HUNGARY

AGRICULTURE AND THE ENVIRONMENT

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SECTION ONE

AGRICULTURAL OVERVIEW

Background to the Sector

Critical to the Hungarian economy, agriculture contributes 20.4 percent (1989) to the GDP. Agriculture and food processing accounts for about 30 percent of national production, 24 percent of exports, and an even larger percentage of hard currency exports. The Hungarian agricultural industry is considered to be the most advanced in Eastern and Central Europe.

Relative to the rest of Europe, Hungary is well-endowed with fertile, flat lying land. About 70 percent of the country, 6.5 m ha, is good agricultural land. Of this, 73 percent is cropland (4.7 m ha), 20 percent pasture or meadows, and the remainder is in gardens and permanent crops (fruits and vineyards).

State farms (136) and cooperatives (1246) possess 87 percent of the land; small-scale private producers own 12 percent of the land. These individuals account for nearly 37 percent of the gross agricultural production, mainly fruits, vegetables, and viticulture.

Principal crops and yields are shown in Table 1. Data are for 1989.

Table 1 Hungary: Principal Crops and Yields (1989)

	Area (m ha)	Yield (kg/ha)
Wheat	1.339	5240
Maize	1.084	6220
Sunflowers	0.355	1970
Vegetables	0.339	
Barley	0.282	4690
Pulses	0.195	
Grapes	0.140	
Sugar Beets	0.120	43800
Fruits	0.094	
Potatoes	0.044	18530

Yields are high by world standards. Hungary is self-sufficient and a net exporter of most small grains[1], maize, meat products, vegetables, fruits, wine, and potatoes.

Agricultural output has been achieved through reliance on large scale production units, mechanization, and heavy use of chemical inputs. Of obvious concern to the environment is the potential for excess applications of agricultural inputs. Details on use of inputs is contained in the next section of this report.

Agricultural Inputs

Fertilizers

Fertilizer usage in 1990 dramatically declined from levels used during the 1980s. Beginning in the early 1970s, Hungary greatly increased consumption and sales of fertilizers to levels commensurate with other Eastern European planned economies. (See Tables 2 and 3). In the period 1980-89, combined NPK levels averaged 219 kg/ha based on a total agricultural area of 6.525 m ha, or 273 kg/ha based on a "likely-fertilized" area of 5.29 m ha. In 1990, combined NPK dropped to 103 kg/ha or 47 percent of 1980-89 levels (Figures 1 to 4). The drastic reduction was due to:

- price increases of about 50 percent for fertilizer formulations;
- removal of 30 percent subsidies on fertilizer price;
- difficulties in marketing surplus agricultural production;
- uncertainties from proposed privatization of land which has led the State to cut back on use of inputs by State farms and cooperatives.

Until 1989, fertilizer and pesticide inputs were subsidized at 30 percent of cost. Subsidies was reduced to zero over the last two years. Hungary is self-sufficient and an exporter of nitrogenous fertilizers. The country imports all raw materials used for production of phosphatic fertilizers, and, until 1990, imported large quantities of phosphatic and potash fertilizers.

Fertilizer requirements are shown in Table 4. The analysis reveals that:

- between 1975 and 1989, additions of nitrogenous (N) and potash (K) fertilizers were about 10 percent short of crop

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[1] Rice is an exception, although it is grown in Hungary even at latitude 48° N which is at the northern extreme for successful cultivation of the crop.

requirements.[2]

- between 1975 and 1989, additions of phosphatic (P) fertilizers were about 45 percent in excess of crop requirements.
- additions of N, P, and K in 1990 were severely deficient when compared to crop needs.

During the past 15 years, fertilizer applications in Hungary have not been excessive and have roughly tallied with crop requirements. At the same time, fertilizer applications may still have contributed to environmental problems. Some forms of N and K are mobile. Unless N and K fertilizer sources are carefully managed, N and K can easily move into ground and surface waters. Although overall use of N and K fertilizers was somewhat deficient between 1975 and 1989, use on some farms may have exceeded crop requirements and may have contributed to a pollution problem. Moreover, since application timing and placement of fertilizers is rarely perfect, some N and K likely has been leached beyond crop root zones and into ground and surface waters.

Most forms of P are not mobile and tend to be fixed in the soil. Thus, inorganic P is not likely to be a major source of environmental contamination even if applied at rates somewhat in excess of crop needs. Obviously, farmers can reduce applications and benefit economically from their decision to use less P.

Improved fertilizer management techniques should consist of:

- split applications of N and K fertilizers in an attempt to properly time applications to crop needs;
- reduce application rates of P fertilizers from levels used during the 1980s;
- give special attention to sandy areas such as the Danube-Tisza interfluve where sophisticated fertilizer management will be required to avoid water pollution.

With 1990 fertilizer application rates reduced by a factor of two, the concern is that crop yields will be negatively impacted unless adequate nutrients are provided. The immediate impact may not become apparent particularly if there is some residual carry-over of these elements. However, over the longer term there must be adequate crop nutrition if agricultural production is to be maintained at traditional levels.

Pesticides

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[2] This conclusion differs from that reported in Hungary, Environmental Issues, Draft, IBRD, Number 9337-HU, November 1990, p 61.

Hungary has a large, state-owned pesticide manufacturing industry. Beginning in 1983, exports of agrochemicals exceeded imports by 7000 to 15,000 mt per year. Presently, some emphasis is also being paid to biotechnology and to manufacture and use of biological control agents.

The agrochemical industry has point-source impact upon the environment. One can note chemical odors, dead trees near chemical factories, and discharge of contaminated factory wastes to streams and to the ground water. Concerns have also been raised about non-point-source problems related to heavy use of pesticides by agriculture. However, pesticide contamination is not widely evident in Hungarian soils, surface or groundwaters, or in agricultural products sold to consumers.[:] The fact that pesticide residues are not commonly found may be because pesticide detection is difficult given the wide array of products and their decomposition to other forms, and the problems associated with sophisticated techniques required for detection of minute concentrations.

Although Hungary uses more pesticides than other countries in Europe (Table 5), there are indications that chemical pesticide use peaked in the early 1980s (Table 6). The sense is that removal of input subsidies, cost increases, and environmental awareness have all combined to slacken demand.

[:] The report entitled "The Quality of Waters, 1989" published by the Ministry for Environment and Regional Development makes no mention of pesticides detected in waters. Citing, Fekete, 1988, the 2nd Draft of "The Environmental Impacts of Agriculture in Hungary, by I. Fesus, et. al. states that pesticide levels in soils and plant materials are far less than limit values set for health protection (p 28).

Table 2 Hungary: Fertilizer Consumption/Sales, 1960-89

	(1000s of mt)				(kg/ha)*
	Nitrogen	P_2O_5	K_2O	N + P + K	N + P + K
1960	75	66	27	168	23
1970	391	217	229	837	122
1975	536	429	553	1518	224
1980	537	390	472	1399	211
1981	563	399	524	1484	225
1982	647	392	490	1528	232
1983	625	410	551	1586	241
1984	626	431	467	1524	233
1985	558	336	444	1338	205
1986	593	355	435	1383	212
1987	614	332	426	1373	210
1988	646	322	449	1418	217
1989	617	283	402	1302	196
1990	358	127	187	672	103

Sources:
1960-75: State of the Hungarian Environment, Hungarian Academy of Sciences, 1990.
1980-86: Statisztikai Havi Kozlemenyek, COMECON Yearbook.
1987-88: Statistical Pocket Book of Hungary, Hungarian Central Statistical Office, Budapest, 1990.
1989: Fesus, I, et. al., The Environmental Impacts of Agriculture in Hungary, in draft, 1990.
1990: Ministry of Agriculture, Budapest

* Based on an area of 6.525 m ha which is the total agricultural area including meadows and pastures. If we assume that meadows and pastures do not receive applications of purchased fertilizers, the net area receiving fertilizers is approximately 5.29 m ha and per hectare applications shown in the table should be increased by 23 percent.

Table 3 Fertilizer Applications in Selected Countries

Country	Average Applications N + P + K kg/ha
Netherlands	770
Belgium	530
East Germany	428
Czechoslovakia	330
France	310
Poland	250
Denmark	245
HUNGARY	219 (average 1980-89)
Bulgaria	170-200
Romania	130

Source: IBRD, Bulgaria: Introduction to the Agricultural Sector, 1990. Unless indicated, data are for 1986.

Table 4 Hungary: Fertilizer Requirements

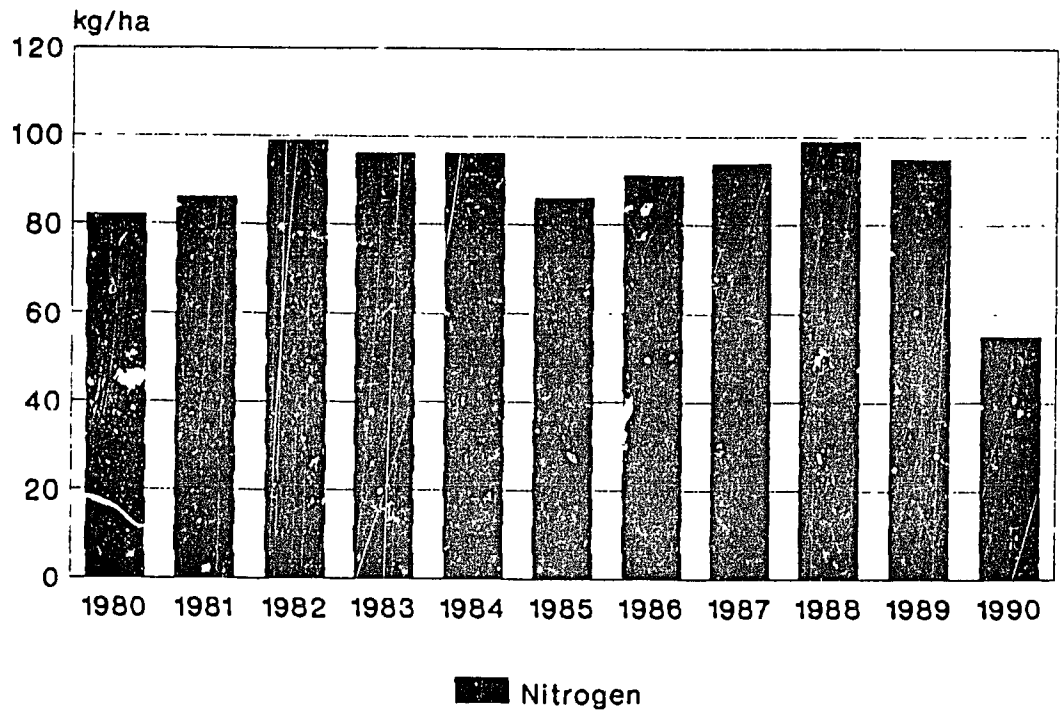
Crop	%[4]	Est. Nutrient Removal kg/ha[5]			Calculated Needs (kg/ha) (% x Removal)		
		N	P_2O_5	K_2O	N	P_2O_5	K_2O
Sm Grains	38	70	30	60	27	11	23
Maize	25	200	80	160	50	20	40
Sunflower	15	100	20	25	15	3	3
Vegetable	8	200	80	160	16	6	13
Pulses	5	-	30	40	-	2	2
Grapes	3	200	80	160	6	2	5
Su Beets	3	150	60	200	4	2	6
Fruits	2	200	80	160	4	2	3
Potatoes	1	115	45	200	1	-	2
	100				123	48	97
Calculated Nutrient Needs					123	48	97
Fertilizer Usage 1975-89[6]					113	70	90
Fertilizer Usage 1990					68	24	35

[4] Percentage crop distribution based on 1989 cropped area. Source: Statistical Pocket Book of Hungary, 1989. Central Statistical Office, Budapest, 1990.

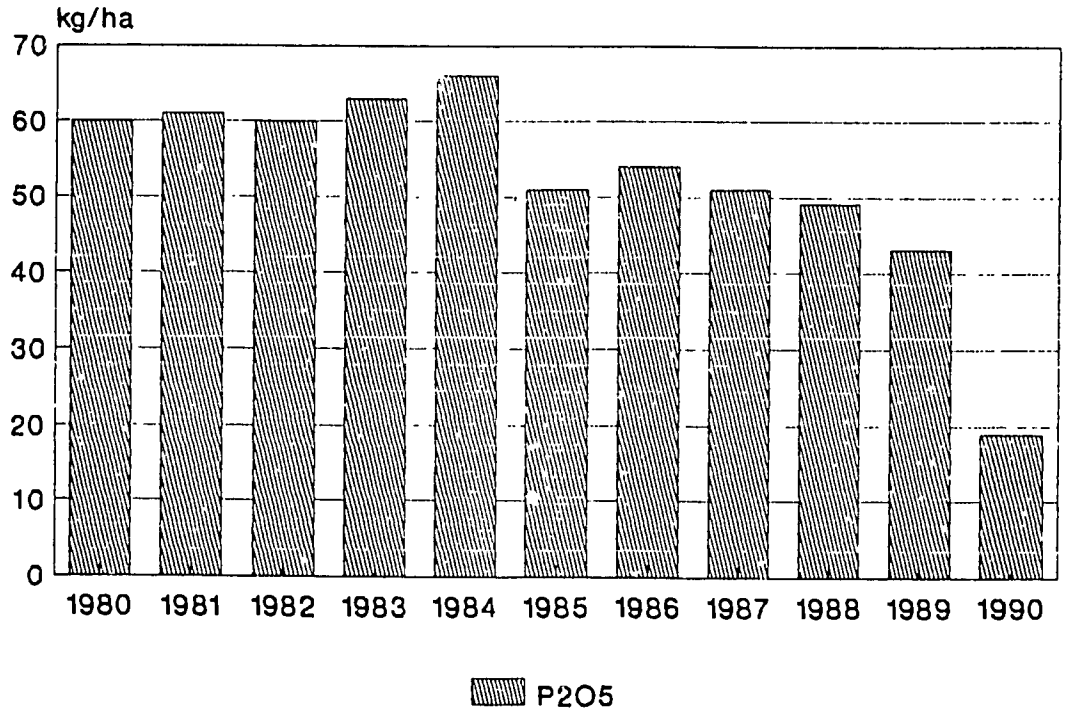
[5] (1) ILACO, Agricultural Compendium, Elsevier Scientific Publishing Company, N.Y., 1981, p 531.
(2) Sunflower Science and Technology, J.F. Carter ed., Agronomy Monograph Series # 19, ASA, Madison Wisconsin, 1978, p 119.

[6] Based on 5.285 m ha that received fertilizers.

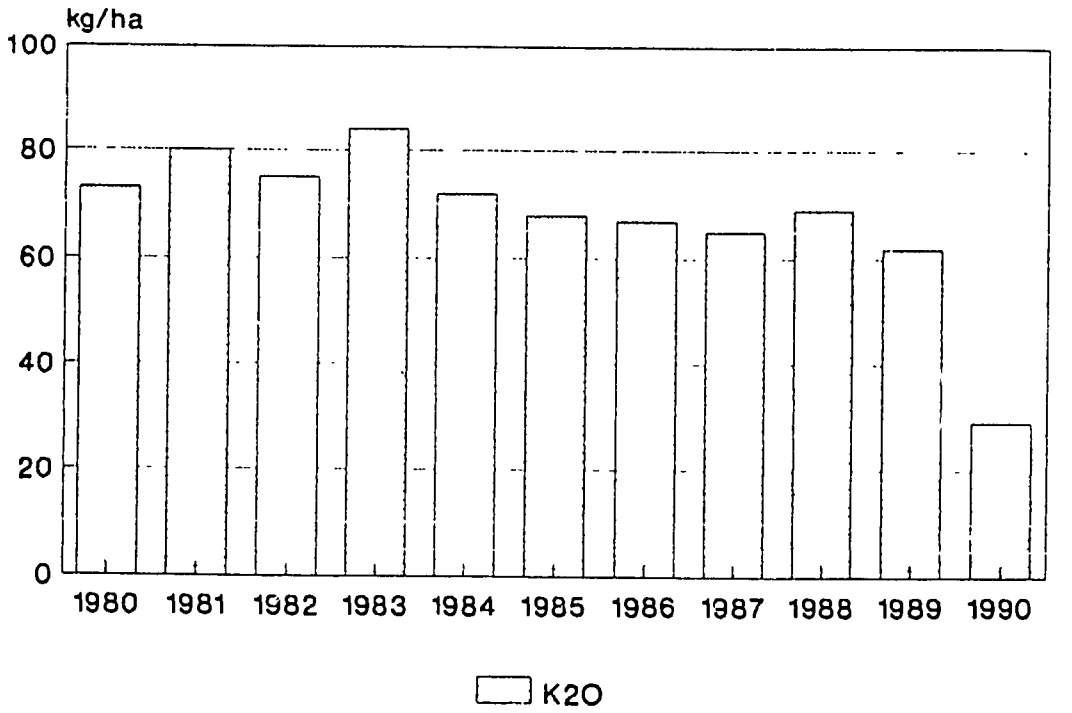
Hungary: Nitrogen Applications



Hungary: Phosphorus Application



Hungary: Potassium Applications



Hungary: NPK Applications

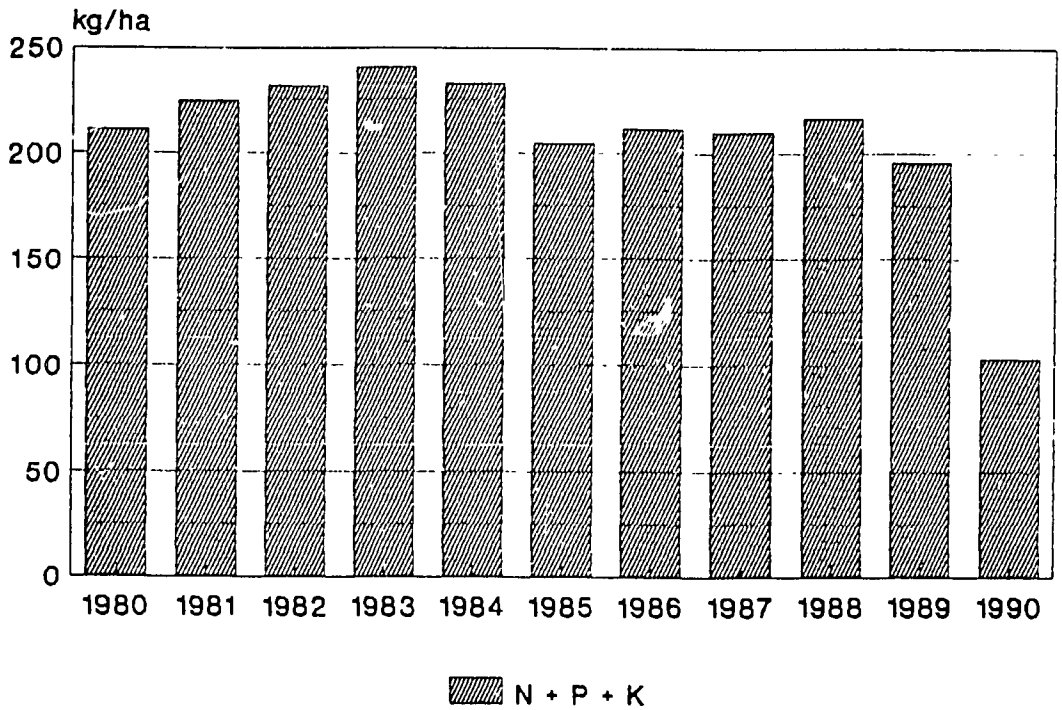


Table 5 Use of Pesticides in Selected Countries

Country	Average Application of Pesticides kg/ha
HUNGARY	7.8
EC Countries	6.5
Bulgaria	3.4
Poland	1.6

Table 6 Hungary: Use of Pesticides, 1970-89

Year	Active Ingredients: Herbicides	Fungicides	Insecticides	Total (1000 mt)	kg/ha
1970	4.7	10.4	3.1	18.6	2.85
1975	12.5	13.7	3.1	30.8	4.72
1980	13.7	15.0	3.2	33.7	5.16
1989	12.6	12.8	3.4	30.0	4.69
1990	16.5	7.2	2.9	26.6	4.11

Sources:
1970-80: Hungarian Exporter, April 1984.
1989-90: Ministry of Agriculture, Budapest

Nitrokemia Industrial Works. Data are for 1989 and cover pesticide formulations and not active ingredients.

IBRD, An Agricultural Strategy for Poland, Report of the Polish, EC, IBRD Task Force, 1990, p288.

Based on average pesticide imports of 23,400 (1982-88) and an agricultural area of 6.8 million ha.

IBRD, An Agricultural Strategy for Poland, Report of the Polish, EC, IBRD Task Force, 1990, p 288.

Irrigation and Water Resources[12]

Extent and Importance - Irrigation can serve approximately 300,000 ha or about four percent of Hungary's cultivated area. The area actually irrigated varies from one year to the next because, even in the drier Eastern areas of the Central Plains, irrigation is a supplemental activity used to augment summer rains. The current irrigable area is down from a peak irrigated area of more than 400,000 ha in 1979. Reasons for irrigation's decline in importance are not completely clear, though costs appear to be a significant factor. Hand-move sprinkler systems and pumps installed during the 1960s have exceeded their useful lives and many have not been replaced. At the same time there have been modest increases in the areas irrigated with drip and automated sprinkler systems.

Irrigable (1979)	412,000 ha
Irrigable (1987)	292,000 ha

Water Sources - Some 85-90 percent of the water comes from 55 river intakes which tap the Danube or Tisza Rivers or their tributaries. Ten to fifteen (10-15) percent comes from sub-surface water. An estimated 360 million cubic meters are used for irrigation each year. VITUKI (the Research Centre for Water Resource Development located in Budapest) has records of sub-surface water overdrafting. Exploitation of sub-surface water is on the increase and water tables in the Danube-Tisza inter-fluve have gradually lowered over the past 20 years. The situation bears continual monitoring.

Water Quality - There are no reports of water quality being an impediment to water use for irrigation.

Water Application Methods - Approximately 75 percent of the area is irrigated using sprinkler irrigation methods, 18 percent using gravity methods, and six percent is irrigated using drip or other high technology forms of irrigation.

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[12] Sources of Information about Irrigation in Hungary:

(1) Ministry of Agriculture, Budapest.
(2) Research Institute for Irrigation, 5541 Szarvas, Szabadsag u.2.
(3) Szilard, G., Irrigation in Hungary, Agrokemia es Talajtan, Vol 38, No. 3-4, 1989, pp 685-690.

Irrigation Methods (by percent of area)		
Permanent Set Sprinkler	31	
Moveable Sprinkler	44	
Sub-Total Sprinkler		75%
Gravity		18
Drip, Micro-spray		6
Other		1

Energy Consumption - Sprinkler irrigation requires pressurization (approximately 40 meters) which is an energy consumer. Modest pump lifts may be required at some of the river intakes. Energy is also required to access groundwater. However, in general, Hungary has low flat-lying terrain and energy needs for irrigation are not considered excessive.

Irrigation Service Fees - Irrigation service fees are variable depending on local conditions, particularly, pumping requirements. Fees cover operations and maintenance (O&M) costs incurred by 12 regional water authorities. Fees ranged from 300-8000 HUF/1000 m^3 ($5-132/Ac-ft), which are high in comparison to most countries. The indication is that O&M costs are fully met by the fees. The consultant did not discuss financial transactions regarding fee payment. However, it may be surmised that fees are book transfers paid by state farms or cooperatives in return for receiving water. Once farms are privatized, we may find that individuals will be unable to pay full water costs. If this occurs, irrigation systems will be shut down unless the Government is willing to help subsidize a portion of O&M costs.

Subsidy on Irrigation Capital Costs - Hungary has a 40 percent subsidy on purchase of irrigation equipment and supplies, for example sprinkler equipment. If irrigation is perceived as contributing to environmental problems, for example, drainage, salinity, over-exploitation of groundwater, or use of energy, why should the sub-sector be subsidized? If the country finds itself with a surplus of agricultural commodities, the same question can be raised. However, if agricultural produce is sold at prices which are controlled so as to keep urban food costs low, or if agricultural produce is sold to garner hard currency through international trade, there may be good reason to subsidize irrigation capital costs and possibly a portion of irrigation service fees.

River Training and Impact on Wetlands - River training (channelization) for flood control and navigation has reduced wetlands and the extent of gallery forests. There is interest from conservation-oriented individuals to protect existing forests, to help protect bio-diversity, and to restore wetlands.

Impact of Privatization - Land privatization plans will engender a series of water privatization issues. While new ownership makes land divisible, the irrigation infrastructure is not as easily divisible. How will irrigation water deliveries be maintained to small individual farms? How can deliveries be coordinated so that existing main and secondary irrigation facilities still can be used to deliver water to small farm units? There will be a requirement to foster establishment of non-governmental mechanisms, or institutions such as irrigation districts, to equitably allocate, price, and deliver (operate and maintain systems) water amongst competing agricultural users. USBR experience in the Columbia Basin is one model for the type of transfer of responsibility which can be envisaged.

Also of concern to the irrigation sub-sector is a need to scale down the size of on-farm irrigation systems. Like most farm equipment, irrigation equipment is too large to be used successfully on small farms. Hungary will need to scale-down the size of irrigation equipment, eg. pumps, and sprinklers. The 40 percent subsidy given for purchase of irrigation equipment could be restricted to purchase of small-scale equipment or to enable small-scale farmers to access small surface supplies or groundwater.

Forestry

Forests occupy about 1.7 million ha, or 18 percent of the area of the country. Over the last 40 years, the area planted to forests has increased by 0.5 million ha. Forest lands are mainly controlled by state forest enterprises (68%) or agricultural cooperatives (22%). Under plans for agricultural privatization, state forest lands will remain public. However, the timber trade, - afforestation, management, cutting, transport, and marketing, - will be privately controlled.

Forest area is classified for timber production (81%), for preservation (15%), and for recreation (4%).

Growing stock, dominantly in hardwoods (85%) is estimated at 288 million m^3 (1990). The volume of standing timber has increased by about 1.5 percent per annum over the past 20 years (Figure 5).

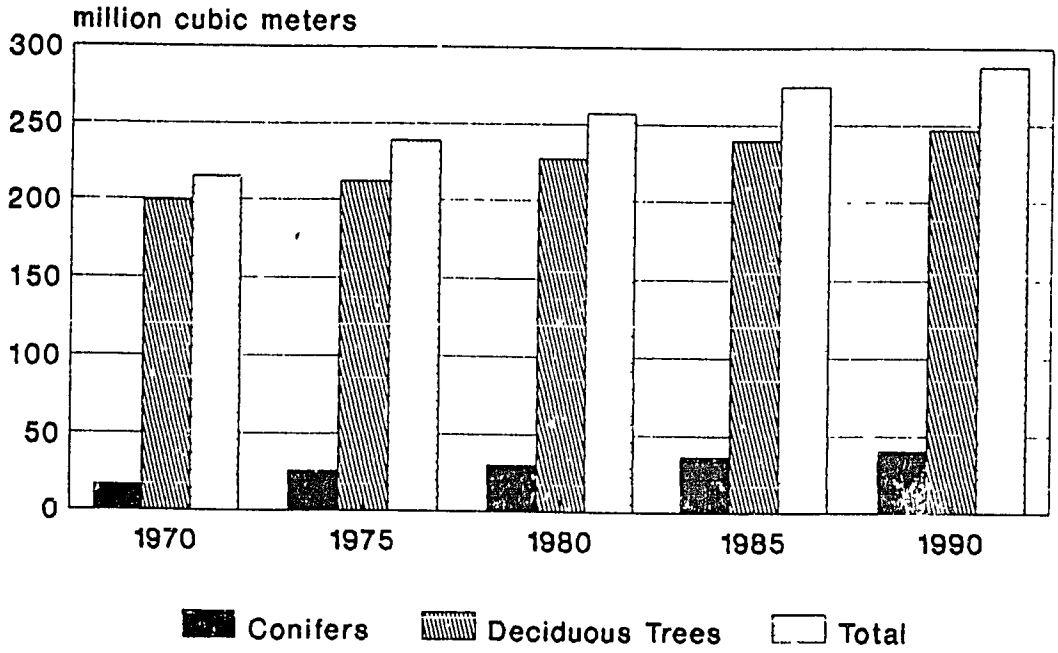
Hungary has been an exporter of timber to the West but an importer from the Eastern bloc. The country is a net importer of wood pulp and paper from both the West and the East.

Principal issues associated with the forestry sub-sector are

these:

- All Hungarian forests are planted, even those in areas designated as national parks. Having planted the forests, the Ministry of Agriculture seeks to maintain control and to manage the forest resource. The Ministry of Environment seeks to maintain forest areas in national parks as fully protected areas without intervention.
- There are some forested areas planted on sandy lands between the Tisza and Danube rivers. Forests draw water from sub-surface waters which are declining. The impact of declining water tables on forest health is not known, nor is the reverse known: the impact of water demands by forest upon sub-surface water resources.
- There is a very limited amount of "gallery" forests along certain reaches of the eastern rivers. Most such forests have been harvested or destroyed. Protection is suggested for preservation of various wildlife species associated with the mature forests.

Hungary
Conifers and Deciduous Forests



Volume of Standing Timber

SECTION TWO

HUNGARIAN GOVERNMENT PRIORITIES IN AGRICULTURE AND THE ENVIRONMENT

Meetings with Government officials revealed interest in five main environmental concerns related to agriculture.

1. Point Source Pollution: Liquid Waste Disposal from Feedlots

The Ministry of Agriculture indicates that liquid waste disposal from point sources, in particular, pig feedlots, is the number one environmental problem originating with agriculture. Conversant with technical solutions, the problem is to obtain the financial means to implement the technologies. Under privatization, feedlots are to be sold. Options for polluting feedlots are: (1) not to privatize and to close down the feedlots; (2) sell feedlots at reduced prices with the requirement that the buyer invest in pollution control mechanisms. Another agricultural point source pollution problem is the treatment and disposal of effluent from the food industry. The Ministry is also concerned about techniques for sludge treatment, disposal, and use.

2. Non-Point Source Pollution (NPS): Agricultural Chemical Impacts upon Surface and Groundwater

Surface and groundwater contamination from agro-chemicals (fertilizers and pesticides) is believed to be high. However, there is a lack of published data about agriculturally-derived NPS in Hungary. Among the issues/unknowns to be addressed by proposed research are: (a) the severity of the NPS problem; (b) NPS trends with time; and (c) the relative importance of point source versus NPS contamination.

Three Ministries and the Hungarian Academy of Science share interest in the problem:

- The Ministry of Environmental Protection and Regional Policy and the Ministry of Agriculture are interested in linking (1) agricultural practices, and (2) the vulnerability of environmentally sensitive areas (ESAs) and regions of high natural value, to policy instruments (regulations, taxes, credits, and prices) which can be used as mechanisms to moderate the problems.
- The Ministry of Transport, Communication and Water Management (MTCWM) is interested in systems which safeguard potable water supply (groundwater).

- The Ministry of Agriculture is interested in reducing the sector's reliance on intensive use of inputs.
- The Academy of Science has proposed research to assess the impact of agricultural decisions on natural resources. The work would be undertaken with the Water Resources Research Center (VITUKI) which is part of the MTCWM.

That four groups will work on problems related to NPS pollution indicates that practices and policies regarding use of agro-chemicals is a widespread concern. That the four groups are coordinating efforts to work together is a very positive approach. Local research efforts could be supported by a program of increased interchange with US agencies/institutions working on similar problems. NPS pollution is likely endemic to the region. The topic will be addressed through a regional workshop.

3. Agricultural Systems to Reduce use of Agro-Chemicals

Agricultural strategy over the past 20 years has emphasized intensive use of inputs of agricultural chemicals to obtain high yields and to boost production. Hungary is now faced with agricultural surpluses and the loss of traditional agricultural markets. The future strategy will be to privatize land holdings and to promote product quality. The GOH has reduced price subsidies on NPK and has eliminated the subsidy on pesticides resulting in decreased use of these inputs. Caught in a price squeeze, farmers will seek to maintain production levels while reducing inputs. Assistance is needed regarding environmentally-friendly technologies which use fewer inputs (eg. Low Input Sustainable Agricultural {LISA} systems). The Ministry will initiate actions to raise public and scientific concerns about environmental impacts of intensive use of agro-chemicals. Strategies used in other countries to increase awareness of the problem will be welcome.

4. Mechanisms to Address Problems of Over-exploitation of Groundwater between the Danube and the Tisza Rivers

On April 17, Parliament instructed Government agencies (the Academy of Science, the Ministry of Agriculture and the Ministry of Environment) to prepare plans to eliminate environmental problems of the Central Hungarian plains. Thirty-five (35) percent of Hungary's irrigated area is in this region. Groundwater is a source of supply. Irrigation plus several years of drought have combined to result in a steady lowering of the water table between the Danube and Tisza Rivers. The GOH must deal with provision of potable water supply, permitting of wells, control of pumping-hours, water pricing, and urban/industrial-

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For example, the deep water table in the vicinity of Kecskemet has fallen steadily from 20 m to 23 m over 12 years.

agricultural competition for water supply which directly influence the over-exploitation issue. A problem related to the groundwater decline is that forests planted in the area and surviving on water from the water table will be endangered if the water table is further lowered. Within the plain, the inter-fluvial area between the Danube and Tisza is dominated by very sandy soils which are particularly vulnerable to contamination from over-use of chemicals, feedlot wastes, and municipal sewage effluent.

5. Land Set-aside Planning to Protect Vulnerable/Sensitive Areas

Vulnerable or environmentally sensitive areas can include:

- sandy soils where agricultural inputs must be managed with care to avoid contamination of groundwater;
- watershed areas which are recharge headlands for aquifers;
- steep lands which are erosion prone;
- habitat areas such as wetlands adjacent to rivers which are used by birds and wild game and which could be protected as pockets of biodiversity.

Within the framework of privatization, the GOH can elect to zone vulnerable/sensitive areas and, instead of privatizing these areas, the GOH might set-aside or retire lands from agricultural uses. Not only would these lands be protected, but such a policy might also help reduce production surpluses. Privatization plans offer a timely window of opportunity, not to be missed, to achieve these dual objectives. The GOH would appreciate assistance as to policies and procedures followed by the USA under similar circumstances.

SECTION THREE

INITIATIVES FOR FUTURE US SUPPORT TO THE HUNGARIAN AGRICULTURAL SECTOR

Hungary's agricultural sector faces a period of rapid change. Most agricultural lands will be privatized and the Government's role in agricultural production sharply reduced. Traditional (CMEA) markets for Hungary's crop and livestock products are largely shut down and the country is faced with significant agricultural surpluses. Over the past twelve months, agricultural input prices have increased by 50 percent and subsidies for agricultural chemicals have been phased out.

The US Government is seeking ways to support institutions and individuals, public, private, and non-governmental, that can assist Hungary to restructure its agriculture to continue to achieve economic gains and to make environmental improvements. Our Government has made a decision to assist Hungary and other emerging democracies in Central and Eastern Europe. If the US chooses to channel support to the Hungarian agricultural sector, there emerge three candidate categories for assistance:

- Agriculture and the Environment;
- Commodity Marketing;
- Privatization Impacts.

Agriculture and the Environment

Hungarian agriculture has been strongly and singularly focussed on production goals. Agricultural leaders are well aware that the country has been out-of-step with decision-making based on market economics, and that past policies and actions have resulted in negative impacts upon land and water resources in the country. "The Government's Agricultural Policy and Program", published in July 1991, charts a new course for the sector. The document states that the "new agricultural policy must integrate production objectives ... with protection of natural resources". Among specific environmental objectives are reduced use of chemical inputs, decreased energy input, limited waste production, and increased reliance on environmentally-friendly chemicals and methods.

Hungary seeks to promote environmentally-sound agricultural practices which enhance the country's natural comparative advantage in agricultural production. The country would benefit from increased scientific exchange and the exchange of information. Assistance from the US Government should be

directed to strengthening the capacity of GOH institutions and individuals and their ability to deal with environmental problems. Assistance should include support for: data collection and publication; technical assistance, research, and training.

In general, the approach of the US Government should be to invest in preventive solutions to problems associated with agriculture and the environment, rather than to be called upon to help resolve problems once they occur.

Commodity Marketing

In the recent past, most of Hungary's export trade has been through barter arrangements with the Soviet Union and Eastern European trading partners. That trade has been disrupted because of recent events in the region. Currently, Hungary has agricultural surpluses. Although large by internal standards, surpluses are relatively small when compared to agricultural commodities in world trade.

Hungary should have little problem disposing of surpluses. The problem could be dealt with by seeking new trading partners, and by returning to market economics and through use of information systems as the bases for trade orientation. Long-experienced with international marketing of agricultural surpluses, the US experience can be very valuable to Hungary.

Privatization Impacts

Hungary is moving toward privatization of agricultural lands. "Approximately 70-80 percent of arable land and 35-40 percent of forests may become private property".[1] The Government intends to keep 20 of the 136 state farms and to retain a major share of another 20 units. The remainder of the state farms and cooperatives will be sold or turned over to shareholders. The policy and program document goes on to forecast "that land use and land ownership will be separate". The implication is that many production units will continue to be farmed as large units but under private ownership.

Government policies will support private sector initiatives. Privatization also requires re-definition of Government roles and institutions. These are examples:

- The Government is positioning itself to transition from its traditional (1950s-1990) role of command and control of production with little or no regard for natural resource protection, to a new role in which the Government has little

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[1] "The Government's Agricultural Policy and Program", The Ministry of Agriculture, Budapest, July 1991, p 9.

or no role in production but a large role in making rules and enforcing these with respect to stewardship of natural resources. The Ministry for Environment and Regional Development is being strengthened. What should be the role of Government with respect to setting and enforcing rules pertaining to resource stewardship?

- Under the command and control system, State farms and cooperatives employed technically trained agriculturalists to guide production. When farms are privatized, who will be responsible for information exchange (agricultural extension) and how will information be transmitted to individual growers? This has been a traditional role for Government and Land Grant Universities in the USA.
- Irrigation water distribution by Government agencies is effective because deliveries are made to large farm units. With privatization, the GOH will find it impossible to meet distinct needs of thousands of individual farmers. In the Western United States we have non-public irrigation agencies that distribute the water. Hungary may have to form similar institutions.

These are examples where US experience, - the EPA, the USDA and Land Grant Universities, the USBR and water districts, respectively, can be useful to Hungary.

Suggestions for Future US Support to the Hungarian Agricultural Sector

Specific suggestions for future US Government support to the Hungarian agricultural sector can be grouped into categories by level of projected spending.

Low Cost

1. Provide information on topics of interest to the Hungarian agricultural and environmental communities. These topics were mentioned as being of immediate interest:

   - pesticide registration procedures;
   - use of sludge;
   - waste handling procedures from animal feedlots.

2. Provide subscriptions to periodicals dealing with agriculture and natural resource management. For example, USDA/ARS' "Agricultural Research", the University of California's "California Agriculture", Agricultural Engineering, the New Farm (Regenerative Agriculture), focus on practical research applications concerned with agriculture and the environment. Magazines could usefully be sent to the Ministry, the agricultural universities and technical schools, and to the

research institutes. This is another way of helping the agricultural community re-focus on english as the communication medium of choice.

Modest Cost (less than $500,000/yr)

1. Conduct training courses/workshops/visits. Sponsor attendance by Hungarian scientists/officials at conferences in the region. Support visits by Hungarian officials to see facilities in the USA.

Both the USDA and the National Academy of Sciences have regional workshops on the Eastern Europe agenda:

- NPS pollution and impacts on soils and water supplies;
- Use of LISA strategies (IPM, varieties, timing of chemical applications);
- Monitoring soil loss.

For US agencies working in Eastern Europe, there is something of an understanding that the USDA should be working in development and the National Academy in research. In practice the understanding is not followed. The coordinating local agency for the USDA-sponsored IPM workshop in Budapest in September, is the Hungarian Academy of Sciences, a research organization. Research workers from the various Eastern European National Academies are the invitees, and not development specialists, - government officials or crop protection specialists. USDA is establishing their program in Eastern Europe through contacts in the research community.

The National Academy has targeted the same audience. It will sponsor a LISA workshop in Sofia in October. Invitees are researchers from Eastern European National Academies. Many of the Europeans are on both USDA and National Academy lists. The program materials are apt to be similar too since IPM will be covered as a sub-set of LISA. Yet, there is no coordination between the USDA and the National Academy sponsored workshops.

2. Establish a small funding window to enable Hungary to access short-term technical assistance. For example, early in 1991, the US Government provided assistance to a neighboring country to help resolve a problem of Arsenic contamination in waters used for rice production. Workshops will likely suggest other specific needs concerned with agriculture and the environment, Assistance to help establish extension services also would be welcome.

The Ministry seeks additional training/technical assistance in:

- pesticide registration;
- techniques for control of effluent from feedlots;

- detection of chemical residues in agricultural products;
- systems to monitor soil/land use changes with time. The Ministry of Agriculture in collaboration with the Ministry of Environment have created an expert group to make recommendations for a joint monitoring system for land and water resources. The envisaged system calls for a central data bank or MIS which would publish information about environmental concerns related to the agricultural, natural resources, and other sectors. US support to strengthen an MIS capability would be useful to the country.
- economic evaluation of environmental damages and economic means to finance improvements which are environmentally-friendly. Both the Ministry of Transportation, Communications, and Water Management and the Ministry of Agriculture stated that they seek additional understanding about economic methods to calculate the degree of degradation and the trade-offs which can be suggested as solutions.

A portion of the technical assistance should go to private agribusiness concerns, including the food processing industry, to help resolve environmental problems associated with agro-industry, and to make the sector's products more competitive in international markets.

Through the Hungarian Enterprise Fund, a US not-for-profit organization, loan funds can be provided for commercially viable agribusinesses. These might be used, for example, to clean up waste discharge from a business which was recently privatized.

3. Agribusiness marketing support. A visit by a specialist from the USDA with expertise in export-oriented commodity marketing could pave the way for a regional workshop to deal with marketing. Or, the US Government might invite some Hungarians to participate as ex-officio members of USDA trade delegations to other countries.

4. Give assistance to the Ministry to complete the draft (1990) report to the IUCN: "The Environmental Impacts of Agriculture in Hungary". The report was prepared, in part, to access support for training from external donors. The could be very useful as a state-of-the-environment report. The current draft would benefit from updating, completion (the portion on institutions and policies has not been written), and general editorial assistance.

A Program ($1,000,000 to 1,500,000/yr)

1. Provide funding for research. Hungary's agricultural sector

depends upon three premier universities[2] and nine research institutes[3]. Providing ideas and often leadership for the sector, these institutions can initiate changes to emphasize the connection between agriculture and the environment. In the current period of economic transition, all are faced with severe budget shortfalls. Increased interaction with US institutions and access to a modest amount of research funds targeted to applied ag-environmental problems will pay dividends. If students can be used in the research, a new generation of environmentally-sensitive agriculturalists can be trained.

There are existing competitive programs which deal with agriculture and environment. A portion of US support for research should be reserved for award to Hungarian teams or teams of Hungarian and US researchers with proposals designed to resolve environmental problems in the agricultural sector. Ministry staff should prepare a list of suitable topics and should organize visits to discuss topics with students and staff at the universities.

The research agenda to be supported should be broadened to include topics in farm management, economics and marketing, and public administration (privatization). Private enterprise should be invited to enter into competition for research support. For example, industry could help develop energy efficient small-scale equipment for small farms: pickups, tillage equipment, irrigation equipment.

2. Fund joint research/development/technology transfer initiatives in Hungary, the USA, or possibly another country. The Binational Agricultural Research and Development (BARD) fund is a model. Under BARD, Israeli and American researchers collaborate on basic research projects which have commercial applications. Under BARD, costs of the program are shared with each country contributing to maintain an endowment which generates $7-8 million per year in project support. An endowment

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[2] (1) Godolloi Agrartudomanyi Egyetem, 2100 Godollo, Pater K.u.1, Dr. Koosis Karoly, Rector. (2) Debreceni Agrartudomanyi Egyetem, 4001 Debrecen, Boszormenyi u. 138, Dr. Kozma Andras, Rector. (3) PANNON Agrartudomanyi Egyetem, 8260 Keszthely, Deak F.u.16, Dr. Horn Peter, Rector.

[3] (1) Biotechnology, Godollo. (2) Food Research Institute, Budapest. (3) Cereals/Plant Breeding, Szeged. (4) Aquaculture, Szarvas. (5) Forestry, Budapest. (6) Animal Breeding and Nutrition, Herceghalom. (7) Agricultural Economics, Budapest. (8) Irrigation, Szarvas. (9) Machinery/Agricultural Engineering, Godollo. (10) Geodesy, Cartography, and Remote Sensing, Budapest. (11) Vegetables, Kecskemet. (12) Fruits and Ornamentals, Budapest.

could be created through earmarking a portion of agricultural commodity sales (PL 480) for this purpose. Hungary too has surplus agricultural products and a portion of the sales from these might be used to match US funding.

3. Establish a LISA program with one of the universities or research institutes to be carried out on cooperating private farms. This could be used as one model or as a springboard to establish an agricultural extension capability for private farmers. If a Hungarian university agrees to engage in such work, the US might provide funding for a twinning relationship with a US university.

Program Coordination

It would be useful to designate one US agency as the overall lead group for technical assistance to Europe and the Soviet Union. Presently, many US Government agencies are involved, among these, AID, the EPA, the National Academy of Science, and USDA. To date, the necessary coordination between agencies is not strong.