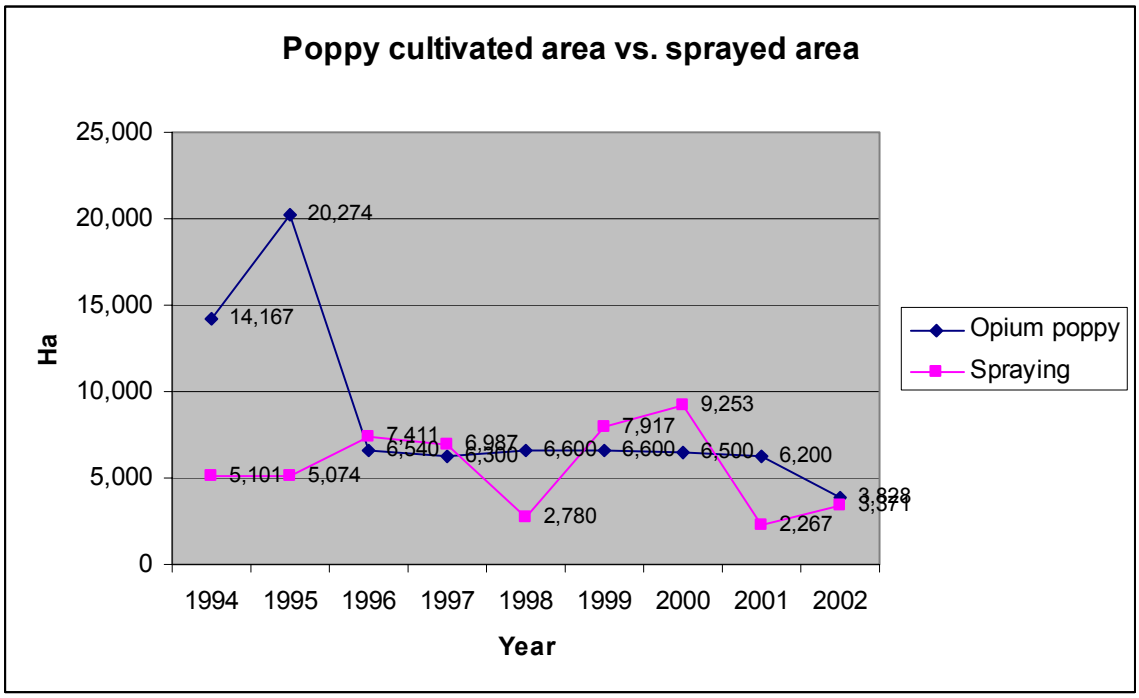


Figure 5



2.6. MAKING ERADICATION SUSTAINABLE

The geographical information generated by SIMCI on land coverage (forest, water, pastures, licit crops, infrastructure, villages, etc.) also contributes to land use planning activities implemented by both governmental and private institutions, and to alternative development in particular.

While the Government's coca eradication programme and related law enforcement measures reduce the area under illicit coca cultivation and drive down the economic incentive to plant new coca fields, sustaining the reduction in coca cultivation requires that farmers have socio-economic alternatives. UNODC also actively supports alternative development programmes in the coca growing areas of Colombia which aim at achieving this goal by complementing the eradication efforts of the Government.