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# Agricultural research in Italy

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Italy is a country that is marked by a very big deficit in the agricultural products and foodstuffs sector – one that is constantly growing and is now in the range of 10,000 billion lira – in second place after the crude oil trade deficit. Cereals, cattle, meat, wood and cellulose pulp make up the bulk of its imports.

Among the few trade surplus sectors are wine, pasta, as well as fruit and vegetable produce.

In order to have a better understanding of the problems involved in the present agricultural situation in Italy, one must take into account the following factors:

- the number of people employed in the agricultural sector, after the exodus during the period 1960-1970, has tended to remain stationary, but the added value of agricultural workers represents about half that of the industrial sector, whereas in the more developed countries the added values of the two sectors differ very little;

- only 1.2% of those working in the agricultural sector have any qualifications;

- even today there are still a large number of farming concerns that are less than one hectare in size, and this fact – which is absurd from an economic point of view – is one of the main obstacles to modernization both in the technical and management fields; and

- the progressive neglect of hilly or mountainous regions has led to a worsening of the hydro-geological situation, which in turn has had negative results on the soil.

On the other hand, the pedo-climatic conditions of a country such as Italy, which spreads over a latitude of around 1,500 km, provides for different, though complementary, types of production and cultivation.

The primary objectives of agriculture in Italy are to keep costs down, prices stable and to diversify production so as to optimize the use of resources.

Within the framework of this policy, a decisive role can be played in the future by the southern regions where, it should be remembered, one million hectares of land, which today are dry, will become irrigable over the next six to eight years.

Agricultural research will play a fundamental role in reaching the objectives fixed by the Italian government, and which are also shared by the European Economic Community.

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## I - Agricultural research in Italy in relation to scientific research as a whole

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Expenditures devoted to research in Italy amount to more than 8,000 million lira (Table 1) and are

shared in equal proportions between public bodies and the private sector.

In the public service field, two research centres – the CNR (*Consiglio Nazionale delle Ricerche*) and the ENEA (*Ente Nazionale Energie Alternative*) – are the biggest contributors, followed by the State Civil Service and universities.

In the private sector, allocations for research come mainly from private firms, followed by those that benefit from state subsidies.

From **Table 2**, which includes the percentage of expenditure for Research and Development (R & D) of the Gross Domestic Product (GDP) in OECD countries, it can clearly be seen how far behind the other more developed Western countries Italy is as far as her commitment to scientific research is concerned. The situation in Italy is slowly tending to improve, as the percentage increase in expenditure on R & D in relation to GDP, between 1965 and 1983, increased from 0.7% to 1.2%.

In the agricultural sector, Italy has made a special effort so that, among the various EEC countries (before the entry of Greece, Spain and Portugal), it had the highest increase in the annual percentage of funds for agricultural productivity during the 1975-1983 period (**Table 3**). Over these eight years, average annual growth in the allocation of funds in Italy was over 10%, in comparison with an EEC average of 2%.

In relation to overall expenditure on R & D, Italy devotes 4.1% to agricultural research (**Table 3**); this percentage is higher than that of West Germany, Belgium and France, equal to that of the United Kingdom and below that of Holland, Denmark and Ireland. However, in terms of GDP, Italy's percentage contribution to agricultural research is the lowest in the European Community (1%).

In global terms, Italy spent slightly less than 300 billion lira in 1983 on R & D in the agricultural sector (**Table 4**). The most substantial contributions came from the Ministry of State Education (30.8%), the Ministry of Agriculture (20.4%) and the CNR (13.9%). More modest, though still substantial contributions, come from regions and municipal governments (11.2%), from the Mezzogiorno Fund (8.4%) and from ENEA (5.9%).

The growing interest shown by the Italian Administration in the agricultural research sector emerges clearly in **Figure 1**.

**Table 5** shows the importance of the role played by the State in agricultural research (70.9%), in comparison with that played by companies (29.1%), as well as the impact of applied research (69.5%), in comparison with that of development (25.6%) and pure research (4.9%).

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## II - National organization of agricultural research and institutions

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The public system for agro-food research in Italy stands out for the remarkable multiplicity of its administrations and institutions.

**Figure 2** is a schematic presentation of the "politico-managerial organs of research" and the "research structures" themselves.

The Parliament and the Government are responsible for determining the financing; the CIPE and its sub-committee work on agricultural problems; the CIPAA supplies general addresses and authorizes programmes; and the Ministry of Scientific Research carries out general monitoring.

The main body of research and experimentation is carried out through the three national networks which consist of university institutes, the Ministry of Agriculture's Experimentation Centres and the related peripheral sections, as well as the CNR Institutes and Research Centres.

CNR Institutes and Centres can be distinguished from each other in that the Institutes have an autonomous management, personnel and structures, while the Centres depend on the University, and are directed by university professors and make use of university structures.

Each of these three networks is run by politico-scientific bodies which are present in an advisory capacity and are responsible for such tasks as programming: the Ministry of Education's Consultative Committee for Agrarian Sciences, the Ministry of Agriculture's National Committee on Experimentation, and the CNR's Advisory Committee on Agrarian Sciences.

These three committees are for the most part made up of representatives of the scientific world (University and CNR) or the administrative-scientific world (Ministry of Agriculture).

Despite the presence of representatives of three different institutions and of the Ministry of Scientific Research, the following points should be noted:

- the lack of any real coordination between the different research bodies;

- the absence of representatives of the various social bodies concerned with innovation and research (regions, producers' associations, the agricultural food processing industry, etc.),

- in committees and research centres alike, the structures are ill adapted to the realization of projects and the communication of the results obtained.

At the management level, there are big differences between the University, the Ministry of Agriculture institutes (MAF) and the CNR.

The 18 agriculture faculties and the 23 MAF institutes are all administratively independent (Chairman and Administrative Board), while the institutes and the CNR centres are administered by a centralized system.

In spite of their shortcomings – mainly due to the fact that they only became involved in 1977 in the field of "research and experimentation of regional interest" – the regions play an important role, one that is constantly evolving and growing. This is the case for both applied and demonstrative experimentation and in the organization of research financed by them and commissioned from national bodies present in the region (universities, MAF institutes, CNR institutes), and finally service activities (zooprophylactic institutes, observatories for plant diseases, analysis laboratories, etc.), and extension services (regional agencies for agricultural development, mountain communities) activities that are closely linked to research.

**Figure 3** gives an idea in graph form of the Regions' contributions to the budget for the agricultural sector (vertical axis) and for agricultural research (horizontal axis).

Proportionately, the regions that are most committed to the agricultural sector are: Basilicata, Sardinia, Marches, Trentino-Upper Adige and Sicily.

**The Map** shows the geographical distribution of university, Ministry of Agriculture, CNR and regional research structures.

In spite of a certain imbalance in some southern regions (Abruzzi, Basilicata, Calabria), the research structures – leaving aside their functional capacity – are relatively uniformly distributed over the country as a whole.

**Tables 6, 7, 8, 9 and 10** classify existing structures in Italy according to the institutions to which they belong.

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### III - Relations between the national system and neighbouring activities

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As has been noted above, a large amount of research, both pure and applied, is being carried out in Italy in faculties of agronomy and veterinary medicine – as in the United States – independently of the Ministry of Agriculture institutes, but sufficiently integrated into the activities of the CNR.

The close connection between universities and the CNR, which was still very strong some years ago, is now tending to loosen thanks to the policies implemented over the last five or six years by the CNR, a policy that tends to create separate institutes that differ from the centres that exist within the universities and which are directed by university professors.

It may generally be said that in Italy there are frequent and positive contacts between research institutions and farmers, outside the institutional context of such collaboration.

The world of Italian research is decidedly open to the practical world, both to supply information, and to receive stimuli and suggestions on the research directions that should take priority.

In the fruit, vegetables and flowers sector, which is of primary importance to Italy's agricultural economy, the Società Orticola Italiana (SOI) continues to play a very important role in communicating science by encouraging meetings,

exhibitions, open days and guided visits; by taking responsibility for publishing technical articles with a very serious experimental content but written in simple language; and by coordinating the different regional activities in order to integrate them into the national context.

Within the context of collaboration between research and farmers, numerous experiments have been carried out in private companies, especially in the case of university institutes which often lack access to experimental farming concerns.

Many regions have a regional Committee for Experimentation, in charge of the programming and coordination of research carried out in a regional context. Representatives of research institutes (university, MAF, CNR) are asked to sit on such committees.

Regional representatives and farmers are found among the members of the Administrative Board of the MAF experimental institutes.

Relations with the agricultural industry (phytoremedies, fertilizers, agricultural machinery, transformation, etc.) are less widespread and occur less frequently, but are overall positive.

Collaboration between the agricultural research sector and other institutions, whose sphere of interest is not strictly agricultural, but with whom it would be useful to establish contact (chemistry, physiology, microbiology, etc.) is fairly rare and limited.

At the national level, the lack of effective coordination of all scientific research has a negative influence on the relations between structures that are not directly linked to each other.

The Ministry of Scientific Research and Technology was created with the express aim of compensating for this lack of organization. Until now, however, its concrete action has had little influence on the situation that existed previously which was characterized by the existence of several centres of power and scientific decision.

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## IV- Human resources

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### 1. Scientists

**Table 11** shows the number of Italian researchers – as full-time units – in the whole research and development sector. In all, there are 50,000, of whom 30,000 belong to the public sector (60%) and 20,000 to the private sector (40%).

In 1984 there were just under 2,000 researchers employed in agricultural research (**Table 12**), of whom 66% belonged to the State administration sector, and 34% to companies.

**Table 13**, on the distribution of expenditure on agricultural research per economic category, shows that personnel account for 60 % of the total.

Both university professors and Ministry of Agriculture researchers are on the same salary scale, while CNR scientific personnel and research centres that depend on the other Ministries have a less advantageous salary scale. This tends to lead to a migration of the best people towards the Universities and the MAF institutes.

State administration researchers are employed through a public competitive examinations, with a few exceptions.

Training of researchers, which in the past took place before the examination through study grants, now occurs only after the examination, and this has led to a deterioration of the situation.

The recent implementation of a "Research Doctorate" which resembles the anglo-saxon Ph.D., should allow for better selection of researchers in the future.

One way of training researchers that is relatively common is to spend some time in a foreign research institute. In this respect, the United States is the most sought after country.

### 2. Other Personnel

Technicians and other staff are shown in **Tables 11 and 12**.

A comparison between research in general and agricultural research in particular shows that the situation is more favourable in the latter sector where the ratio of researchers to other personnel is just under 0.5, while within the research category it is just over 1.

Technicians and administrative staff are generally employed through a public examination, while agricultural workers are employed under a national contract of a private nature.

The hiring of all State personnel is subject to excessive rigidity and slowness, while the hiring of agricultural workers is much more flexible and rapid.

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## V - Research programs and results

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Table 14 gives an initial idea of the importance given in Italy to the different sectors of agricultural production at the research level. It also shows the percentage of funding contributed by the State sector and companies, for products and technologies.

In the field of State administration, most funding for research goes to plant and oenological products (29.5%), followed by research of a general nature (22.7%), zootechnology (17.2%), veterinary medicine (17.0%) and silviculture (12.5%).

In the company sector, almost one third of the financial resources (28.6%) goes to industrial tinned products, followed by pesticides (26.3%), fertilizers (13.1%), live animals and animal and vegetable products, machines for the food industry and agricultural machines.

Research fields are theoretically identified by the CIPE and CIPAA, and translated into operative terms by the scientific advisory committees of the three national research organizations (university, CNR, Ministry of Agriculture). In reality, however, it is the research structures who, on the basis of their position in the operative context of

the country and in the national and international scientific world, decide on the research programs.

This manner of operating has often led the Italian scientific world in the public administration to deal with themes that are not always linked to the realities of production and do not respond to the information needs of the country.

In order to improve the efficiency of the system, both the CNR and the Ministry of Agriculture have, in a little under ten years, launched a series of finalized projects defined according to the demands of scientific and economic policy. A large number of scientific institutions belonging to the universities, the Ministry of Agriculture, the CNR and the regions have been asked to collaborate on these, according to criteria of competence, complementarity and interdisciplinarity.

Thus, parallel to the so-called "ordinary" programs which are more or less chosen by individual researchers and each institute, coordinated programs are being developed, that are both collegial and thematic. They are aimed at general objectives, and are established in agreement with both national and regional political authorities and, in the case of the Ministry of Agriculture, with representatives of the production sector. Table 15 shows the objectives of the various projects by theme and working group.

The Ministry of Agriculture "national" programs involve a little under 200 operational units, and absorb around 8 billion lira per year in order to function. The financing of the CNR takes a little less (around 6 billion) and involves 550 operational units.

In the case of the MAF Experimental Institutes, the financing of "national" projects represents approximately 30% of the total.

Numerous themes covered by the projects are of great interest and highly topical, including other countries that belong to ICAMAS: Irrigation, grain legumes, hard grain, olive growing, etc.

Table 1: Funds allocated to research in 1984

Research sectors	Billions	%
<b>1. Government</b>		
State offices	1,181.00	14.4
Research centres (CNR, ENEA)	1,838.00	22.4
Universities	938.00	11.4
Public bodies	149.00	1.8
<b>Sub-total 1</b>	<b>4,106.00</b>	<b>50.0</b>
<b>2. Private sector</b>		
<i>Ente Nazionale per l'Energia Elettrica (ENEL)</i>	152.00	1.9
Companies with state involvement	1,688.00	20.5
Private companies	2,270.00	27.6
<b>Sub-total 2</b>	<b>4,110.00</b>	<b>50.00</b>
<b>Total</b>	<b>8,216.00</b>	<b>100.00</b>

Source : IRSRDS - CNR

Table 2: Research and development expenses as % of GDP  
in OECD countries

Countries	%
Italy	1.0
France	2.0
United Kingdom	2.4
Japan	2.4
West Germany	2.5
United States	2.5

Source : IRSRDS estimate based on 1981 OECD data

**Table 3: Public expenditures in agricultural research of EEC countries as a % of total public research expenditures (1975/1983)**

Countries	%		Annual variation since 1975 (%)
	1975	1983	
Italy	3.0	4.1	+10.3
West Germany	1.9	2.1	+0.6
France	3.8	3.2	+2.9
United Kingdom	4.4	4.0	+1.8
Netherlands	7.6	7.6	+0.9
Belgium	4.4	2.9	-1.8
Denmark	9.7	9.3	-1.8
Ireland	40.8	31.4	-1.5
<b>EEC average</b>	<b>3.6</b>	<b>3.5</b>	<b>+2.0</b>

Source : EEC

**Table 4: Distribution of public expenditures for agricultural research in 1984**  
(million liras: 1 \$ = 1 200 liras)

Institutions	Amount	%
Ministry of Public Instruction	88,185	30.8
Ministry of Agriculture	58,438	20.4
CNR	39,732	13.9
Regions and municipalities	32,000*	11.2
Mezzogiorno Fund	24,000*	8.4
ENEA	16,750	5.9
Companies with State involvement	10,471	3.7
Other ministries and bodies	10,258	3.6
International contributions	6,108	2.1
<b>Total</b>	<b>285,942</b>	<b>100</b>

Source: E. Galante, C. Sala, 1986

\*: estimate



**Table 5: Distribution of agricultural research expenditures between government and private sources and between pure and applied research and development research**

Source of financing and type of research	%
Government	70.9
Private companies	29.1
Pure research	4.9
Applied research	69.5
Development research	25.6

Source: table based on ISTAT data

**Table 6: Research institutes of the Ministry of Agriculture and Forestry and their outlying stations**

Institutes	Location	Outlying stations
<b>Disciplines</b>		
Agronomy	BARI	MODENE, METAPONTO
Plant nutrition	ROME	TURIN, GORIZIA
Plant pathology	ROME	-
Zoology	FLORENCE	ROME, PADOUE
Agricult. mechanization	ROME	TREVIGLIO
RI soil protection	FLORENCE	RIETI, CATANZARO
<b>Production</b>		
Zootechnology	ROME	TURIN, CREMONE, ROVIGO, MODENE, POTENZA, RAGUSE
Cereal crops	ROME	SAN ANGELO, LODIGIANO BERGAME, VERCEIL, BADIA POLESINE, FIORENZUOLA, FIOGGIA CATANE
Forage crops	LODI	MONTAGNANA, FOGGIA, CATANE
Industrial crops	BOLOGNE	ROVIGO, OSIMO, BATTIPAGLIA
Horticulture	SALERNE	MONTANASO LOMBARDO, ASCOLI, PICENO
Tobacco	SCAFATI	BOVOLONE, ROME, LECCE
Flowers	SAN REMO	PESCIA, PALERME
Fruit trees	ROME	TRENTE, FORLI, CASERTA
Vine growing	CONEGLIANO	ASTI, AREZZO, BARI
Citrus fruit	ACIREALE	REGGIO DE CALABRE
Olives	COSENZA	SPOLETO, PALERME
Sylviculture	AREZZO	FLORENCE, S.PIETROAVELLANA, COSRNZA
<b>Technology</b>		
Application of agricultural products technology	MILAN	PALERME
Milk and cheese	LODI	PARME
Oenology	ASTI	GAIOLE EN CHIANTI, VALLETRI, BARLETTE
Elaiotechnology	PESCARE	-

**Table 7: Institutes and centres of the National Research Council**

**Institutes**

Institute of Agrarian Nematology for Vegetables, Bari  
 Institute of Germplasm, Bari  
 Institute of Agricultural Problems of Irrigation in the South, Ponticelle, Naples  
 Research Institute for Problems of Adaptation of Bovines to the Southern Environment, Ponticelli, Naples  
 Institute for Vegetal Biosynthesis in Plants of Agrarian Importance, Milan  
 Institute for Soil Chemistry, Pise  
 Institute for Radiobiochemistry and Ecophysiology of Vegetables, Monterotondo Station, Rome  
 Institute of Applied Phytovirology, Turin  
 Institute for Bio-agronomic Problems of Mediterranean Silviculture, Sassari  
 Research Institute on Small Ruminants, Castel del Monte Andria, Bari  
 Institute for Environmental Analysis and Remote Sensing Applied to Agriculture, Arcetri, Florence  
 Institute of Toxins and Microtoxins of Plant Parasites, Bari  
 Institute of Forest Ecology and Hydrology, Cosenza  
 Institute for Reproduction of Woody Species, Florence  
 Agrosilviculture Institute, Porano-Terni  
 Institute for the Defence and Valorization of Animal Germplasm, Milan  
 Institute for Genetic Improvement of Forest Plants, Florence

**Centres**

Study Centre for the Genetic Improvement of Vines, Turin  
 Study Centre for Animal Feeding in Zootechnology Production, Turin  
 Study Centre for Weed Control, Padoue  
 Study Centre for Business Accounting, Bologne  
 Study Centre for Parasite Control, Bologne  
 Study Centre for the Conservation of Forage Plants, Bologne  
 Study Centre for Arboriculture Techniques, Bologne  
 Study Centre for Mountainous Woody Species Pathology, Florence  
 Study Centre for Soil Analysis, Florence  
 Study Centre for Autotrophic Micro-organisms, Florence  
 Study Centre for the Origin, Classification and Mapping of Soils, Florence  
 Study Centre for Soil Microbiology, Pise  
 Study Centre for Oleiculture, Peruge  
 Study Centre for the Chemistry of Antiparasites, Peruge  
 Study Centre for the Genetic Improvement of Forage Plants, Peruge  
 Study Centre for Industrial Horticulture, Bari  
 Study Centre for Early Maturing Vegetables in Sicily, Catane  
 Study Centre for the Genetic Improvement of Citrus Fruits, Palerme  
 Study Centre for Milk Technology, Bromatology and Microbiology, Milan  
 Study Centre for the Improvement of Pasture Productivity, Sassari  
 Study Centre for the Genetic Improvement of Forage Crops, Portici, Naples  
 Study Centre for Viruses of Mediterranean Crops, Bari  
 Study Centre for the Control of General Agricultural Plant Pathogens, Milan

**Table 8: Faculties of agriculture and veterinary medicine**

Universities	Agriculture	Veterinary	Universities	Agriculture	Veterinary
Turin	x	x	Peruge	x	x
Milan	x	x	Viterbo	x	
Padoue	x		Naples	x	x
Udine	x		Bari	x	x
Bologne	x	x	Potenza	x	
Piacenza	x		Reggio Cal.	x	
Parme		x	Catania	x	
Florence	x		Messine		x
Pise	x	x	Palerme	x	
Ascoli Pic.	x		Sassari	x	x

**Table 9: Main regional and provincial experimental institutions not included in the ERSAs (Regional Agricultural Development Bodies)**

- Institute for Experimental Zooprophyllaxy of Piemont and Ligurie, Turin
- Institute for Experimental Zooprophyllaxy in Lombardie and Emilie, Brescia
  - Ichtyology Establishent, Bresica
  - Advanced Institute for Milk and Cheese, Mantoue
- Agronomic and Forestry Experimental Unit, S. Michele All'Adige, Trentin
- Regional Centre for Agricultural Experimentation for Frioul, Venise Julie, Verone
  - Experimental Institute for Arboriculture in Verone Province, Verone
  - Experimental Zooprophyllactic Institute of Veneties, Padoue
  - Experimental Zooprophyllactic Institute of Ombrie and Marches, Peruge
  - Experimental Zooprophyllactic Institute of Latium and Toscane, Rome
    - Ichtyology Establishent, Rome
    - Experimental Zooprophyllactic Institute of Arbuzzes, Terame
  - Experimental Zooprophyllactic Institute of Mezzogiorni, Portici, Naples
    - Experimental Zooprophyllactic Institute of Pouilles, Foggia
  - Regional Centre for Experimental Agronomy, Cagliari
  - Experimental Unit for Cork Oaks, Tempo Villasor, Cagliari
    - Zootechnology and Milk and Cheese Institute, Sassari
  - Experimental Zooprophyllactic Institute of Sardaigne, Sassari
  - Experimental Zooprophyllactic Institute of Sicily, Palerme
  - Regional Institute for Flower Growing, San Remo, Imperia
  - Research Centre for Animal Production of Reggio Emilia
    - State Fishponds, American Vines, Palerme
    - Graniculture Unit, Caltagirone, Catania
  - Experimental Cave of the Region of Sicily, Milazzo, Messina
    - Experimental Cave, Noto, Siracusa

**Table 10: Other research institutions****Ministry of Agriculture and Forestry**

National Nutrition Institute, Rome  
 Central Hydrobiology Laboratory, Rome  
 Central Office for Ecology and Meteorology, Rome  
 National Institute for Agrarian Economics (INEA), Rome  
 Research Institute for the Valorization and Production of Agricultural Markets (IRVAM), Rome  
 Oenology Office, Genes  
 National Institute of Poultry Biology  
 Institute for Agrarian Technology and Publicity (ITPA), Rome

**Ministry of Industry, Commerce and Artisanal Production**

Experimental Station for the Leather Industry and Tanning Products  
 Experimental Station for Silk, Milan  
 Experimental Station for Citrus Species and Derivatives, Reggio Calabre  
 Experimental Station for Oils and Fats, Milan  
 Experimental Station for Cellulose, Paper, Natural and Synthetic Textiles, Milan  
 Experimental Station for Food Conservation, Parme

**Ministry of Foreign Affairs**

Overseas Agriculture Institute, Florence  
 Mediterranean Agronomic Institute, Bari (ICAMAS)

**National Committee for Research and Development of Nuclear Energy and Alternative Energy  
(ENEA)**

*Fonti Alternative Rinnovabili Risparmio Energetico Department (FARE)*

**Ministry of State Involvement**

Agriculture Section: Assoreni  
 Agriculture Section: Agip Petroli

**Ministry of Public Instruction**

Institute of International and Comparative Agrarian Law, Florence

**Mezzogiorno Fund**

Bonomo Research Centre, Bari

**Tableau 11: Scientific, technical and other staff working in R & D in Italy in 1984**

Research sectors	Researchers	Technicians and others	Total
<b>1. Public sector</b>			
State agencies	2,469	3,398	5,867
University	23,906	8,136	32,042
CNR	2,596	2,545	5,141
ENEA	1,152	2,153	3,305
Other bodies	219	715	934
<b>Sub-total 1</b>	<b>30,342</b>	<b>16,947</b>	<b>47,289</b>
<b>2. Private sector</b>			
ENEL	877	840	1,717
Semi-private companies	6,825	7,362	14,187
Private companies	12,717	22,306	35,023
<b>Sub-total 2</b>	<b>50,761</b>	<b>47,455</b>	<b>98,216</b>

**Table 12: Scientific, technical and other staff working in agricultural research in Italy in 1984 (\*)**

Sector	Researchers	Technicians	Others	Total
State agencies	1,261	1,162	1,485	3,908
Private companies	664	512	261	1,437
<b>Total</b>	<b>1,925</b>	<b>1,674</b>	<b>1,746</b>	<b>5,345</b>

Source : ISTAT

(\*): excluding teachers in agriculture and veterinary faculties

**Table 13: Agricultural research budget by category**

Category	%
Personnel	60
Operations	27
Equipment	13

Source : based on ISTAT data

Table 15: National agricultural research projects

**1. Ministry of Agriculture and Forestry projects according to theme****1.1. Maize and Sorghum**

- Constitution of late maize for scaferlati production, and of early maize for the second crop.
- Intercropping of summer cereals in zones that are submitted to irrigated PW.
- Alternate sorghum-maize in spring sowing.

**1.2. Wheat**

- Physiology of the production of soft-grained wheat
- Physiology of the production of hard-grained wheat

**1.3. Barley**

- New short, rain resistant genotypes.
- Resistance to diseases.
- Resistance to drought.

**1.4. Oleaginous Plants**

Sunflower, soy bean, rape, castor oil plant, safflower.

**1.5. Medicinal plants**

Crocus, Sage, Gentian, Lavender.

**1.6. Fruit and Citrus Fruit-Growing**

Early fruit growing, industrial fruit growing, citrus fruit growing (genetic improvement, *mal secco* control programs, almond.

**1.7. Vegetable Growing**

Asparagus and onion, cauliflower and other *Brassica minora* types, eggplant, sweet and hot peppers, table tomatoes, greenhouse vegetables, vegetable farming for the tinned-food industry (tomatoes, peas, beans, green beans).

**1.8. Aquaculture**

Marine aquaculture, mollusc parks, fresh water aquaculture, ecology and production of fish in aquatic environments, crayfish breeding.

**1.9. "Cattle Crossbreeding" Project**

- Fattening of crossbred males (maternal base Brown and Fresian).

- Cow calf-line (maternal base Alpine Brown).

**1.10. Fodder-Zootechnology**

- Evaluation of certain species of particular interest (broom, sainfoin, white clover, climbing clover, lupulin).
- Agronomical-zootechnical problems in beef-cattle grazing (Piedmonteses) in well-irrigated plains.
- Models of grazing enterprises for sheep and goats situated in southern of Italy.

**1.11. Seed Potatoes****1.12. Sugar Beet****1.13. Viticulture**

- Clone selection: study of high quality environment; rationalization of installations

**1.14. Wood Arboriculture****1.15. Grain Legumes**

- Broad bean, chick peas, lupin, beans, peas.

**1.16. Oil-producing Plant Cultivation**

- Table oils ; reduction of production costs.

**2. Ministry of Agriculture and Forestry Coordinated Programs****2.1. Advanced Technology**

The aims of this program are: the use of *in vitro* growing for refining the technique of gene transfer, in order to control parasites, and the possibility of extending to cereals the capacity to fix nitrogen in the roots.

**2.2. Cultivation Systems**

The objectives are:

- more rational use of the soil during the year,
- better use of solar radiation,
- introduction of new crops into the present rotation system.

**2.3. Physiology of Production**

Extension of physiological knowledge for an improved understanding of the mechanisms that regulate biomass production.

**3. IPRA Theme Project (Increase in the Productivity of Agricultural Resources)****Sub-Project 1**

Crossing the barriers that now limit agricultural productivity, using a series of studies that should lead to a greater knowledge of, and therefore a better use of, the intrinsic and extrinsic factors of animal and vegetable production.

- Structure and relations of competition in plant formations.
- Climatic and phenological factors, states of stress, and how to control them.
- Biochemistry and physiology in regulation, absorption, transfer, accumulation and differentiation processes.
- Strategies and techniques for genetic improvement of agricultural and forest plants.
- Biological fixing of nitrogen.
- Interaction of plants with other organisms.
- Models of the dynamics of parasite populations in epidemiological environments.
- Physiology and physiopathology of zootechnical production.
- Genetic improvement of animals in zootechnical production.
- Biological bases of breeding and production technology.
- Gastro-intestinal microbiology of monogastric and polygastric animals.
- Physiological, genetic and ecological problems in the breeding of aquatic species.

**Sub-Project 2**

Increase in the knowledge of agricultural and forestry systems, by interdisciplinary exploration of the various components, including work problems and quality of life as well as the relationship between agriculture and industry.

- Quantitative model of the agricultural-forestry mono-system.
- Sub-systems in marginal zones.
- Integration and competition of urban systems with agriculture for use of the soil resources.
- Knowledge-innovation resource: effects of the modification of agricultural systems.

**Sub-Project 3**

Innovative technology to improve the final availability of agricultural products thanks to conservation, transformation, nutritional evaluation, job security, distribution of agricultural products and impact on food consumption and nutrition.

- Demand for foodstuffs and their nutritional use.
- Conditioning, conservation and transformation of agricultural products.
- Biotechnological processes for the food sector.

**Financing: 5.9 billion**

OU 547 from the University, CNR, MAF, public and private organizations.

**4. CNR "Energetica 2" Project According to theme**

As a whole the project concerns the industrial sector, but one of the sub-projects is devoted to the study of biomass and agriculture.

**5. CNR Working Group****5.1 Research party on irrigation (GRUS)**

Using collegial methodology, this working party is studying (in various farming environments in the North, the Centre and the South), irrigation needs of the most important crops and comparing the different methods of irrigation.

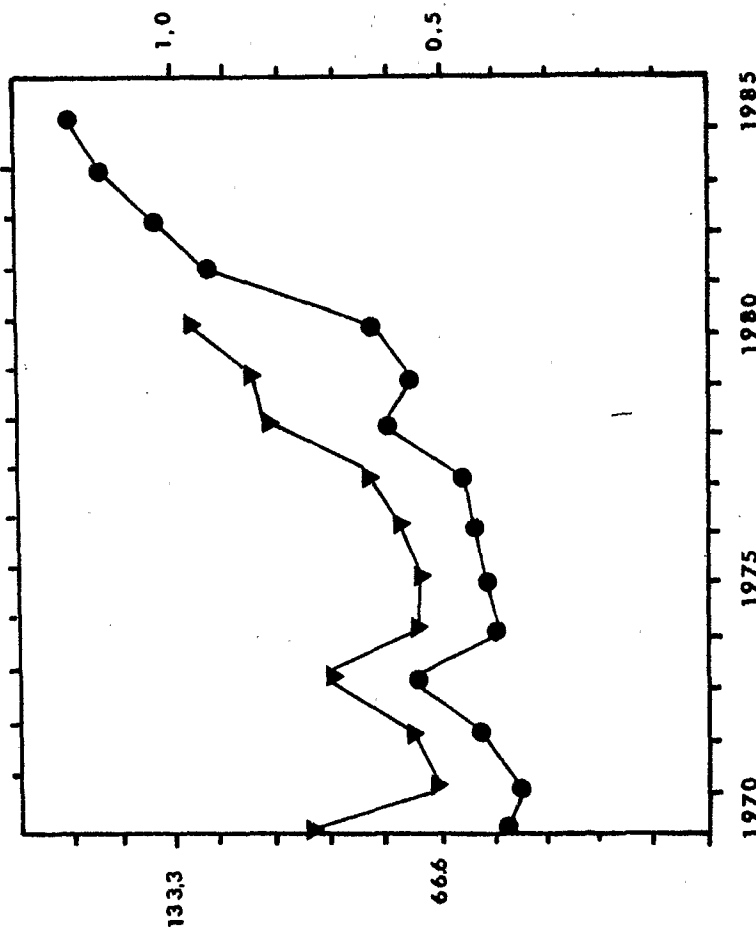
**5.2. Safeguard of genetic fruit trees resources**

The task of this working group is to make an inventory of, describe and collect the germoplasma existing in Italy for the following species:

Citrus fruits, apricot trees, cherry trees, almond trees, apple trees, pear trees, olive trees, plum trees and vines.

Figure 1: Public resources for agricultural research in Italy from 1970 - 1984

Source: GALANTE (E.), SALA (C.), 1986

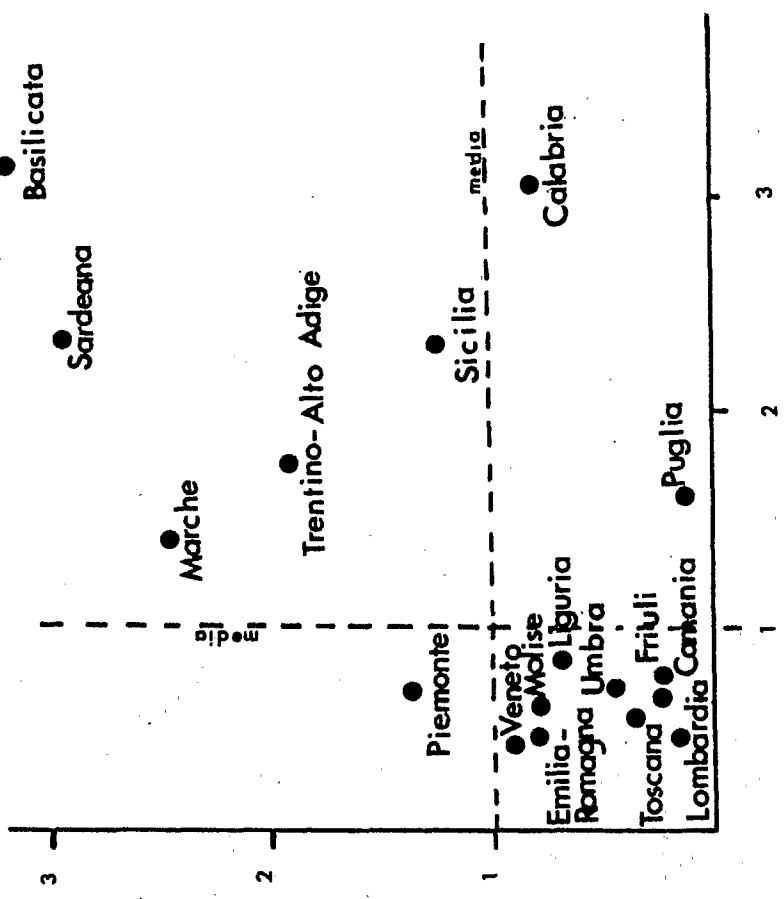


Public budget for agronomic research/agricultural budget

Public budget for agronomic research (million Ecus)

Figure 3: Relative importance of agricultural research according to GDP of agriculture in 1982

Source: GALANTE (E.), SALA (C.), 1986

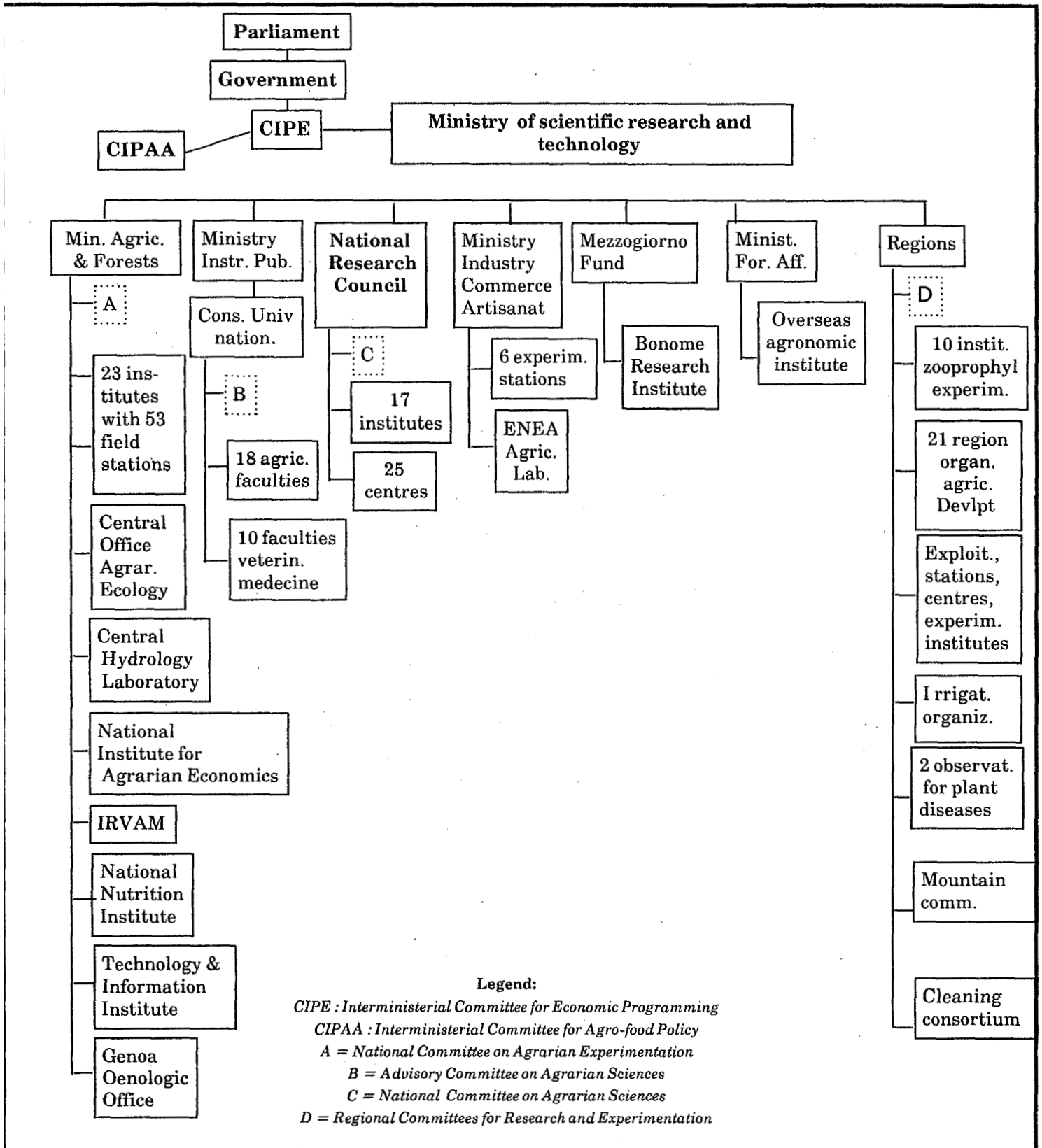


abscissa: agricultural research in million ECUS

ordinate: agriculture GDP



Figure 2: Organizational chart of agricultural research in Italy



Map: Geographic distribution of public research institutions in Italy



- Experimental Institute of the Ministry of Agriculture and Forests
- Agronomic and Veterinarian Faculty
- Institutes and centres of the National Research Council
- ▲ Main regional and national experimentation institutions