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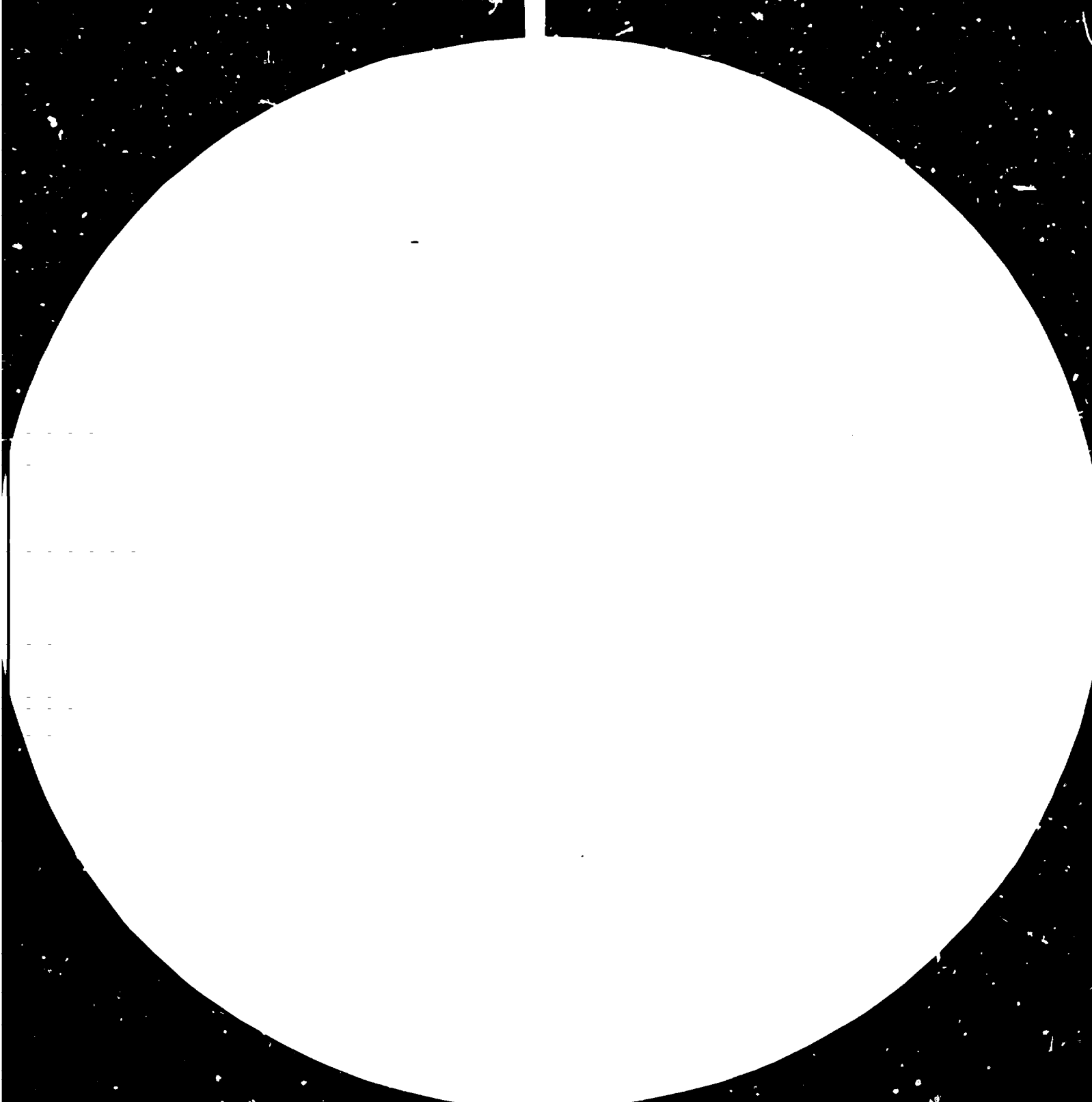
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Meeting on Exchange of Experiences and Co-operation
among Developing Countries in the Development
of Agricultural Machinery Industry

Beijing, China, 20-27 October 1980

COUNTRY SUMMARY - COLOMBIA ^{*/}

by

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001005

^{*/} The views expressed in this paper are those of the author and do not necessarily reflect the views of the UNIDO Secretariat. This document has been translated from an unedited original.

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1. Requirements and demand in respect of agricultural machinery and implements

The requirements for the five-year period are estimated mainly on the basis of the sales figures for wheeled tractors, since the purchase of specific agricultural implements is largely determined by the acquisition of these machines.

By way of information, a set of tables and graphs containing statistical data on imports of tractors and combines, sales by region, etc. are appended to this report. Also included are maps showing the country's principal zones of agricultural mechanization, the distribution of tractors and tractor sales and the locations of Colombian metalworking and engineering industry facilities.

2. Estimates of demand and current use

In the face of the difficulty of obtaining reliable statistics on the manufacture of agricultural machinery and implements, a difficulty due in large measure to the dispersal of the enterprises comprising this industry, it was necessary to base the figures given below on a survey conducted among the distributors of agricultural equipment. In this way, it was possible to ascertain with some accuracy the size of the market for a number of the agricultural implements used in Colombia.

<u>Implement</u>	<u>Units per year</u>
Ploughs having 3, 4 and 5 discs	3 360
Rakes, clearing (20" discs)	2 760
Rakes, California-type (without transport system)	700
Rakes, California-type (with transport system)	600
Cultivators, rear-mounted	800
Cultivators, front-mounted	400
Seeders, broadcast	660
Seeders, grain (row-type)	720
Scrub cutters	450
Clod-breakers	70
Subsoil ploughs	120
Fumigator-sprayers	2 500

3. Manufacture and import

3.1 Category I (simple tools and implements)

Domestic production is sufficient to meet the country's internal demand for these products, in addition to which it has been possible to gain access to some markets in Central and South America and the Caribbean. There are some five firms which manufacture machetes, peinillas, ^{1/} axes, hoes, etc.

In 1977, hand tools accounted for 30 per cent of the modern production sector. The main processes involved in the production of these tools are forging, cold stamping, machining and welding, the nickel and abrasives required being imported.

3.2 Category II (intermediate equipment)

Domestic production in this category concentrates mainly on soil-preparation implements, as listed below:

Ploughs with 3, 4 and 5 26-inch discs;

Mouldboard ploughs;

Subsoil ploughs;

Rakes, Ransome (one-half smooth discs and one-half toothed discs) with 16, 18, 20, 22, 24 and 28 24-inch discs;

Rakes, excentric drag (one-half smooth discs and one-half toothed discs) with 18, 20 and 22 24-inch discs;

Rakes, clearing, with 28 and 32 20-inch discs;

Scrub cutters (hydraulic lift) with 66-inch and 84-inch cutting edges;

Cultivators, 2-furrow and 4-furrow;

Seeders, rear-mounted, hydraulic lift, three-point coupling with 4 and 6 jets;

Coffee pulp removers;

Maize-shellers and forage choppers.

It would appear that the domestic demand for these products is being met, in view of the fact that they are being exported in annually increasing amounts.

^{1/} Translator's note: A kind of machete.

The data available from several studies on the sources and channels for the technology employed indicate:

- (a) Imported machinery and equipment used as models;
- (b) Visits to and training at enterprises in foreign countries;
- (c) Technology purchases and fixed-term royalty contracts.

In this subsector, agricultural implements which have in one form or another been imported into the country are frequently used as models.

A number of producers have expressed the wish that some sort of machinery be established to enable them more easily to import prototypes embodying new design features in order that the possibility of adapting them might be studied, original designs developed, or improved designs proposed.

3.3 Categories III (motorized machinery) and IV (special-purpose equipment)

(a) Domestic production

There are some 40 firms operating at different levels of technological complexity. These range from well organized enterprises to shops engaged in the manufacture of agricultural machines and implements to individual order.

Category III includes plants or shops producing sprinkler irrigation equipment, motor-driven pumps, machinery for the dispersion of liquids (fumigators), grain and cereal driers, rice (paddy) processing machines, sugar mills, etc.

Since it is impossible to provide exact figures for annual production in terms of units, the reader is referred to the accompanying graphs on production, import and export, in which the figures indicate value in Colombian pesos.

(b) Import of implements

Agricultural implements are imported in the following instances:

Where consumption is small and manufacture in the country would therefore not be justified because of the high cost; and/or

Where the implements concerned are more sophisticated and recently developed, and their manufacture demands a higher level of technological competence.

Among the implements which are still being imported are hay-removers, forage harvesters, reapers, threshers, etc.

(c) Import of motorized machinery

Under this heading, Colombia must import such machinery as wheeled, caterpillar and articulated tractors, two-wheeled tractors, grain harvesters, cotton-pickers and other types of pickers, mainly from European countries and the United States, Argentina and Brazil.

The country will continue to import this kind of self-propelled machinery, in reflection of good crop expectations in specific areas of domestic agriculture, with the result that the rationalization of this import activity will be guided by the ratio between the price of the agricultural commodities in question and the cost of the machinery.

(d) As noted above, tractors and other self-propelled equipment are not manufactured in the country. The possibility of assembling this machinery in Colombia is now under discussion with two Andean Pact countries. One of the problems about establishing an assembly plant in Colombia is the small size of the Andean Pact market (approximately 8,000-10,000 units) and the fact that two manufacturers - John Deere in Venezuela and Massey-Ferguson in Peru - are already active in it.

The tractors proposed for assembly in Colombia would have the following characteristics: average power - 55 hp; use of domestically manufactured components - 30-75 per cent; production volume - 500-1,500 units per year.

3.4 Basic installations and auxiliary producers

The country has one steelmaking enterprise, which uses iron, lime, and coke to produce some 260,000 tonnes of steel a year.

Further to this plant there are four iron-and-steel works which produce iron articles primarily from scrap.

Further, there are two other enterprises, partially under State ownership, which are engaged in the forging of tractor components and automobile parts.

As far as auxiliary and supporting producers are concerned, the country has a more or less sufficient number of plants manufacturing such items as tires, batteries, filters, nuts and bolts, valves, radiators, circuitry and fittings, as well as a large number of workshops of all descriptions.

Colombia: Production, import and export
of agricultural machinery

	<u>Production</u>	<u>Import</u>	<u>Export</u>
<u>Category I</u>			
Manual tools	X		X
Animal-drawn implements	X		
Simple manually operated equipment for the primary processing of agricultural commodities	X		
<u>Category II</u>			
Implements for pulling by, or mounting on, a tractor, but not tractor-powered			
Ploughs	X	X	X
Harrows	X	X	X
Furrow-openers	X		
Water pumps, manually operated			
Threshers, small	X		
Mills	X		
Shellers	X		X
Graders		X	
Coffee pulp removers	X		X
Other simple machines for the processing of agricultural commodities			
<u>Category III</u>			
Tractors, agricultural		X	
Tractors, mini and two-wheeled		X	
Threshers	X		
Sheaf-binders		X	
Sprayers (fumigators)	X		X
Grain driers	X		X
Harvesters, tractor-drawn		X	
Sprinkle irrigation equipment	X		X
<u>Category IV</u>			
Grain harvesters		X	
Sugar-cane harvesters		X	
Other complex machines		X	
Tractors, large		X	

Chief among the factors limiting the establishment or expansion of these facilities are the size of the market for the products manufactured and the poor utilization of installed capacity, which stands at about 60 per cent.

4. Design and development, adaptation, testing and evaluation

The Colombian Institute of Agriculture (ICA) is the official agency responsible for research in this sector of the economy, a function which it performs within the organizational framework of the national Ministry of Agriculture.

This Institute has a department which is charged with the testing, evaluation and adaptation of agricultural machinery and implements of all kinds and with the design of animal-drawn implements. Although it has a staff of well trained personnel, the budgetary resources available to ICA are very small in comparison with the Institute's workload.

It would be well if advisory assistance could be provided to the Institute in order to make possible the implementation of the existing agreement between it, the Agricultural Lending Bank (Caja de Crédito Agrario) and the country's defence industry (INDUMIL) regarding the manufacture of animal-drawn implements for use on hillsides.

5. Engineering and manufacturing technology

The country has a number of institutions capable of providing certain kinds of advisory assistance with respect to the manufacturing and production technology of specific agricultural machines and implements.

In addition to ICA, there are the Las Gaviotas Experimental Centre and the SENA-ASTIN Agreement concluded with the Government of the Federal Republic of Germany on advisory assistance mainly for the small and medium-sized metal-working and engineering industry in one region of the country (Cauca Valley). The latter also has an agreement with the International Rice Research Institute (IRRI), under which it adapts and evaluates machinery made available by IRRI.

6. Repair, maintenance, and supply of spare parts

(a) Repair and maintenance

The agricultural machinery distributors have their own repair shops in the principal distribution centres; however, for reasons of location, they are very often unable to provide efficient service.

Depending on the extent of the repairs to be carried out, either the machine is brought to the distributor's workshop, or else a skilled technician from the sales enterprise goes to the farm to inspect and repair the unit.

There are also several farm machinery rental firms which have their own workshops engaged exclusively in this kind of work. Similarly, there are a number of shops specializing in automobile mechanics, but which also undertake locally certain kinds of repairs on agricultural machinery.

(b) Supply of spare parts

Because of the profusion of equipment makes in Colombia and the fact that some of the manufacturers are poorly represented, confusion has arisen in the supply situation, with equipment owners forced to use spare parts designed for other makes. Another problem with respect to spare parts concerns machinery that has been in operation for more than ten years, since the parts needed are difficult to find in the domestic market and even more so outside the country, because the equipment itself is regarded as obsolete.

Understandably, domestically manufactured spare parts are far more readily available, but there is evidence to suggest that they have a relatively short life-time.

There are government regulations requiring that at least 18 per cent of the total value of the machinery imported by a distributor be allocated to spare parts so as to ensure that they will be easily and quickly available to the users of the equipment.

7. Policies, planning, strategies and co-ordination

The National Department of Planning (DNP) is the national agency responsible for preparing the Government's plans and programmes, which are reviewed by the National Council for Economic and Social Policy (CONPES) whose members include, among others, the ministers of the President's cabinet.

The Ministry of Agriculture has delegated among its affiliated or associated organizations the responsibility for activities in the areas of promotion, research, credit, etc., itself retaining the policy-making function.

Within the Ministry of Agriculture there is an interdisciplinary working group whose members are drawn from all the organizations which are in any way concerned with agricultural machinery. The credit institutions (primarily those of the State); the growers' federations or associations; and the manufacturers, distributors, and importers of agricultural machinery and implements are represented in this group.

The limitations on this group are institutional in nature, as it is merely a consultative body. Efforts are now being made to promote it to an advisory function at the ministerial cabinet level.

8. Interregional co-operation

Through the South American Centre for Agricultural Mechanization, the country is able to provide training of personnel in the following specialized areas: operation, maintenance, repair and overhauling of agricultural machinery for supervisors and instructors, and training of administrative technicians in agricultural mechanization and machinery.

The Centre is located in the western part of the country in the town of Buga (Valle) and is international in character, since it was established on the basis of an agreement between the National Vocational Training Service (SENA), Food and Agriculture Organization of the United Nations (FAO) and the Massey-Ferguson tractor manufacturers.

Until a few years ago, SENA was active in the field of international promotion and granted fellowships to students from Latin American countries, while FAO provided international experts and all the teaching aids. The training organized by SENA at the Buga Centre covers virtually all levels, from equipment operation and maintenance to advanced, secondary courses of technical and practical training for professionals.

Estimates of demand and current use

Category	Class	Item	1980
I	Implements	1 Manual tools	2 500 000
		2 Manual machinery	
II	Intermediate machinery	3 Ploughs	3 360
		4 Rakes	4 400
		5 Cultivators	1 200
		6 Seeders	1 380
III	Motorized machinery	7 Tractors, simple	700
		8 Two-wheel tractors	600
		9 Pumps	500
IV	Special purpose equipment	10 Tractors, medium-sized	1 340
		11 Tractors, large	560
		12 Combines	100
		13 Cotton-pickers	10

Imports of agricultural tractors by make

(Period: 1970-1979)

Make	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Ford	516	263	496	159	419	450	671	1 215	111	240
Massey Ferguson	196	156	227	156	379	128	127	411	444	201
International	256	-	210	104	364	481	10	189	168	-
John Deere	204	76	121	105	316	196	174	312	151	55
Huffal Leyland	200	-	98	100	310	100	55	170	66	-
B.M. Voivo	107	40	41	24	63	67	71	87	84	21
David Brown	80	170	30	60	-	144	30	75	49	25
Denza	61	106	28	38	96	-	53	111	37	10
Case	10	-	-	33	18	137	9	58	42	-
Oliver	67	36	21	15	42	50	71	24	1	-
Saxe	90	47	82	34	71	96	5	51	35	17
Fits Allis	51	54	142	168	107	125	206	236	101	81
Allis Chalmers	1	-	-	-	5	-	-	7	18	-
Zstor	98	183	159	-	132	143	132	527	136	325
Ebro 1/	-	-	-	-	-	20	33	427	195	111
Other makes	562	79	238	65	257	110	264	178	186	170
Totals	2 007	1 210	1 893	1 061	2 579	2 287	2 023	4 078	1 824	1 256

1/ For the period 1970-1974, Ebro is included under other makes; from 1975 on, it is indicated separately.

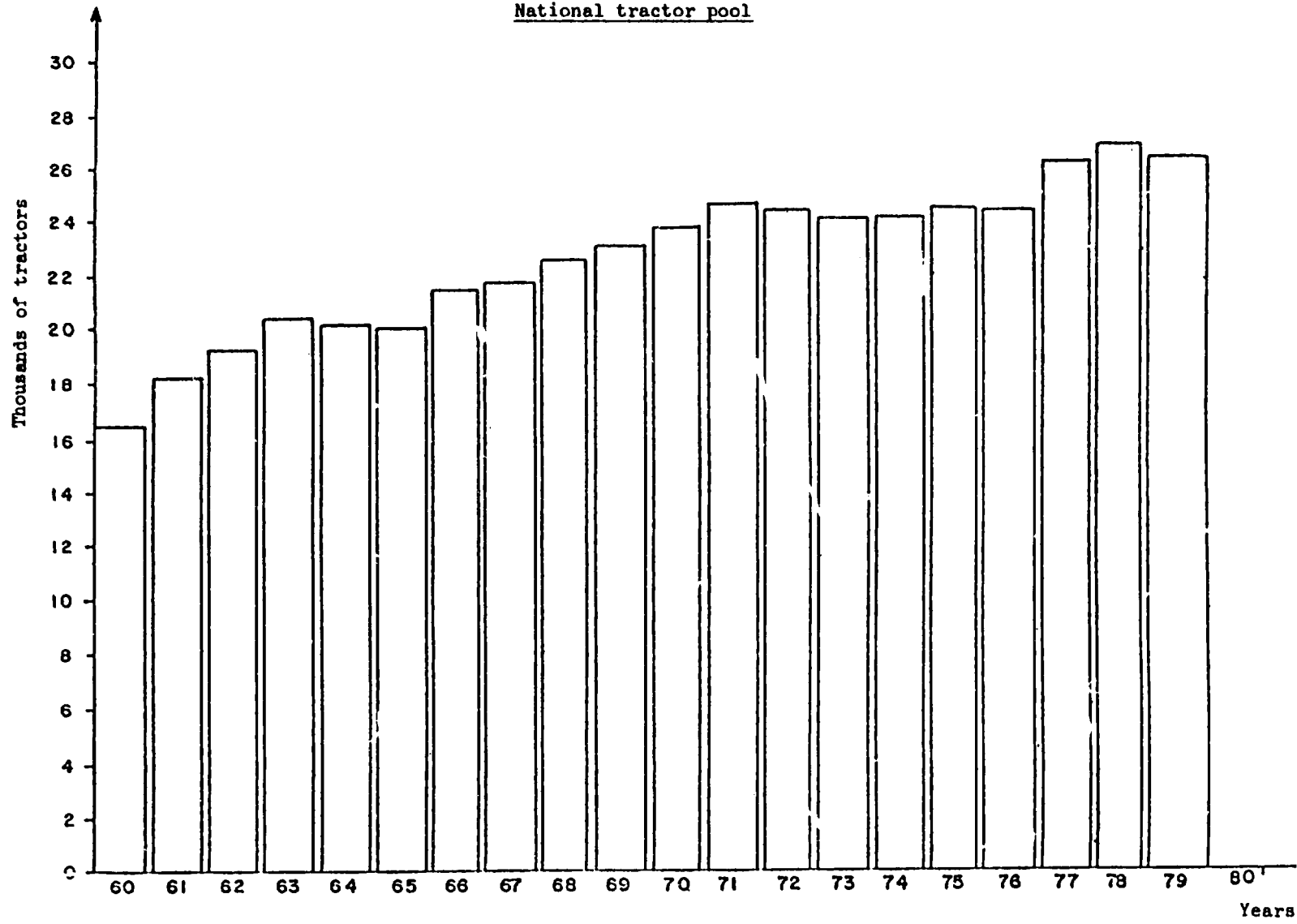
Source: Colombian Foreign Trade Institute (INCOMEX).
 Import licences approved for the period 1970-1978.

Imports of tractors by countries of origin

Country	1970	1971	1972	1973	1974	1975	1976	1977	1978
United Kingdom	1 821	751	721	754	682	576	650	927	956
Federal Republic of Germany	291	178	294	178	399	508	235	559	333
United States	226	69	146	233	294	367	467	357	155
Italy	212	79	72	164	178	254	115	223	185
Czechoslovakia	94	180	82	107	274	240	142	177	340
Sweden	228	60	48	39	78	88	50	58	39
Spain	50	25	17	16	90	17	55	218	320
Romania	-	23	42	2	43	50	53	82	58
France	30	23	59	64	-	4	3	13	-
Poland	-	14	17	4	-	5	-	-	-
Japan	15	7	11	-	1	-	12	21	-
Canada	13	-	13	-	-	-	4	18	-
Argentina	-	-	-	-	-	82	221	10	277
Brazil	-	-	-	-	-	30	20	15	-
Others	15	35	-	17	383	-	1	15	
	2 995	1 434	1 522	1 578	2 381	2 221	2 028	3 115	2 663

Sources: Foreign Trade Yearbooks, National Administrative Department of Statistics (DANE) 1970-1977; Agricultural Credit Bank; Agricultural Sector Planning Office (OPSA), 1978.

National tractor pool



Colombia: Tractor imports and pool

Year	Tractors imported	Pool
1945	776	
1946	616	
1947	920	
1948	776	
1949	1 572	
1950	1 590	6 350
1951	1 615	7 784
1952	979	9 184
1953	1 369	10 208
1954	2 374	11 694
1955	2 493	13 346
1956	2 239	14 572
1957	852	14 652
1958	1 565	15 124
1959	1 844	15 361 ^{1/}
1960	2 428	16 429
1961	1 930	18 241
1962	1 905	19 251
1963	1 317	20 380
1964	2 000	20 125
1965	1 794	20 174
1966	1 756	21 491
1967	1 764	21 886
1968	2 999	22 511
1969	3 049	23 067
1970	2 995	23 823
1971	1 434	24 405
1972	1 522	24 362
1973	1 578	24 006
1974	2 381	24 049
1975	2 221	24 340
1976	2 028	24 463
1977	3 115	26 261
1978	2 663	26 924
1979 ^{2/}	1 256	26 398

^{1/} National Agricultural Census, DANE

^{2/} INCOMEX import records

Sources: Foreign Trade Yearbooks, DANE - 1945-1978;
INCOMEX - 1979.

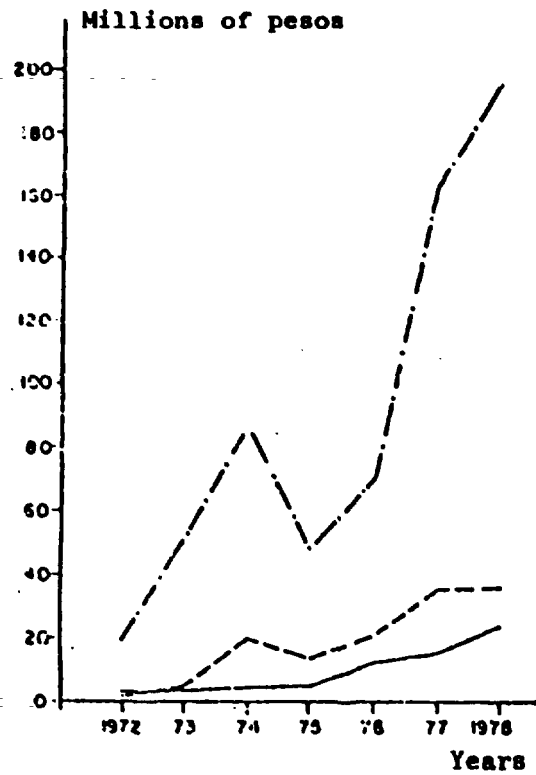
Colombia: Tractor pool and its power

Year	Pool	Average power (hp)	Power of total pool (thousands of hp)
1950	6 340.	40.0	254.0
1951	7 784	40.4	314.5
1952	9 184	40.8	374.7
1953	10 208	41.2	420.6
1954	11 694	41.6	486.5
1955	13 346	42.0	560.5
1956	14 572	42.4	617.9
1957	14 652	42.8	627.1
1958	15 124	43.2	653.4
1959	15 361	43.6	669.7
1960	16 429	47.1	773.8
1961	18 241	48.2	879.2
1962	19 251	49.2	947.1
1963	20 380	49.9	1 016.9
1964	20 125	50.8	1 022.3
1965	20 174	52.1	1 051.1
1966	21 491	54.7	1 175.5
1967	21 886	54.9	1 201.5
1968	22 511	54.1	1 217.8
1969	23 067	55.9	1 289.4
1970	23 823	58.4	1 391.3
1971	24 405	62.8	1 532.6
1972	24 362	61.7	1 503.1
1973	24 096	61.9	1 491.5
1974	24 049	61.0	1 466.9
1975	24 340	62.5	1 521.2
1976	24 463	64.1	1 568.1
1977	26 261	64.0	1 660.1
1978	26 924	65.0	1 750.0
1979	26 398	65.0	1 715.9

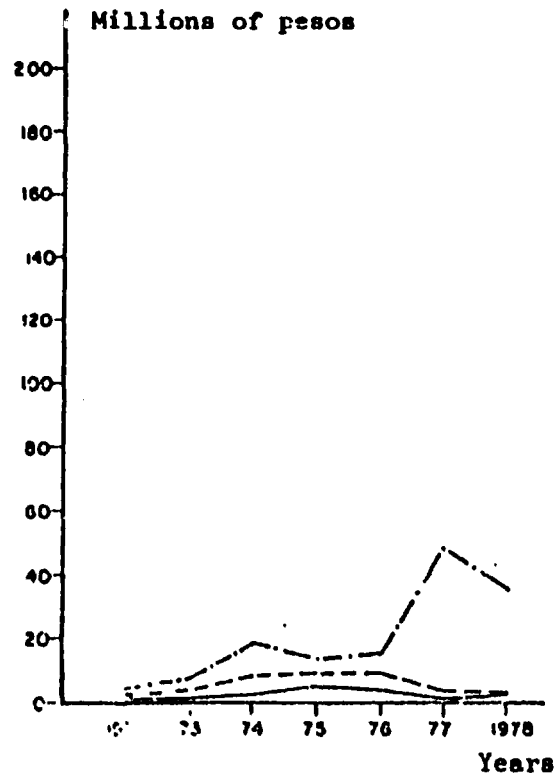
Sources: OPISA and Ministry of Agriculture.

Production, imports and exports of agricultural implements, in current Colombian pesos

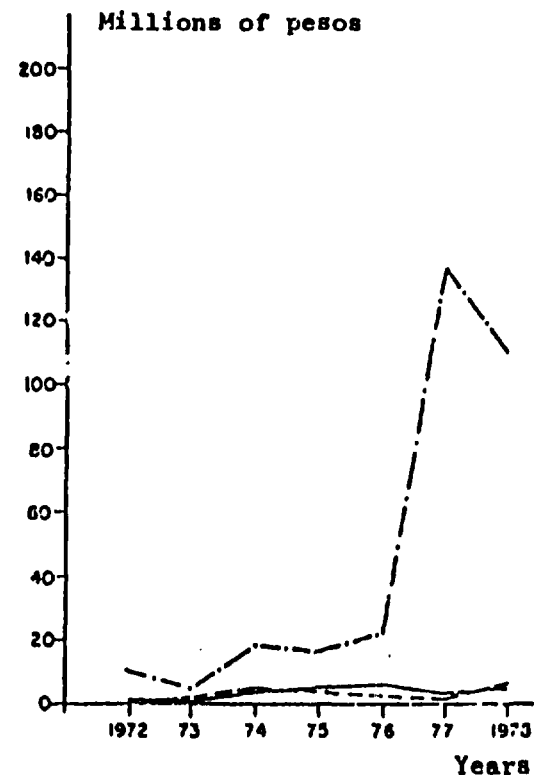
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Fumigators



Ploughs

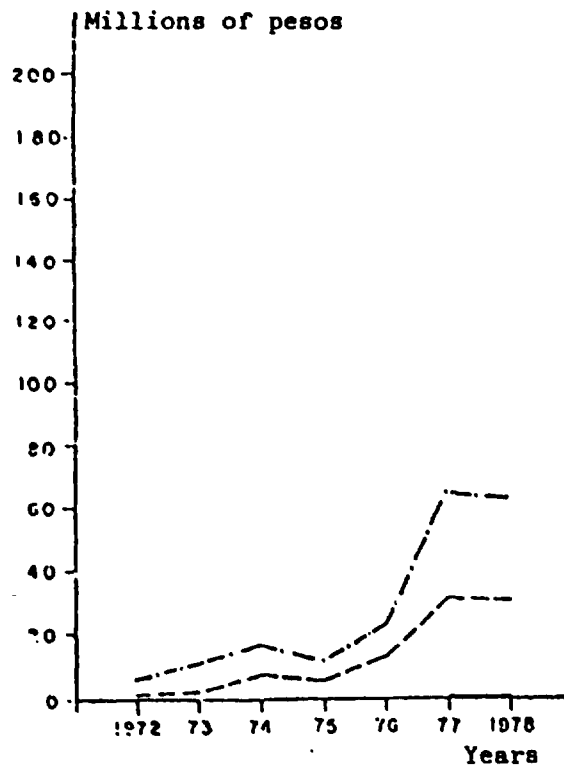


Rakes

Key:

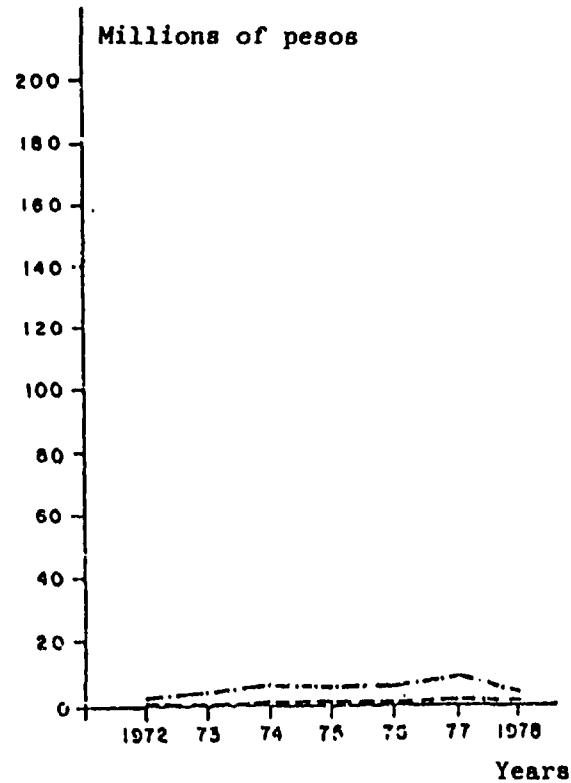
- .-.- Production
- Imports
- - - Exports

Graph 1 (cont'd)

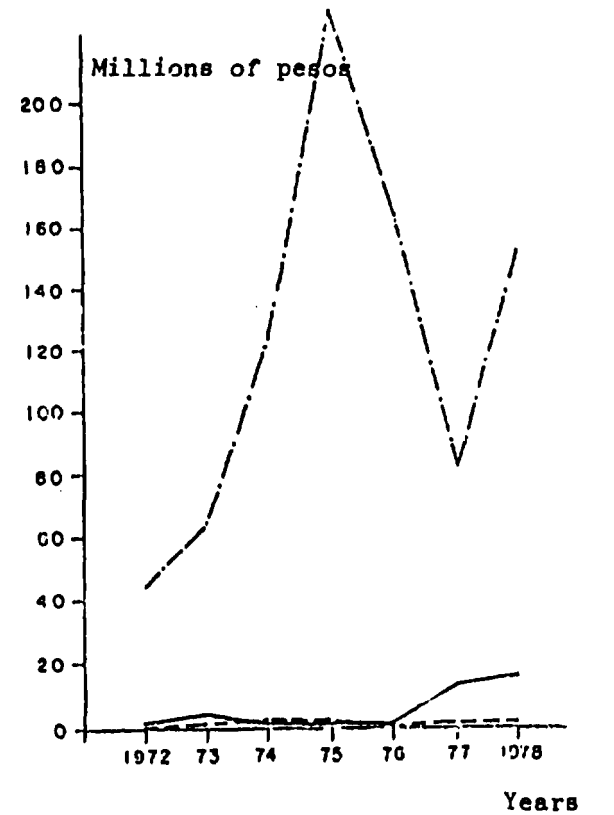


Coffee-cherry removers

..... Production
—— Imports
- - - Exports

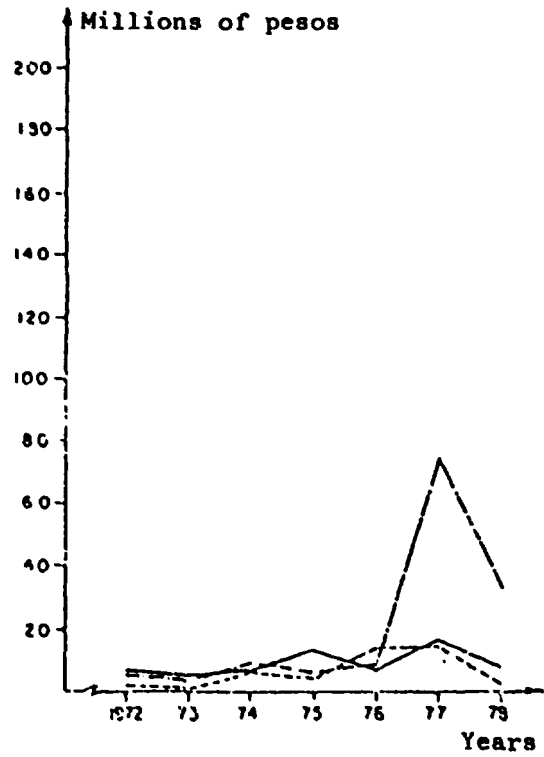


Forage cutters and choppers

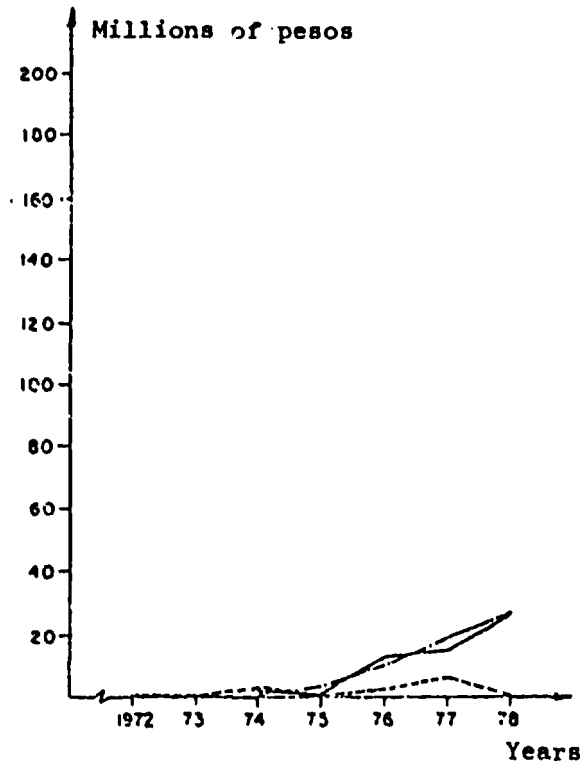


Unspecified machines and apparatus

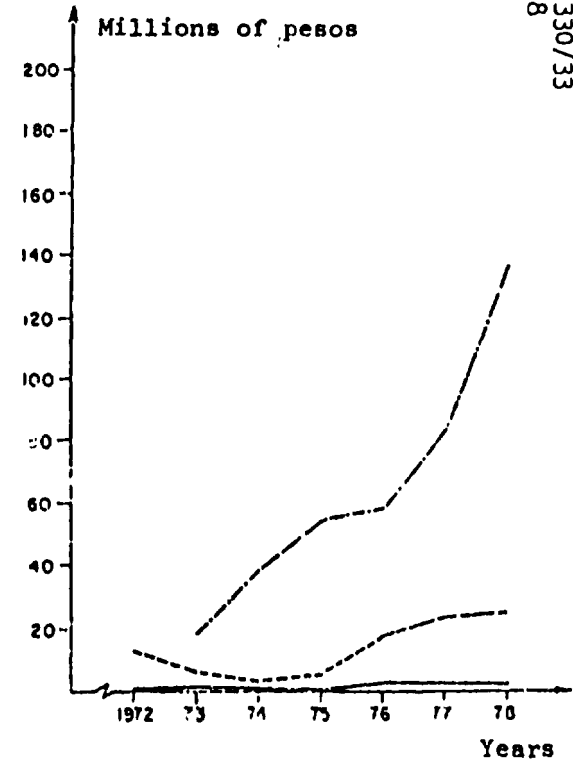
Graph 1 (cont'd)



Seeder-cultivators (ridging ploughs)



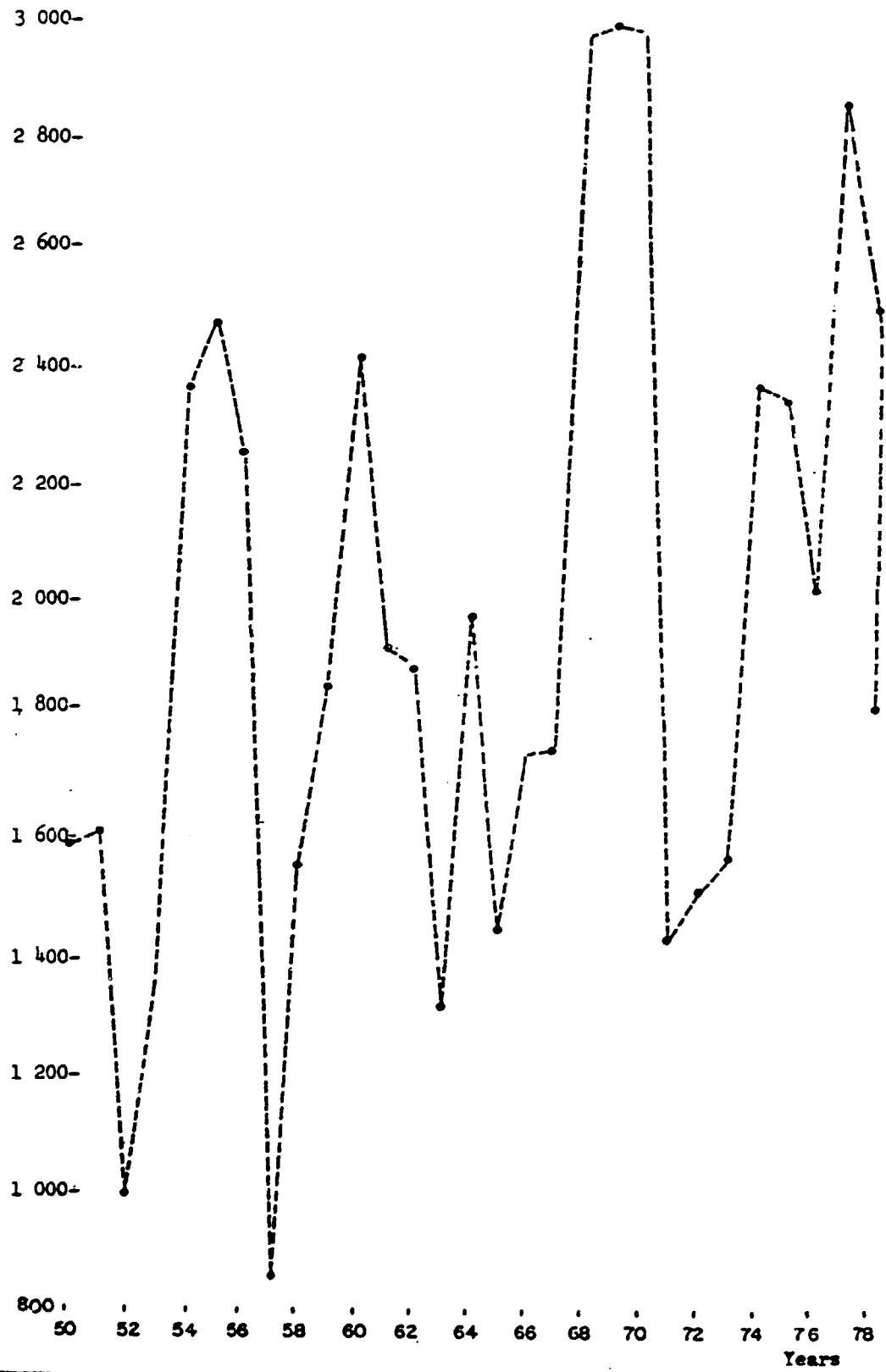
Mowers, reapers and
scrub-cutters



Discs for ploughs and rakes

..... Production
—— Imports
- - - Exports

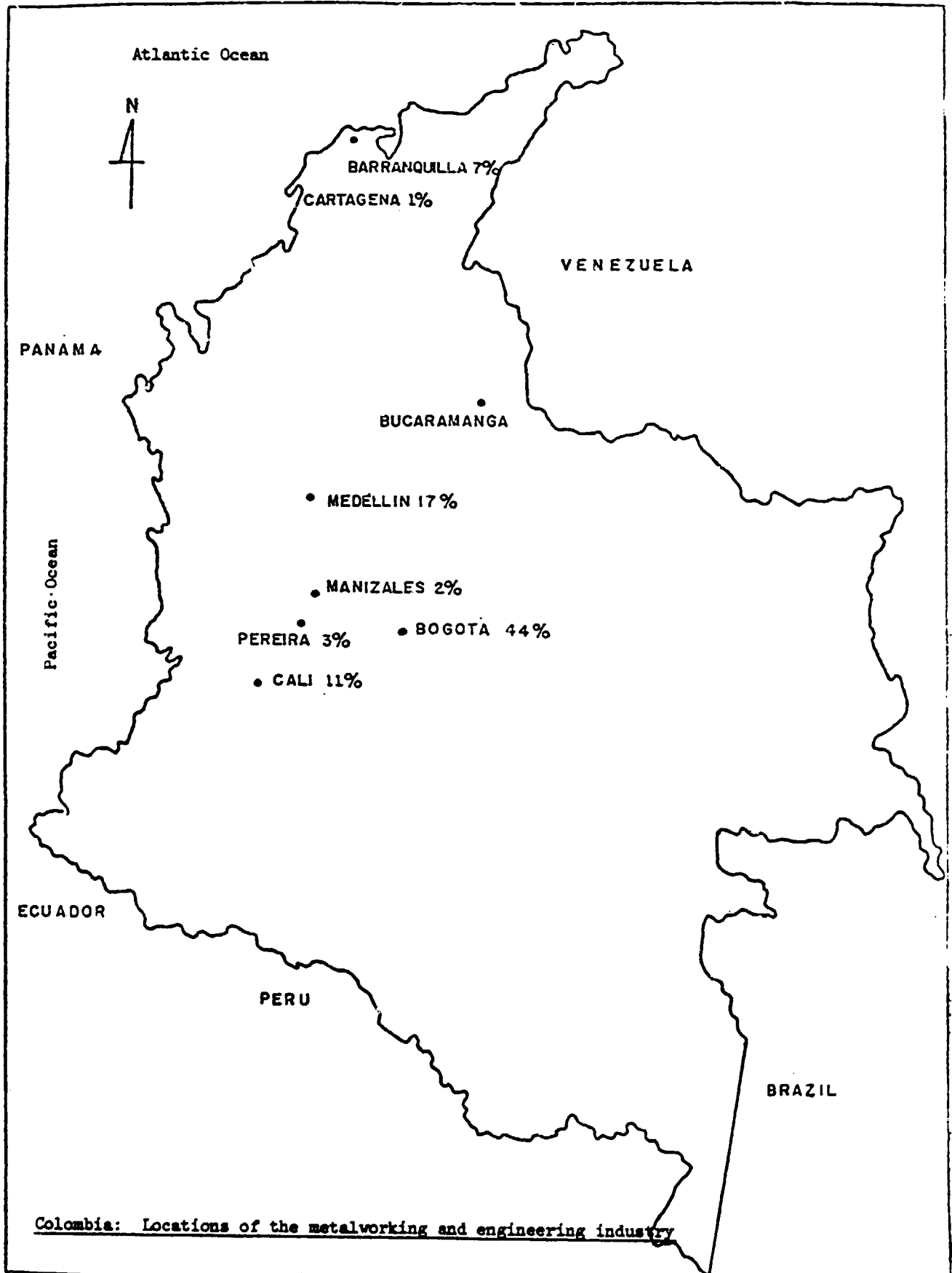
Imports of agricultural tractors



Imports of tractors (1950-1979)

Year	Number of tractors	Average power (hp)	Total tractor power (thousands of hp)
1950	1 590	42	66.8
1951	1 615	42	67.8
1952	979	42	42.1
1953	1 369	43	58.9
1954	2 374	43	102.1
1955	2 493	45	112.2
1956	2 239	47	105.2
1957	852	49	41.7
1958	1 565	51	79.8
1959	1 844	53	97.7
1960	2 428	55	133.5
1961	1 930	56	108.1
1962	1 905	56	106.7
1963	1 317	57	75.1
1964	2 000	58	116.0
1965	1 794	59	105.8
1966	1 756	60	105.4
1967	1 764	61	107.6
1968	2 999	62	185.9
1969	3 049	63	192.1
1970	2 995	63	188.7
1971	1 434	64	91.8
1972	1 522	67	101.9
1973	1 578	70	110.5
1974	2 381	72	171.4
1975	2 221	72	159.9
1976	2 028	72	146.0
1977	3 115	72	224.3
1978	2 663	75	199.7
1979	1 259	75	94.4

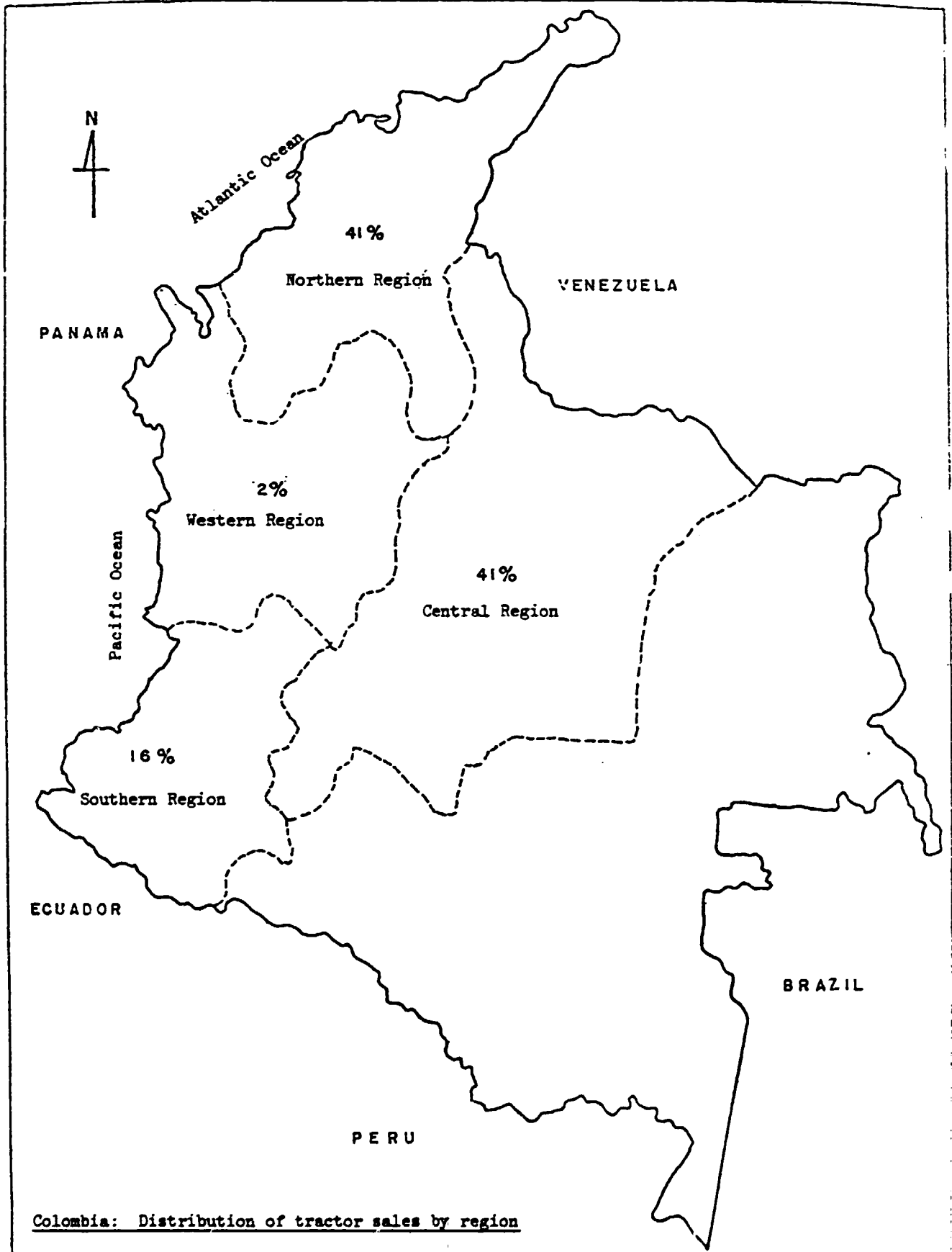
Sources: Foreign Trade Yearbooks, DANE.
Agriculture in Colombia, 1950-1972; DANE.
1972-1979: power estimated by OPSA.



Sale of wheeled agricultural tractors, by power: 1975-1977

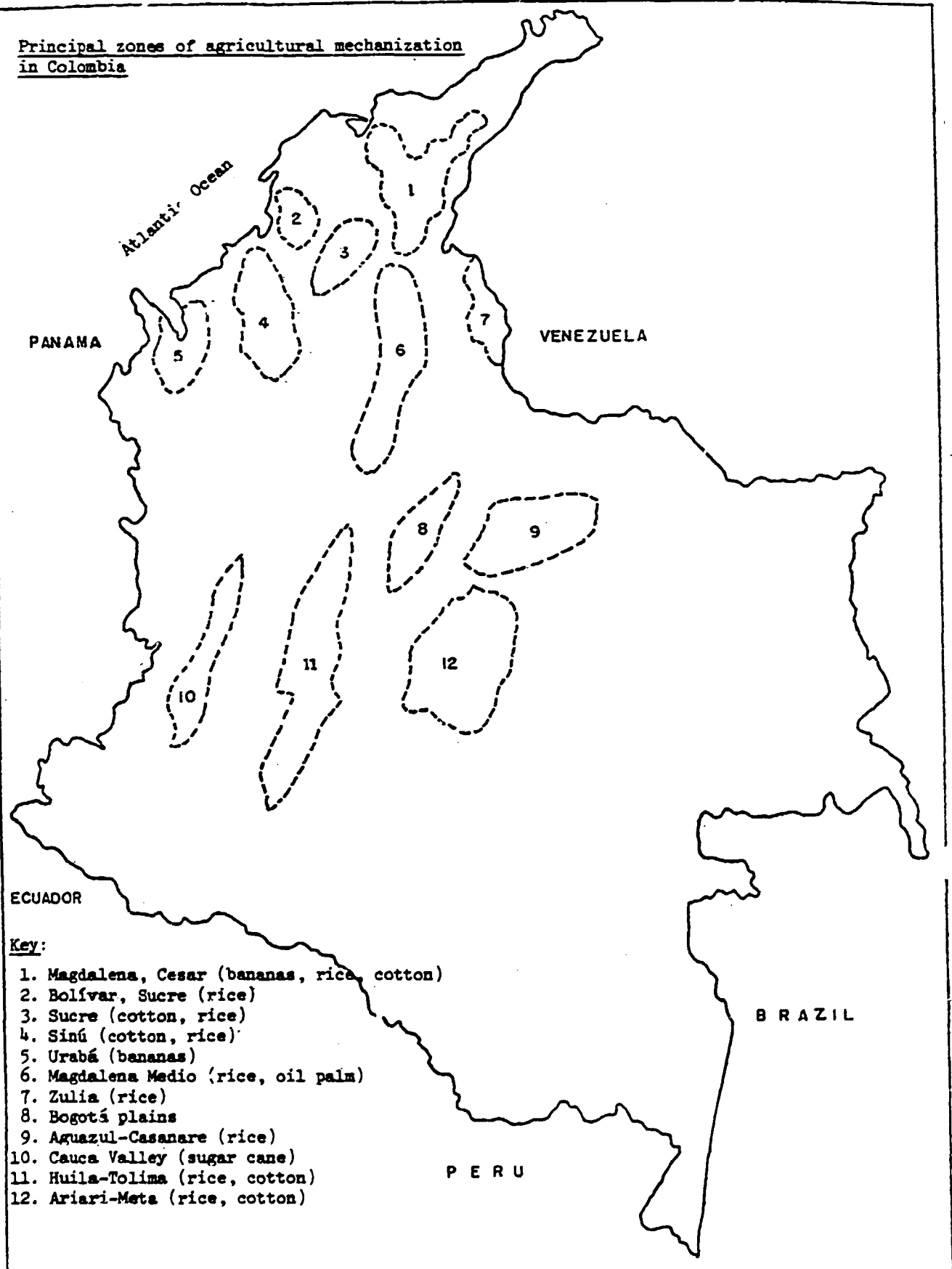
Power	1975		1976		1977	
	Units	%	Units	%	Units	%
Less than 40			-	-	45	1.7
From 40 to 60			100	4.6	20	1.1
From 60 to 70	425	20.5	242	11.0	375	14.5
From 70 to 80	887	42.9	1 243	56.6	1 348	52.2
From 80 to 100	357	17.2	306	13.9	421	16.2
More than 100	260	12.6	292	13.3	344	13.3
More than 200	-	-	12	0.6	22	0.8
TOTALS	2 069	100.0	2 195	100.0	2 583	100.0

Source: ADIMAGRO

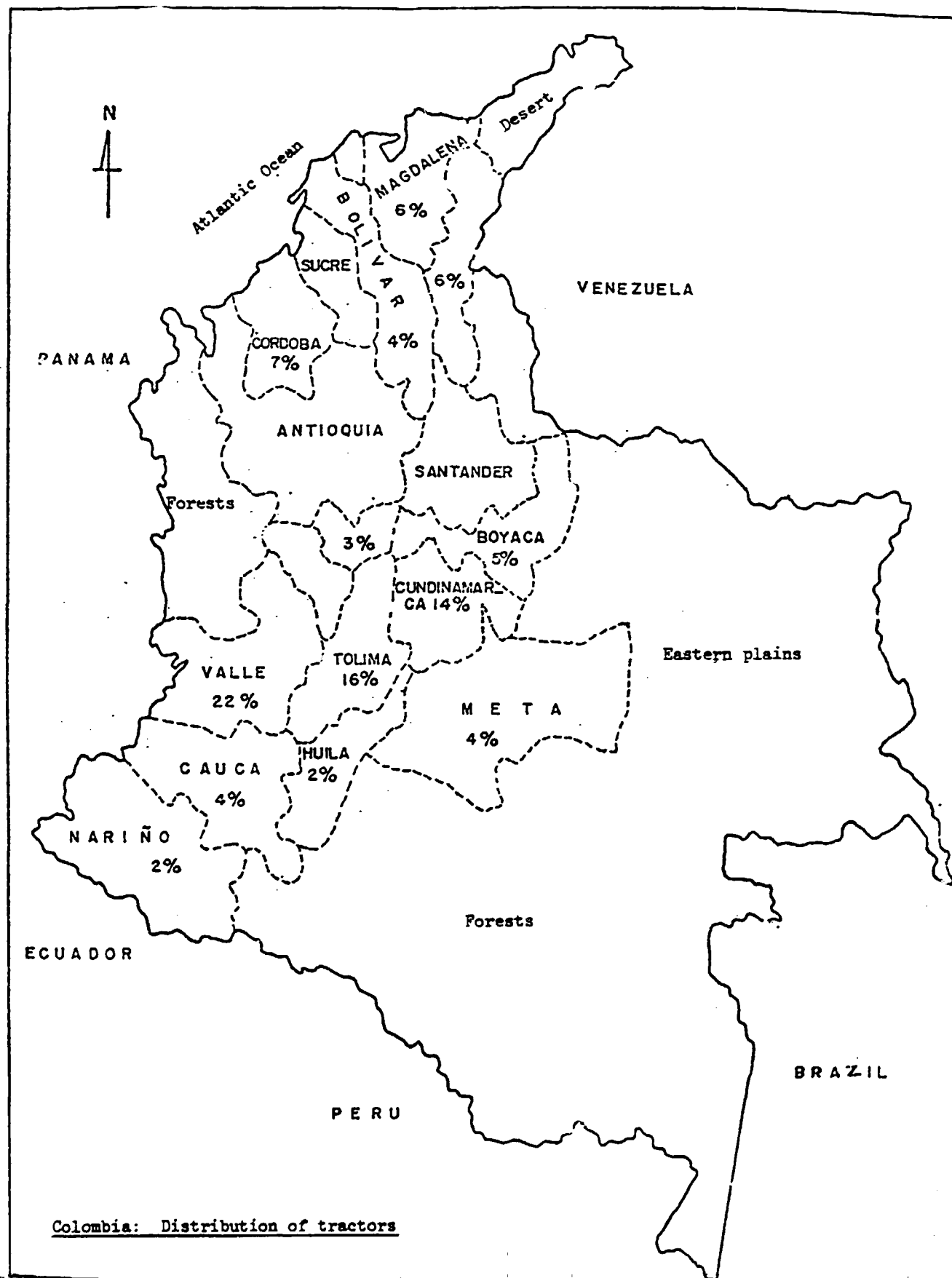


Colombia: Distribution of tractor sales by region

Principal zones of agricultural mechanization
in Colombia



Distributors	Makes
1. AGRICOLAS LIMITADA	UNIVERSAL
2. AGROCOL, S.A.	JOHN DEERE
3. AGROINDUSTRIAL ANDINA LTDA.	GILSON
4. AGRO MECANICAS EPOCA LTDA.	VOLVO
5. ALMACENES ANGEL, S.A.	FORD
6. BAVARIAN MOTORS - DISCAR LTDA.	FENDT
7. CASA TORO, S.A.	JOHN DEERE
8. CENTRALCO S.A.	INTERNATIONAL
9. COLCARIBE S.A.	FIAT - ALLIS
10. DISMAQUINARIA LTDA.	VOLVO
11. DISTRIBUIDORA NISSAN LTDA.	JOHN DEERE
12. FEDEARROZ	ZETOR
13. GENERAL ELECTRIC S.A.	DAVID BROWN-CASE
14. HELD & CIA. S.A.	DEUTZ
15. MOTOVALLE LTDA.	MASSEY-FERGUSON
16. MAQUINARIA AGRICOLA AGRO LTDA.	UNIVERSAL VOLVO
17. PRACO S.A.	NUFFIELD LEYLAND
18. SAMECO LTDA.	SAME
19. SIDA LTDA.	MASSEY FERGUSON
20. TORO VEGA LTDA.	JOHN DEERE
21. VELEZ ANGEL & CIA.	FORD



Colombia: Distribution of tractors

