LITHUANIA:

COUNTRY REPORT TO THE FAO INTERNATIONAL TECHNICAL CONFERENCE ON PLANT GENETIC RESOURCES

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Note by FAO

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CHAPTER 1
Introduction to Lithuania and Its Agricultural Sector

Lithuania's relief was formed by all three glacial epochs, and the last glacier met its end in the territory of our country. As a result you can find a large diversity of relief, soil, nature and even climate in the small area which is Lithuania (65,300 sq. km.).

The country's western quarter is bounded by the Baltic sea. Regardless of the rather long coast line, which extends for 99 km, the sea climate does not prevail here. The variations in the climate inside Lithuania are influenced by three strong air flows fighting among themselves. The first of these is caused by the Gulf stream, the second comes from the north, and the third from the continent. It is not unusual to us that at the same time the temperature can be +3 +5 C° in the western part of the country while in the eastern regions it is as much as 10-20 C° below freezing point. There are especially marked contrasts in climate in summer, when at same time some districts suffer from heavy rains while in other parts of the territory plants become yellow from drought. The average of the precipitation is 630 mm per year. However, it can fluctuate between 500 to 800 mm in different parts of the country. Meteorologists say that Lithuania is located not only in the centre of the Europe (a fact determined by the calculations of the French National Geography Institute), but also at the crossroads of cyclones. The diversity of the soil and climate has also caused a large diversity of the flora. In Lithuania you can meet in the same places plants that are typical of northern tundra and others typical of western Ukraina.

The population of Lithuania is almost four million. Over thirty per cent this population is rural, and plays an important role in our economy. As our land is poor in useful materials for excavation, vegetation is the main asset. Almost 70 per cent of the territory is used agriculturally, nearly 30 per cent for forestry, and 1.5 per cent of Lithuania is covered by water.

For many years agriculture was more oriented towards animal husbandry and dairy production. Until 1990 more than half of our meat and milk produce was exported. Nowadays trade links with Eastern countries are much weaker, and we have been forced to pay more attention to the technical crops such as flax, rape, sugar beet and potato, and also to horticultural crops. Lithuanian agricultural production has been always very dependent on export, thus it is difficult to foresee what crops will be prevailing at the turn of the century.

However, it is obvious that fodder production will have to remain the main trend in our agriculture. This trend will be conditioned by our climate and by the lack of fertile soil, which entails the use of a lot of manure. More than 5 per cent of the cultivated land will have to be occupied by pastures and meadows, 40-45 per cent by cereals and pulses, and 5-10 per cent by technical and horticultural crops.

The size of farms has been changing tremendously because of the varying political situation over the last fifty years. Until 1948 small farms (10-15 ha) prevailed. During the soviet period large farms were created (1,000-10,000 ha). After 1991 compulsory and centralized distruction of big farms was carried out by a new government. As a result a lot of weak subsistence farms were created, often smaller than five hectares in size. The consequence of that reform are very painful, but it is clear that the future belongs to the bigger farms with acreages of several hundred or even thousands hectares. The tendency to increase farm acreage is already being felt.

In spite of the genuine desire to develop the local agricultural machinery industry it is obvious that in the future we also will have to rely on imported machines. From this point of view foreign companies will have a great influence on the evolution of our agriculture.

Until 1989 we had a well organized seed industry, one of the most advanced in the former Soviet Union. Seed production farms were able to satisfy not only local needs (every five years all the seed stocks of country farms were renewed), but also to export seed to other republics. However, this system of seed production was also ruined by the reforms, and now we are doing our best to develop a new one.

Plant breeding has a long-established tradition in Lithuania. The first breeding station was founded in 1922. Later, it became leading breeding centre for the western republics of the Soviet Union. Almost all the varieties that were grown in Lithuania, were developed by our own plant breeders. Lithuanian varieties were also popular in the other republics of the Soviet Union. Sometimes western varieties were approved here too, especially from Sweden and Finland. However, rather often the imported varieties were more susceptible to diseases and other adverse factors than local varieties. For example, the Swedish spring wheat "Arkas", and the very popular spring barley "Roland" have a high yielding capacity and farmers like them, but their disease resistance is lower than that of our own varieties. Disease invasions rarely results in more than 15 per cent damage to the yield. Only potato frequently sustains significant destruction due to virus or *phytophtora*. The highest damage to the crops is usually caused by drought. Because of the drought in 1992 and 1994, the yield of all crops was half the normal level.

Plant breeders deal with many adverse factors, as all of them do more or less damage. They agree that without a high diversity of genetic resources, their work will can not be fruitful.

CHAPTER 2
Indigenous Plant Genetic Resources

Specific climatic and variability of soil have led to the existence of a large flora diversity in Lithuania. But until now its value has not been properly appreciated. Natural habitats are poorly explored. Plant breeders hardly use indigenous PGR in their breeding programmes. However, it is known that there are many wild relatives of important pasture, medical, horticultural and energy plants in the country (see Appendix 1).

Most of the useful plant species and germplasm resources are still underused. There is a limitless variability in *Oxycoccus spp., Vaccinium spp., Salix spp.,* etc. But rather often the natural habitats of these species are distributed over a narrow range and can be found only within the area of a few forest blocks. Work should be carried out to elaborate specific rules for the legal protection of such areas at state level.

Another question, which concerns medicinal plants is the development of a reliable background for the legalization of a special kind of protected area where useful plants could be used commercially and conserved at the same time. The experience of foreign would be highly appreciated in this case.

An especially high diversity of pasture plants exists in Lithuania. Many different their types grown in the flood meadows near the biggest rivers (the Nemunas, the Nëris, the Nevëys, the Minija, etc.) and the meadows near the smaller rivers are also worthy of attention. Several decades ago a few expeditions were organized by plant breeders. However, since then the exploration of the natural meadows has been neglected. In order to start *in situ* conservation and to increase the usage of the indigenous genetic resources, it is necessary at first to explore natural habitats, in order to determine sites where valuable clones grow. This work should be commenced immediately, because after completion of land privatization, many such natural meadows will be ploughed by farmers. A group of plant breeders and botanists must be formed who will carry out expeditions, during which seed material should be collected and the value of the different habitats should be estimated. It is necessary to protect such territories by legislation or to reach agreement with the owners of the land through other means. However, financial resources are limited for this purpose. It would be very helpful if one good expert from another country could participate in the initial expeditions and consult us about the methodology of *in situ* conservation.

Before the second world war there were a lot of landraces and old cultivars in farms. D. Rudzinskas - the outstanding Lithuanian initiator of plant breeding in our republic and in Russia, and the teacher of N. I. Vavilov, collected large collections of traditional varieties and landraces. Those collections were maintained for several decades in our breeding station, but after the war everything was lost. Perhaps some accessions would be possible to find in the VIR but this hope is very small. The loss of the traditional varieties was caused by the new policy of development of agriculture, which started after the war. Large farms and centralized seed production system were created. This guaranteed high productivity in agriculture and stimulated farmers to plant only certified seed of improved varieties. Consequently, traditional varieties were supplanted by modern ones. If solitary samples of such old varieties remained, they were to be found in the breeders' collections, because plant breeders sometimes used them for hybridization. However, old varieties and landraces were not popular in the breeding programmes either. The situation would not be so bad now, if at that time we had better seed storage conditions, and plant breeders had not had to rejuvenate accessions so frequently. However, we must admit that our seed storage facilities have hardly improved since them.

A slightly more satisfactory situation exists with horticultural crops. It is still possible to find some traditional varieties of apple, pear, plum, cherry and sweet cherry in the collections of the Horticultural institute and even in some amateur gardens. But their future is also uncertain unless urgent steps are taken.

It is a shame but now almost all traditional varieties in Lithuania have been lost irretrievably, and only big catalogues in the archives still remind us about them.

Nevertheless, not everything was so bad in the past. Government land use policies protected natural genetic resources reasonably well. Many reservations, national parks and other sort protected areas were established. The existing system of protected areas in Lithuania includes four reserves, five national parks, one regional park, 236 nature conservation reserves of different types and over 700 natural monuments. Protected areas cover six percent of the total area. The government system determined the order of the land use, which did not allow cultivation of land near rivers, lakes, reclamation canals, or steep slopes. All watersheds were protected by law.

At present we face many new difficulties in environment protection. Due to land privatisation, some areas which earlier were protected are now under the auspices of land owners. There is an urgent necessity for laws that would force owners of land not to harm natural assets.

Briefly, at present in Lithuania the following activities are connected with the conservation of indigenous plant genetic resources at the state level:

- A legal network on the core item - the Law on Environmental Protection
- Biological monitoring
- A system of cadastres
- Red Data Book, updated annually by the Red Pages
- Regulated utilization of rare species
- A system of protected areas, established in 1992
- Establishment of a vegetation database for protected areas
- A threatened species growth site database

The legal network is on the further development phase. Currently the law on vegetation protection and utilization is being prepared.

CHAPTER 3
Conservation Activities

As was mentioned in the previous chapter there is a well established legal network of protected territories in Lithuania. We also have a dense network research institutions who carry out work related with *in situ* conservation. Until now the evaluation of *in situ* conservation sites has been executed mostly on the species level. If we want to increase usage of indigenous PGR in breeding programmes, it is necessary to explore diversity within species more thoroughly.

Despite the work that has been done, Lithuania has never had any special programme for PGR conservation *in situ* and *ex situ*. Only from 1994, with assistance from the Nordic Gene Bank, was the national program "Cultivated Plant Resources" begun in Lithuania. It encompasses both methods of conservation.

Nowadays our *ex situ* collections are mainly maintained by plant breeders. Most of them are very bulky, consisting mostly of the accessions which were received from VIR several years ago. But now it is becoming more and more difficult to renew seed samples from VIR, and it is not possible to regenerate all these accessions on our own. After all it would not be reasonable to maintain all accessions which are in the working collections. Thus in the future we are going to give preference only to local PGR in our program. However, if we want to free ourselves from those clumsy working collections, at first we need to establish reliable contacts with other genebanks who can provide us with parental material for breeding purposes. We look forward to the establishment of the global network, which create better possibilities for us to access the PGR of other countries.

In the meanwhile there is no gene bank in Lithuania. Almost all our collections are stored in paper or cloth bags in repositories without humidity and temperature regulation. Also, because of unsatisfactory prestoring processing of seed, plant material has a very short longevity. But we have coped with such storing conditions until now, as all PGR were conserved in VIR, and our plant breeders did not need to keep material for a long time in their storehouses. Present conditions have forced us to take care of our own PGR. Nordic countries offered help for this aim. They allocated money in order to supply our future gene bank with deep freezers, seed drying and packing equipment. The Lithuanian Institute of Agriculture is going to allocate rooms for that purpose. Other essential equipment and materials for the mini genebank, will be purchased from the fund of national PGR

program. This, at the end of 1995 we hope to have our own small gene bank, where we will preserve active collections of local origin.

As our national PGR are not very well explored, it is rather difficult to forecast exactly how much storage space we will need in the future. Nevertheless, in the beginning 5 refrigerators would be sufficient.

So far as we are going to keep only active collections in the national gene bank, base collections would be reasonable to conserve in the Nordic Gene Bank.

In the nearest future the Baltic states should also elaborate a plan for conservation of duplicated material.

In addition to seed storage, we also employ storage measures in two botanical gardens. There is rich arboretum in the Horticultural institute, and field collections in eight institutions, which are involved in the national PGR program.

The documentation quality of different collections depends on the breeder or researcher who was working with it. Some collections are reasonably thoroughly documented meeting the VIR requirements, and they have almost completed passport data. However, many collections require a more detailed description.

According to our national PGR program curators of different collections (mostly plant breeders) are going to describe all samples to be recommended for medium-term conservation in terms of the description lists prepared by IPGRI. For three years these collections will be appraised in nurseries, and at the end of 1997 we are going to publish a completed catalogue of national PGR. We hope that we will have a complete computerized database by that time. But it will not be easy, as computers are available only in the national PGR coordinating centre (kindly provided by the Nordic countries). It is a shame but all the institutions are very poorly computerized. None, of the plant breeding departments has yet mastered professional use of computers. So we will have to rely for some time on manually recorded data.

In order to have adequate documentation for *in situ* collections and for these collections to be in good condition, it is necessary to explore natural habitats more fully and to collect more data about natural relatives. Nevertheless, a lot is already done in this field by the Botanical institute. Researchers from this Institute have established a large data base of economically important wild growing plants. They have observed over 200 species over a period of ten years. But as mentioned above, this work was carried out mainly on the species and races level.

3.1 EVALUATION AND CHARACTERIZATION

Working collections of major crops has been characterized, and sometimes evaluated by breeders. They followed recommendations for characterization issued by VIR. But as a rule, plant breeders limited their work only to agronomically important characteristics - yielding capacity, disease resistance, earliness of maturity, etc. If all countries evaluated their plant material according to a unified system, we think it would make exchange of data and material among genebanks easier. However, it is obvious that current resources will not allow us to evaluate and characterize national collections following each paragraph of descriptor lists exactly. We consider that is more justifiable at present to limit our evaluation efforts to the most economically and morphologically important traits, and to omit paragraphs of secondary importance in the meanwhile. It would be better to test as many as possible different accessions, instead of detailed description of only a few samples. it is a pity that descriptor lists have still not been developed for some crops.

The main problem in regeneration is the need to rejuvenate too frequently, as we do not have adequate storing facilities.

It would be very helpful if we could master how to use the in vitro method for propagation and also for storing purposes. Genetic laboratories of the Lithuanian Institute of Agriculture and of the Horticultural Institute have been working with the in vitro method for many years. But if we want those laboratories to help us to regenerate and to store our PGR collections, it is necessary to find additional finances for purchase of a liquid nitrogen apparatus or LN container, refrigerators for cold storage, chemical reagents for growth media, and growth regulators.

CHAPTER 4
In-Country Use of Plant Genetic Resources

Regardless of a small area of Lithuania, there are active breeding programs for many crops: spring barley, winter wheat, rye, oat, flax, faba bean, vetch, lupine, potato, forage grasses (*Festuca, Lolium, Phleum, Poa, Dactylis*), legume grasses (*Trifolium, Medicago*), apple, beans, broccoli, cabbage, carrots, cauliflower, cherry, cucumbers, currant, gooseberry, koglrabi, lettuce, leek, onion, pepper, parsley, pear, plum, raspberry, red beets, radishes, celery, squash, strawberry, tomato.

Nobody kept records about the scale of the usage of our own resources and of material from other sources. Plant breeders usually prefer to use advanced foreign varieties for hybridization rather than local genetic resources. Even when Lithuanian varieties of major crops were very popular and broadly cultivated in the country most of them were derived from crosses with foreign varieties. One of the main reason for the oblivion of local resources among breeders was the easy access to the VIR collections and the direct personal contacts between our plant breeders and foreign breeding companies, which readily provided their plant material to us. At that time exploration, collecting, and maintenance of our own PGR would have required extra funds and manpower, and nobody was interested to provide it. As a result, plant breeders often were more familiar with the resources of Siberia than with the PGR diversity in their own country. However, such a strange situation was more prevalent among breeders of major crops.

Small fruits and medicinal plants, which were used in commercial activities, were often obtained from national collections with local origin. About 20 researchers were involved in work with medicinal and small fruit plant resources. In particular we were skilled in commercial usage of medicinal plants. In Lithuania one of the biggest factories for processing of these plants in the previous Soviet Union existed. But imported varieties were used too, especially for species that were cultivated commercially on a large scale. The need to import foreign medicinal plant material arose due to the absence of self - sufficient local seed industry of medicinal plants and of the lack of advanced Lithuanian varieties. However, wild relatives of medicinal; small fruit and energy plants were much better investigated than of pasture or horticultural plants.

The main users of national PGR collections will remain the same in the future as they are now - plant breeders, researchers and educational institutions. It would be a mistake to expect direct benefits from commercial organizations,

as they will always rely only on varieties improved by plant breeders. So in order to improve PGR utilization in Lithuania, firstly national collections should satisfy plant breeders' needs, i. e. they should have wide and useful diversity, be thoroughly evaluated and characterized, be well documented, updated, etc. In Lithuania it is especially important to establish good contacts between our genebank and plant breeders, as our national PGR program mainly rests on the initiatives and support of these people. Our finances are very limited, and plant breeders agreed to participate in the national PGR program without additional payment. But if plant breeders do not feel that our national genebank is going to be a reliable source of plant material for breeding purposes, and it will not be a good mediator between plant breeders and other genebanks, it will be very difficult to justify the existence of such a genebank in the future to them.

CHAPTER 5
National Goals, Policies, Programmes and Legislation

There is a national programme "Cultural plant resources", which is funded for three and a half years (until the end of 1997) by the Lithuanian State Science and Studies Foundation. Eight main institutions - the Institute of Agriculture, the Horticultural Institute, the Forestry Institute, the Botanical Institute, Kaunas Botanical Garden, the Agricultural Academy, Vilnius University and Vinius Pedagogical University, that have worked with PGR before, now they are involved in this programme too. Scientists from each institution are members of the board. The board is responsible for the successful fulfillment of this program. The main purpose of the programme is to integrate the work, that has been carried out separately by all institutions until now. For the same purpose the national PGR coordinating centre was established in 1994 in the Lithuanian Institute of Agriculture, following an order, issued by the Lithuanian Prime Minister on 02.12.1993.

However, the essential support and financing of the work with PGR comes from the budgets of each institution. The success of our work mostly depends on the willingness of the institutions' administrators to provide our PGR work with necessary materials, the assistance of different laboratories, space in the trial fields and greenhouses, also of the support of plant breeders.

Within the timeframe of the program plant breeders are going to inventorize our PGR, describe national collections according to descriptor lists, and start establishing a national genebank. A series of expeditions will be arranged in order to find out PGR *in situ* conservation sites and to collect plant material. If we manage to prove to the Government during this "trial period" (1994-1997) that PGR conservation is a worthwhile investment we can cherish the hope of receiving constant long - term financing from the State in the future.

Lithuania joined ECP/GR in 1995. The Ministry of Agriculture is going to pay the membership fee.

It is a shame that the Convention on Biological Diversity has still not been ratified in Lithuania, however, it is at the intensive preparatory phase. In spite of that, PGR activities within the frame of our PGR programme are related to the implementation of the CBD, as it encompasses the *in situ* conservation and sustainable use of resources of economically important wild plants.

PGR collections have not been formally protected by the legislation in Lithuania. At present the Committee for Environment Protection in the Parliament, together with an initiative group, consisting of representatives from different institutions and ministries, is working on the preparation of national legislation on genetic resources. PGR collections are protected indirectly by some separate laws - The Variety Protection and Seed Production Law, The Protected territories Law, The Intellectual Property Right Law, etc.

5.1 TRAINING

Our national programme is staffed with qualified plant breeders, botanists and geneticists, but systematic work with PGR was only started in 1994. So it is obvious that we cannot yet be adequately skilled in it. The main sources of information are IPGRI, FAO and Nordic Gene Bank, who play a very important educational role. However, we still cannot afford to subscribe to other important magazines such as "Diversity", "Genetic Resources and Crop Evaluation", or use the "Document delivery service". We cannot participate in any international meetings, congresses, etc. if our expenses are not fully covered by outside funds. Such a situation limits our possibilities of keeping pace with progress in the PGR field, and in raising the skill level of our specialists.

As our programme is very young and our knowledge in this field is still rather "green", it would be really helpful to receive some basic training in genebank management, PGR documentation and data management, in vitro storage, *in situ* conservation, etc. Because many people would like to attend such a course of PGR documentation and data management it would be better to arrange it in Lithuania or in one of other Baltic countries, and to invite lecturers from genebanks which are advanced in this field. At the Baltic states it is necessary to arrange a series of workshops on the different groups of crops. During such workshops we together with specialists from the Nordic countries could discuss the unified application of IPGRI descriptor lists, documentation and other important issues for the starting point of our work.

CHAPTER 6
International Collaboration

Agenda 21 has not as yet been adopted.

Conservation of Biological Diversity was adopted on 11 June 1992, but not yet ratified.

At present, we have no comments on the role of these two bodies.

Lithuania joined the Commission on Plant Genetic Resources in order to benefit from its accumulated experience and resources. While no specific benefits have been received so far, the material received has been very useful. At present, we have no specific comments on further benefits and future achievements of the Commission.

Undertaking as yet not been signed.

There are no specific reasons for signing of the undertaking, except that it has to be cleared through various government channels.

No comments on "International fund". Lithuania is expected to both beneficiary and donor.

So far, major plant genetic resources collaboration with FAO at the programme level.

Lithuania has very small experience in collaboration with CGIAR. CIMMYT and ICARDA have provided some PGR samples to our plant breeders. And we think that networking efforts of IPGRI are very important for the improvement access to the different sources of PGR.

Lithuania joined ECPGR in 1995. We expect that the participation in the ECPGR will strengthen our collaborative activities on genetic resources, will facilitate to find donors to support particular elements of workplans, will keep us informed about major events, progress and achievements in the field of PGR.

In 1994 a two-year project on PGR was established between the Nordic and the Baltic countries. We hope to set up a long-term collaborative relationship with these countries in the future, because they are neighbouring and have experience in the PGR field. At present the relationship between the Nordic and Baltic countries looks like donors/recipient, but later sharing of resources could be of mutual benefit.

CHAPTER 7
National Needs and Opportunities

- To explore *in situ* conservation areas.
- To compile national collections of socially and economically useful plants, and to complete their evaluation, characterization and documentation.
- To establish a national gene bank and computerized data base.
- To master the use of the in vitro method for propagation and storage of plant material.
- To train staff as soon as possible in PGR documentation and data management, and also in gene bank management, *in situ* conservation and in vitro storage.
- To establish contacts with the CGIAR and other international organizations who are able to supply us with plant material, information, consultation, and other kinds of support, and to participate in all the activities of the FAO Commission on PGR and ECP/GR.
- To look for financial support in order to by necessary equipment for seed and in vitro storage, computers for each institution which participates in the PGR program and to connect them in one network.

APPENDIX 1

Agrostis stolonifera
Alopecurus pratensis
Anthyllis vulneraria
Arrhenatherum elatius
Artemisia absinthium
Aster spp.
Bromus inermis
Carum carvi
Chamomilla recutita
Convallaria majalis
Crataegus spp.
Dactylis glomerata
Festuca spp.
Fragaria spp.
Humulus lupulus
Hypericum perforatum
Iris spp.
Juniperus communis
Lathyrus spp.
Leonurus cardiaca
Lilium spp.
Lolium spp.
Lotus spp.
Malus sylvestris
Medicago spp.
Melilotus albus
Mentha spp.
Onobrychis spp.
Oryganum vulgare
Oxycoccus spp.
Padus avium
Phalaris arundinacea
Phleum pratense
Poa spp.
Polemonium coeruleum
Polygonum spp.
Prunus spinosa
Pirus communis
Ribes spp.
Rubus spp.

Salix spp.
Sorbus aucuparia
Thymus spp.
Trifolium spp.
Trisetum flavescens
Vaccinium spp.
Valeriana officinalis
Viburnum opulus
Vicia spp.
Viola spp.