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AGRICULTURAL PRODUCTION ZONING. HISTORICAL AND CURRENT ISSUES

AUREL LUP¹

Abstract: *This paper brings back to the specialized research circuit, as well as to the political decision makers' attention the zoning work of agricultural production by counties, namely over the period 1980-1985-1990. The author considers it the most important research work carried out by the Institute of Agricultural Economics within the Academy of Agricultural and Forestry Sciences. In the paper are established, according to the territorial profile at the county level, the following: the area of agricultural land by uses, the quality of the land expressed by the natural bonitation grades, their enhancement taking into account the qualitative evolution of the production technologies, the assurance of the main factors of production, but especially the realization in stages of land reclamation works. The following are also established: the geographical space of each crop or species of animals, the average yields per hectare and per head of livestock. The synthesis consists of a number of 20 macro zones hierarchized according to importance: national, county, specialized areas. The paper includes numerous tables and maps. It is similar to works from almost every country in the world. It is drawn up in agreement with the political decision makers, being an event which seems unique in the economic history of Romania.*

Key-words: *agriculture, zoning, macro zone, land reclamation*

JEL Classification: *Q15; Q16; Q18*

INTRODUCTION

As a research topic, the zoning of agricultural production is always current, due to a complex series of natural and human factors, the latter having an increasing influence. From a historical point of view, the spatial distribution of agricultural production was a natural one, determined by the set of environmental factors, which allowed the cultivation of certain species of plants and the breeding of animals in certain regions. The competition for satisfying the human need for food - quantitative and qualitative - and not least the productivity and the cost of obtaining some products had an important role in the territorial redistribution of agricultural production. In the last two centuries, for example, the more productive, cheaper and more consumable maize has largely replaced millet and buckwheat.

In modern times, the development of scientific research in the field, the technical and technological progress, the increase in the speed of transport of the products and the proportional reduction of the cost, the improvement of the storage technologies have greatly influenced the territorial zoning of the agricultural production in which the economic and social factors, the market, largely decide the spatial distribution of agricultural production, both globally and within national economies. The present paper is a case in which the political decision through the program *territorial self-provisioning* (2) canceled significant research efforts materialized in massive investments.

In the countries of the former Soviet bloc - including Romania - sophisticated economic-mathematical models were elaborated with the aim of optimizing the territorial distribution of agricultural production, taking into account a multitude of technical and economic factors and coefficients, more or less controllable (Gavriliev, Kravenco, Popov 1968, 1969, 1970). As for France, we mention the works elaborated by Klatzman (1968), Tirel (1969), Frigola (1972). In the United States, Brokken and Headz (1968) developed models for the simultaneous zoning of plant and animal production (3).

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MATERIAL AND METHOD

Stages, coordination, guidance, executions. Precursors: Ion Ionescu de la Brad, C.Murgoci, Popovici-Lupe.

During the socialist agriculture period:

- I. Central Commission for Agricultural Production Zoning, MA, 1961-1964.
- II. After the completion of collectivization (1962) the work is resumed under the new circumstances.
- III. Coordination and Synthesis Study IEA, 1976.

Phases:

- deepening the study and extending the period until 1990;
- trainings: topographic specialists, researchers from experimental stations, county commissions, methodological guides, programmers, etc.

Coordination:

- Angelo Miculescu, Minister of MAIA; Nicolae Giosan, president of ASAS, the presidents of the County Agricultural Directorates.
- B. Burlacu, S. Hartia, D. Teaci, secretariat.

Methodological guides, authors of linear programming models at central and county level. At the top level S. Hartia. At county level: a number of 40 people, of which 31 researchers from ICEA and 9 from universities and agronomic institutes (Constanța and Tulcea counties, A. Lup).

Working hypotheses

A certain evolution of the number of tractors and the quantity of chemical fertilizers:

	1972	1980	Proposals		
			V ₁	V ₂	V ₃
Number of tractors thousand units	115	126	175	185	200
Chemical fertilizers (thousand tonnes)	639	3033	3100	3965	4850

This working hypothesis was not fulfilled. In 1990, in Romania's agriculture only 152 thousand tractors were operating, and the quantity of chemical fertilizers benefited by the Romanian agriculture was only 1159 thousand tonnes, respectively 23.9% compared to the forecast (6). Even though Romania had the necessary production capacities, both for the production of tractors and for chemical fertilizers, the main destination was the export.

Relying on the ambitious figures released by the plenaries and congresses of the Romanian Communist Party, a certain evolution of the land reclamation works was considered, depending on which production levels per hectare were predicted in increasing variants:

Variant 1. An irrigated area of 2750 thousand ha.

Variant 2. An irrigated area of 3700 thousand ha.

Variant 3. An irrigated area of over 5000 thousand ha, and the quantity of fertilizers.

Variant 4. An irrigated area of over 5000 thousand ha, and the quantity of chemical fertilizers provided would be about 4850 thousand tonnes.

Variant 5. The irrigated area of over 5000 thousand ha and all land reclamation works would be carried out (draining, drainage, soil erosion control, etc.), the amount of chemical fertilizers would be about 5500-6000 thousand tonnes, and the number of tractors would be about 200-240 thousand physical units.

I would like to mention here that at the end of 1989, there were 151.745 tractors in Romania's agriculture, 33.463 fewer units than in 1986, when their number was 185.208. In fact, considering the statistical system of the time nobody will ever know the real figure. What few people know, and those who know neglect the fact that according to a *downward provision* in the last years of the totalitarian communist regime, scrapping worn-out equipment was forbidden. Even so, the statistics of the time would acknowledge the reduction in the number of tractors in recent years: 184.850 in 1987, 165.072 in 1988 and 151.745 in 1989 (6). For the last variant, the great master of the zoning work, Sergiu Hartia also suggested other research achievements such as:

- high productivity plant varieties and hybrids;

- the functional exploitation of the entire complex of land reclamation and agropedo-ameliorative works (improvement of soil reaction, sandy lands);
- the appropriate training and qualification of the agricultural workers;
- an efficient management system (5).

At the research level, all these conditions were met by their transposition into the great agricultural production never achieved both due to the inability of the economy to provide works, substances in sufficient quantities and corresponding quality and to the intervention of the political factor as *decision-maker*.

Foundation of the technical and economic parameters of the zoning activity. In the previous paragraph I mentioned that the parameters that the zoning work would propose for the three periods of time (1980, 1985 and 1990) were conditioned by the provision of levels of endowment and supply with inputs of industrial origin. In parallel, the setting of the operating parameters of the zoning was dependent on the accomplishment of works in stages, that had to significantly correct the parameters of the natural environment: drought, excess humidity, erosion. To this end, the specialists in the field were appealed to, first of all for the bonitation works that synthesized the zoning of the parameters of the natural framework and those resulting from land reclamation works in particular. Their parameters materialized in areas functionally set up in stages (established only in 1983) were assumed to be achieved, i.e. 5500 thousand ha arranged for irrigation (26.8% set up in 1975), 5530 thousand ha drained (35.6% arranged in 1975) and 5300 thousand ha anti-erosion facilities (18.5% set up in 1975). In these conditions, the qualitative bonitation of the soils at the county level was operated establishing at this level the natural and the intensified grade (the latter considering that the arrangements will be made until 1990, the last zoning period (table 1). Maps that described the conditions of the natural environment (the climatic ones in figure 1) were used in determining the intensified bonitation notes.

Table 1

Natural and intensified notes in some counties for the main cultures and country mean

County	Wheat		Maize		Sunflower		Soy		Sugar beet		Potato	
	Nat.	Int.	Nat.	Int.	Nat.	Int.	Nat.	Int.	Nat.	Int.	Nat.	Int.
Alba	30	58	21	48	22	47	27	57	20	47	21	47
Brăila	55	68	60	92	59	78	51	78	54	86	47	68
Constanța	47	74	47	97	47	74	41	84	42	86	36	75
Dolj	48	71	49	83	50	73	46	80	43	74	38	68
Ialomița	59	84	61	112	63	94	57	103	58	107	50	93
Mureș	40	63	25	41	23	33	31	51	45	65	31	51
Teleorman	59	84	57	93	59	82	57	84	54	85	47	74
Timiș	53	77	49	86	59	82	44	63	54	85	40	68
Tulcea	44	67	40	75	41	63	40	75	37	69	32	59
<i>Country mean</i>	47	72	42	74	42	64	41	72	41	73	38	68

Source: (5)

Table 2

Production - kg - land judging point depending on plant technology evolution

Culture	1978	1990	2000
Wheat	60-70	90	100
Maize	80-90	110	130
Sunflower	30-35	40	50
Potato	450-550	600	700
Sugarbeet	500-600	700	800

Source: (4).

The data regarding the evolution of the technological development were provided by pedologists and technologists, so that based on them the values of the bonitation point intensified for different cultures were designed (table 3).

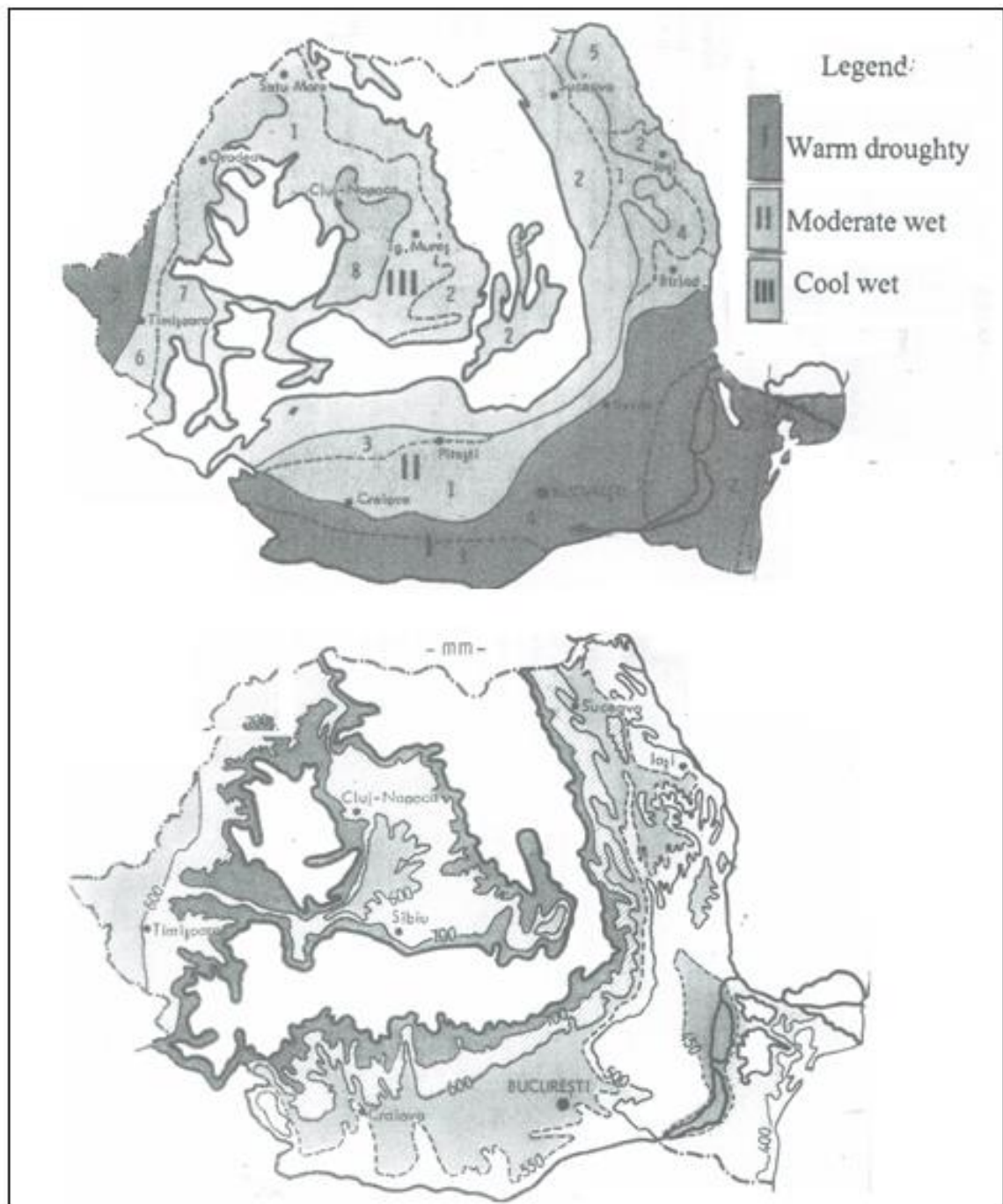
Considering that over time the cultivation technologies will be improved (more efficient biological material, more fertilizers and pesticides, more equipment and more efficient, more competent management) the value in production increase of the bonitation point will also increase (table 2).

Table 3

Production - kg – and land judging point established for level of five variants yields on hectar

Culture	Variants				
	1	2	3	4	5
Wheat	45	50	52	55	60
Maize	60	75	80	90	100
Sunflower	34	36	37	45	50
Sugarbeet	500	600	700	800	900

Source: (5)



Source: (1)

Figure 1. Agroclimatic zones of Romania (above) and territorial distribution of the rainfall (below)

Based on these data established for each county, average productions per counties were proposed for all crops (for wheat, maize and a few counties in table 4).

Table 4
Wheat and maize yields by variants proposed in any (some) representative counties

County	Wheat					Maize				
	V ₁	V ₂	V ₃	V ₄	V ₅	V ₁	V ₂	V ₃	V ₄	V ₅
Alba	2610	2900	3016	3190	3480	2880	3600	3840	4320	4800
Brăila	3060	3400	3536	3740	4080	5520	6900	7360	8280	9200
Constanța	3330	3700	3848	4070	4440	5820	7275	7760	8730	9700
Dolj	3195	3550	3692	3905	4260	4980	6225	6640	7470	8300
Ialomița	3780	4200	4368	4620	5040	6720	8400	8960	10080	11200
Mureș	2835	3150	3276	3465	3780	2460	3075	3280	3690	4100
Teleorman	3780	4200	4370	4620	5040	5500	6975	7440	8370	9300
Tulcea	3015	3350	3484	3685	4020	4500	5625	6000	6750	7500
Total country	3240	3600	3744	3960	4320	4440	5550	5920	6660	7400

Source: (5)

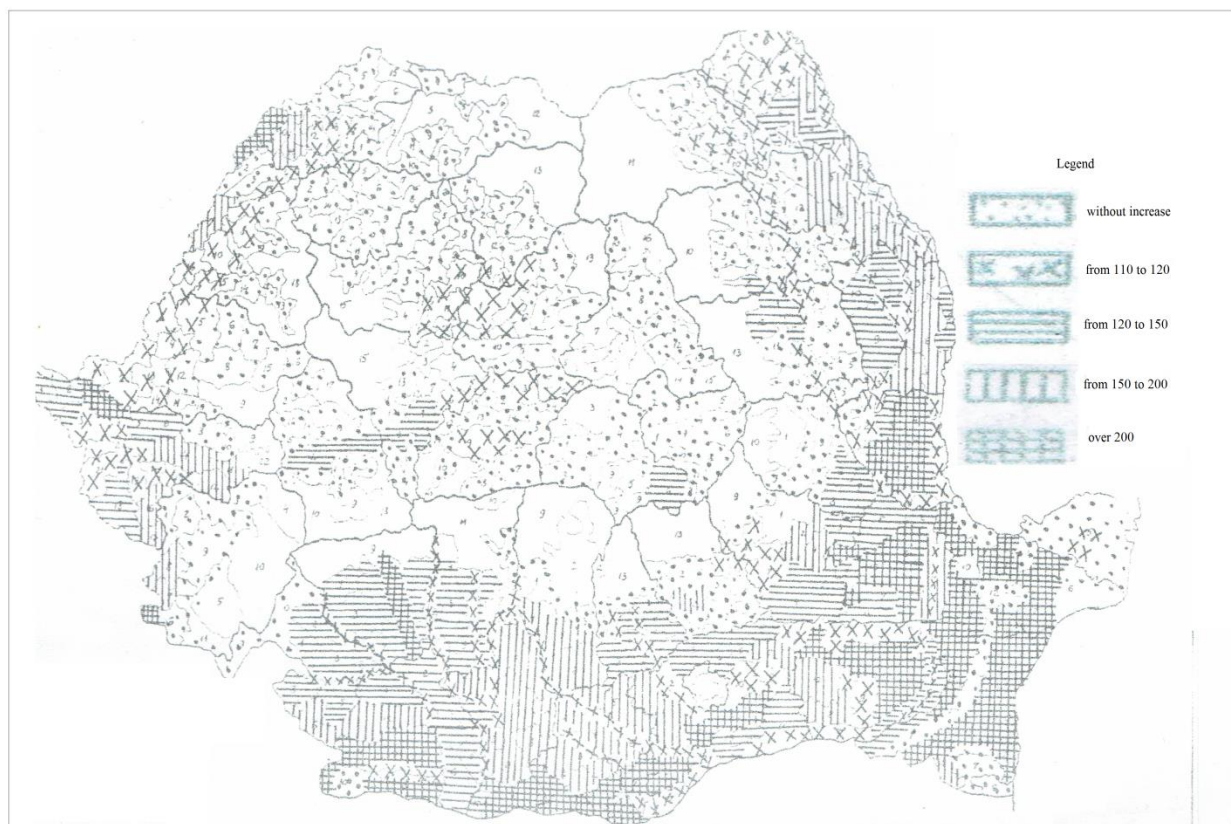
We only mention at country level the five variants of average productions in sunflower and sugar beet crops.

Sunflower (kg / ha): V₁ – 2176; V₂ – 2304; V₃ – 2368; V₄ – 2880; V₅ – 3200.

Sugar beet (kg / ha): V₁ – 40150; V₂ – 47450; – ; V₃ – 52100; V₄ – 58400; V₅ – 65700.

We should mention that the sugar beet was only planned for the cooperative sector and only in 1989 it was cultivated by the state agricultural enterprises.

At the same time, according to the data provided by pedologists and geographers, maps were drawn up in which it is mentioned - depending on the area - the possible increase obtained through irrigation, drainage or soil erosion control (figures 2-3).



Source: (5)

Figure 2. Territorial effect of irrigation. From without increase to over 200



Source: (5)

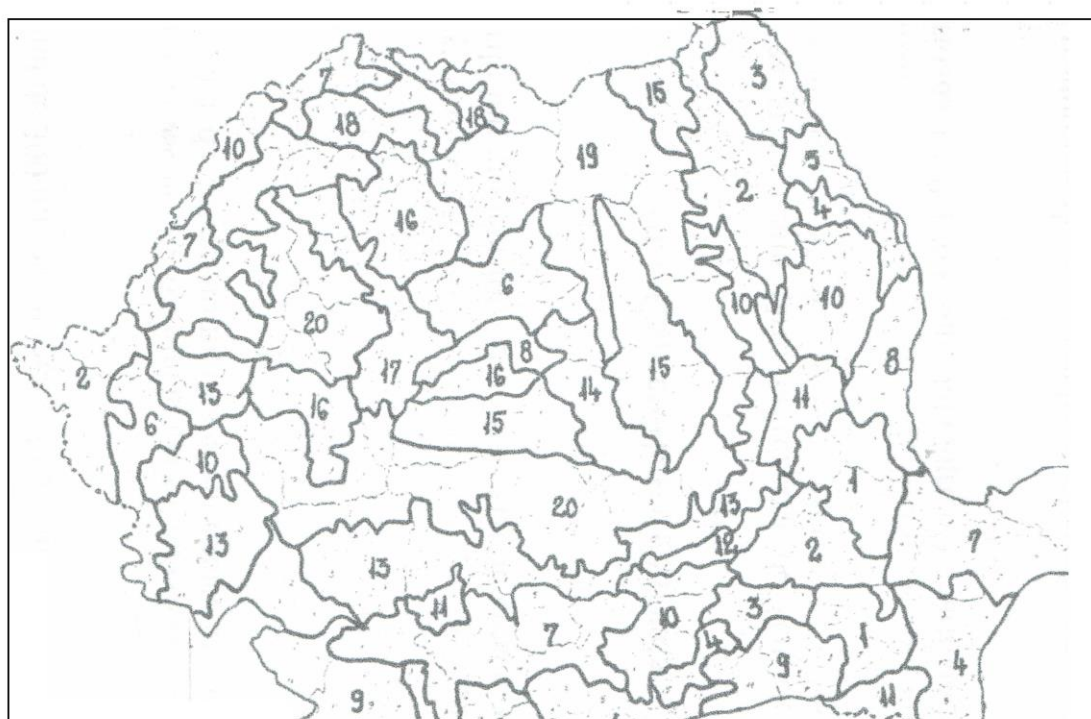
Figure 3. Territorial effect of the dewatering (above) and of the fighting erosion from without to over 200

Ever since the time of the zoning paper elaboration, the authors had doubts regarding the achievement of the proposed productions in variants, both at country level and in some counties, for some cultures decreasing average productions being proposed (table 5).

Table 5
County and county yields proposed for some cultures

Cultures	Some		Country	Counties					
				Alba	Brăila	Constanța	Ialomița	Teleorman	Tulcea
Wheat	1980		3310	2700	4190	4160	4240	3510	3370
	1990	V ₁	3540	2770	4460	3850	4690	4360	4000
		V ₂	3710	3000	4450	4400	4500	4500	4200
Maize	1980		4260	3030	6190	6240	6320	4720	4970
	1990	V ₁	5330	3530	6750	6190	7190	6860	5700
		V ₂	5770	3100	6800	6600	7300	7200	6100
Sunflower	1980		2200	-	2500	2520	2580	2260	2150
	1990	V ₁	2460	-	2460	2330	2690	2580	2360
		V ₂	2380	-	2450	2350	2600	2550	2350
Sugarbeet	1980		40000	36000	44900	45000	45000	42000	44800
	1990	V ₁	41430	35250	46800	41200	47420	39700	-
		V ₂	44120	38000	46800	52500	52500	48000	-
Potat	1980		18800	17600	17900	17600	16000	16300	16400
	1990	V ₁	23250	17620	26380	24000	23000	26700	25000
		V ₂	23110	17400	26100	22150	26300	23800	22780

Source: (5)



Source: (5)

Figure 4. The map of the complex zones at country level

Finally, a number of 20 complex areas (figure 4) were set up, in which the complex profile (the list of areas) of plant, animal or mixed products is presented in order of importance for the respective area. For example, 14: milk, potatoes, wheat.

Table of complex zones at country level

1. Meat, milk, maize, sugar beet, sunflower	11. Vines, meat
2. Meat, milk, maize, sugar beet	12. Vines, milk, meat
3. Meat, milk, maize, sugar beet, sunflower	13. Trees, meat, wheat
4. Meat, milk, maize, vegetables	14. Milk, potatoes, wheat
5. Meat, maize, sunflower	15. Milk, potatoes, wheat, flax, tow
6. Meat, maize, sugar beet	16. Milk, wheat
7. Meat, maize	17. Wheat, milk
8. Meat, maize, vines	18. Wheat, milk, trees
9. Meat, maize, soy	19. Meat, milk, wool, potatoes
10. Milk, meat	20. Meat, milk, wool

CONCLUSIONS

The author considers that the work of agricultural production zoning by counties is by far the most important work of the Institute of Agricultural Economics ASAS (the only specialized one at that time).

Being carried out under political command (recorded in the directives of the XI congress of the Romanian Communist Party) and coordinated at the highest political level (deputy prime minister) and scientifically (by the president of the Academy of Agricultural and Forestry Sciences), it collects and processes data of all the agricultural research in the country, it uses the most advanced working methodologies and calculation techniques of that time.

Of the 40 economic-mathematical models, 31 were prepared by researchers of the Institute of Agricultural Economics, and 9 by academics of the Agronomic Institutes and ASE (Academy of Economic Sciences).

It was for the first time that the results of research in the field from all over the country were gathered and processed with the most advanced computing equipment and it seems to be the only time when the research side and the political one, through the representatives of the state at all levels, were in agreement.

The forecasts advanced through the zoning work were realistic and achievable if the fertilizers and tractors exported were at the service of the Romanian agriculture, if land reclamation (about \$ 50 billion) corresponded qualitatively and were properly exploited.

Unfortunately, only 5 years later in October 1981, the same supreme leadership would cancel the zoning results: *Decree of the State Council on territorial self-provision* according to which each administrative unit was obliged to produce its entire assortment of products for self-consumption, in addition to export quotas.

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