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Danish Institute of Agricultural Sciences (DIAS)
The Ministry of Food Agriculture and Fisheries
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**Background**

The Directorate of Development, of The Danish Ministry of Food, Agriculture and Fisheries, has requested The Danish Institute of Agricultural Sciences (DIAS), through the Department of Crop Protection, Research Centre Flakkebjerg to carry out project identification in Poland and the Baltic Countries. Possible projects should fit into The Ministry's Environment Related Sector Program 1996 and 1997 and the Sector Integrated Environmental Co-operation Programme of 1998.

The Ministry has asked for a survey of the need for co-operation in the harmonisation process to the EU directives, with respect to an efficacy testing system for pesticides, quality assurance systems and residue analysis for pesticides suitable for the purpose of registration as well as a basis for environmentally sound advising of the farmers. In addition, the Ministry wants a survey of the need for a certificate for sprayers and an obligatory system for control and acceptance of the spray equipment. Furthermore, an evaluation of the possibility of implementing a computerised Plant Protection decision support system should be carried out. Finally, an assessment should be made of the degree to which the country is interested in receiving support and participating in co-operation within defined projects.

**Objectives**

The overall objective of the first mission is project identification within the framework described under "Background".

Projects will be identified even if they are outside the normal DIAS activities. This first mission is planned to initiate a constructive dialogue with the counterpart institutions ending up with concrete suggestions from Latvia.
Activities

The following

Letter of Introduction

Was sent to potential partners in Latvia:

Foulu, 29th January 1998

Re.: Visit to Latvia in February

Dear Sir (In this case: Director Martins Busmanis)

I am addressing you on behalf of The Danish Institute of Agricultural Science's International Unit, to ask for your help to identify suitable areas for future collaboration on agricultural and environmental projects between Latvian and Danish research institutes. You already know Alex Percy-Smith and Ebbe Poulsen from International Unit, through the just ended project. I am a new member of this group!

You are aware that DIAS is a sector research institute working with strategic and applied research under the auspices of the Danish Ministry of Food, Agriculture and Fisheries. DIAS has given a high priority to establishing contacts to the Baltic countries with a view to co-operative work.

The Directorate of Development of the Danish Ministry of Food, Agriculture and Fisheries, has requested the institute, through International Unit and Research Centre Flakkebjerg to carry out project identification in the Baltic countries and Poland.

The Ministry has asked for a survey of the need for co-operation within certain agricultural-environmental areas and in the harmonisation process to the EU directives, especially the Uniform Principles. Areas of interest include:

- adaptation and harmonisation of the laws, regulations and procedures for efficacy testing of pesticides and other activities concerning bringing plant protection agents on the market.
- pesticide sprayers certificate,
- inspection system for spray equipment
- computer based decision support systems within the area of plant protection

The main development objectives of these projects will be to develop safe use of pesticides, both in terms of human and environmental aspects, in agriculture in the Baltic countries and Poland.
We would appreciate some contacts, especially within the area of pesticide residue analysis in food (also control body), soil and water, as we have not been in contact with this sector in the past. The different quality assurance systems (GLP, GEP, EN-45 000) will be included in the work as well.

We would like to ask if you would be interested in receiving a visit by two scientists from the Research Centre Flakkebjerg: Mr. Erik Kirknel and Mr. Bent Bromand, as well as myself on Tuesday, the 17th of February, at 14.00 o'clock.? We will cover all our expenses.

The Ministry have given us until 1st April to be finished with this first project identification mission, so time is rather short. I envisage organising a final programme in week 7 and visiting Latvia the week after. When we return to Denmark we will write a report and send it to you for comments. There is likely to be a need for a further visit in March to finalise discussions and ensure that we agree on areas of support and the ensuing work needed in order to make project application to The Danish Ministry of Food, Agriculture and Fisheries. I hope that you can accommodate this proposal in your plans for February and March.

I have also sent this letter of introduction to Latvian State Centre of Plant Protection, Mr. Director Jan Circens and to State Plant Protection Station, Deputy Director Ringolds Arnitis.
Do you know of any other contacts we may have missed?

I look forward to hearing from you as soon as possible.

Best regards

Margrethe B. Høstgaard
International Projects Manager
International Unit
Danish Institute of Agricultural Sciences
Notes from Meetings:

February, 16th

Meeting at Royal Danish Embassy, Riga

Participants: Allan Pagh Kristensen, Secretary of Embassy  
Søren Pedersen, Commercial Assistant, Agriculture and Environment  
Margrethe Høstgaard, DIAS

A short information meeting was held to present the background for the mission and the possible areas of interest for collaboration.

DIAS was given a new report from January, 1998: Agriculture in Latvia (Landbrugsdrift i Letland). The Embassy also gave a copy of the booklet: The Latvian Agricultural Advisory and Training Centre. APK suggested that we visited the Advisory and Training Centre in Jelgava. This was later arranged through the Ministry of Agriculture.

Meeting at the Ministry of Agriculture, Riga

Participants: Ms. Gundega Micule, Director, Production Quality Management Dept.  
Maris Baltakmens, Senior official, Environmental Protection Dept., Ministry of Environment  
Kierkegaard, Adviser, Dept Jens. of Foreign Relations.  
Margrethe Høstgaard, DIAS

Ms. Micule informed us, that the responsibility for control of animal products will probably be in the Veterinary service. The control of the use of pesticides at farm level will probably be at the Plant Protection Station, and Ministry of Welfare will most likely be responsible for food control.

Ms. Micule expressed a strong interest in projects that will help Latvia fill the requirements of the STAGE I Council Directives (i.e. 91/414/EEC and 94/43/EEC). This will, in particular, be done by encouraging DIAS catalogue project numbers 1) Efficacy Testing of Pesticides and 2) Chemical Analysis of Pesticides in Soil, Water and Fruit and Vegetables. Ms. Micule also expressed interest in number 3) Working Environment when working with Pesticides, and included the need for sprayer certificate and spray equipment control.

Mr. Baltakmens and Ms. Micule both expressed a very strong interest in and support to number 8) in the DIAS catalogue: PC Plant Protection. They both see this as a necessary tool to avoid excessive use of pesticides in the future.
Ms. Micule would like to know, if DIAS can help to make a monitoring strategy for residue testing and sampling in food. Where and how often should it be done? Should it be at farm level or at the market? The same questions exist for sampling for heavy metals and pesticides in soil and water.

Besides the more technical side of a project with reference to the Council Directives, Ms. Micule and Jens Kierkegaard expressed the need for help to practical understanding of the texts of the Directives. A project should include this, also even if it includes other experts than those of DIAS. There is also a need to learn how legislation needs to be changed to fulfil the Directives.

Ms. Micule would like to know exactly what in Directive 91/414 would be fulfilled by a project collaboration!

Ms. Micule arranged a meeting with Ms. Maira Dzelskleja, working at the Advisory and Training Centre, Jelgava for Wednesday at the Ministry.

**Meeting at Latvian State Center of Plant Protection**

Participants: Dr. Jan Circens, Director  
Dr. Agr. Maija Eihe, Researcher Apple scab  
Ms. Anna Klavinska, Microbiologist, Cereal diseases  
Ms Ineta Vanaga, Dipl. agr., Weed control  
Erik Kirknel, DIAS  
Margrethe Høstgaard, DIAS

The Center carries out 90% of all efficacy testing of new pesticides in Latvia. They have translated the EPPO guidelines and are using these. It includes a laboratory for residue testing in connection with registration trials. The staff consist of 13 scientists and 1 technician. This means that the scientists must do all the technical work as well.

The Center is at present participating on a Nordic-Baltic project on GEP running with Bent Bromand and Lise Nistrup Jørgensen from Research Centre Flakkebjerg. They are just now waiting for 2 sprayers that are held back by customs in the airport, as they have been asked to pay 18-20 % of the value in customs. The sprayers are part of the project. Such imports should be exempt from customs.

The Center only gets money from the Ministry for certain projects. (e.g. weed species/spacing in a region in Latvia, Apple scab monitoring, EPPO guidelines).

The participants from the Center expressed an urgent need for help to buy an instrument for seed counting (1000 grains), and a measuring instrument for grain humidity.
There is an interest in PC-Plant Protection. This would involve technical staff as well as hardware, such as computers and weather stations. It would be possible and realistic to start with diseases in winter wheat and building up collaboration with the advisory service.

Right now, the only collaboration is with State Plant Protection Station. Ms. Maija Eihe counts ascospores for apple scab once a week and sends the results to SPPS.

The Center feels it is a problem to provide results free of charge to advisers, who then sell the information to farmers. There is a lack of communication between the State Centre of Plant Production and the advisory service. They believe they could collaborate with SPPS, if they had the money for the research from the Ministry.

Conclusion:
The possibilities of collaboration around PC-Plant Protection should be investigated. The Center needs support to solve the problem of lack of communication with the advisers.

The Center would like to continue and further develop the work on GEP.

A second meeting was arranged for Wednesday, when we met the scientist responsible for the residue laboratory. We also talked to the scientist responsible for potato diseases, Ms. Irena Afanasjeva, to see if there are any possibilities to collaborate around the potato late blight model, NEGFRY.

**February 17th**

**Meeting at State Plant Protection Station**

Participants:  
Ringolds Arnitis, Deputy Director  
Anda Resnais, Head of Section  
Erik Kirknel, DIAS  
Margrethe Høstgaard, DIAS

SPPS works within three areas:
1. Plant Quarantine  
2. Plant protection products:  
   a. Registration  
   b. Control of PPP use at farm level  
   c. Control of PPP traders  
3. Warning systems

SPPS has one division with 3 people in Riga and 15 local PP specialists (agronomists) around the country. They have 10 locations around the country with trials.
Latvia relies on the documentation provided by chemical companies regarding environmental data in the pesticide registration process and SPPS will not, themselves, initiate further environmental research on pesticides.

**PC plant protection and warning systems** - it was revealed that the interest in warning systems had high priority. When a decision to spray is taken, it is with the recommended dosage and interest in reduced dosage is of minor importance or absent. This is partly due to the necessary input of research in the validation process of the program, which was an economic burden for Latvia. The director did not predict significant increase in the pesticide consumption in the future.

However, Latvia needs real time weather data for a more precise warning system and the director and Anda Resnais showed interest in the Hardi METPOLE. The warning system(s) is aimed mainly towards potatoes and cereal crops. Ringolds Arnitis would like to collaborate concerning the PC-P Weather module and the NEGFRY model for potato late blight, which could be used in the warning system for cereal and potato diseases. As they would need to collaborate with scientists to validate the forecasting models, they need to find relevant Latvian partners.

Ringolds Arnitis also expressed a need for help in the work with GEP.

**The quality control of pesticide products** is also the responsibility of The State Plant Protection Station. Analyses were mainly carried out by "Raziba" (which we visited the same day).

**Pesticide residue analysis in plant products** is carried out at various laboratories. Some research activities in the plant production and analysis for chemical companies providing data used in the registration process is carried out. Apparently, monitoring of pesticides in plant products on the market is very seldom performed. Two ministries are involved in these fields, The Ministry of Agriculture, who acts mainly on the production side and The Ministry of Welfare who act for the consumers.

The "old" Plant protection law from 1994 (a new law is under revision), contains requirements for a certificate of the sprayers. Such a certificate is necessary when purchasing pesticides. The course lasts 25 hours and is considered to be sufficient for the sprayers. 12.000 certificates have been granted out of estimated 20.000 potential certificates. The course is organised by The State Plant Protection Station. No co-operation is wanted in this area.

**Testing of spray equipment** is not implemented within the Latvian Plant Protection law and such activities are neither being carried out at present nor are planned. The farmers are not ready for such testing and have no economic resources available for this. 2.000 tractor mounted sprayers are estimated to be available plus a number of knap-sack sprayers. Many farmers use this type of spray equipment due to the small size of most farms. No co-operation is wanted in this area.

There does exist an approval system for new models of spray equipment. The importer of the sprayer is responsible for this approval.
Meeting at **State Scientific Production Enterprise Raziba, Riga**

**Participants:** Martins Busmanis, Director  
Regina Timbare, Dr agro  
Valentina Dane, Head of laboratory  
Tatjana Samohvalova, Leader of Toxicology laboratory  
Ilga Muraska, Toxicology laboratory  
Daniela Pinke, Toxicology laboratory  
Erik Kirknel, DIAS  
Margrethe Høstgaard, DIAS  
Bent Bromand, DIAS

The pesticide laboratory is one of several departments at Raziba and was originally started in 1975, with working area in toxicology and pesticide residue analysis such as determination of pesticides after seed treatment. In 1983 the laboratory underwent a reorganisation, included heavy metals etc. The laboratory worked from then on with analysis of pesticide residues in soil, water and plant material mainly on the producer (farmer) side. The reason for the soil analysis was primarily due to a recent heavy use of persistent pesticides (triazines and chlorinated hydrocarbons). After 1992, most of the economic support has come from contracts with private companies (despite the fact that it is a state organised chemical laboratory) due to the lack of resources of the farmers.

The laboratory seems to be well organised and since 1995 has implemented a quality assurance system similar to EN-45.000. The laboratory is accredited by "Latak", and has been inspected twice since then with a positive outcome. The laboratory employs 80 staff members with 4 members in pesticide residue analysis plus 26 field staff.

At the present moment, the laboratory is negotiating with The Ministry of Agriculture for future contracts especially on monitoring of pesticides in food on the market.

**Quality control of formulated pesticides** is done to a very limited degree. An official laboratory does not exist for this task.

It would appear that the staff is relatively staff, with little problem of staff moving to more attractive positions in the private sector. This maybe because salaries at this laboratory are individual and adjusted to market prices.

Wishes for co-operation were briefly expressed. Training in analytical methods in pesticide residue analysis, including getting acquainted with modern instrumentation and a fully implemented quality assurance system EN-45.000 in practice, was expressed as having a high priority. The laboratory is in desperate need for technical equipment and would benefit from GC-mass spectrometry instrument.
Further details of co-operation will be provided after this report is forwarded to Latvian colleagues for comments.

February 18th

Meeting with Ministry of Agriculture, Riga

Participants: Ms. Gundega Micule, Director. Production Quality Management Development
Ms. Zane Smith, Head of Production Quality Management Development
Margrethe Hostgaard, DIAS
Erik Kirknel, DIAS
Bent Bromand, DIAS

Dr. Micule and Ms. Zane Smith were briefed of the results of the mission in Latvia.

The present Nordic/Baltic GEP-project was discussed and the difficulties the Latvian State Center of Plant Protection has with implementing the system. This was mainly due to lack of resources, both technical staff and spray equipment at the station. Maybe the fees for efficacy testing should be regulated. The Ministry was aware of the importance of having an effective efficacy testing system available, which live up to standards. However, it was felt that it was not necessary at the present time to have an authority to control the testing units and issue certificates.

The Latvian State Center of Plant Protection is interested in PC plant protection decision support system in cereals and potatoes. In order to make the system beneficial for the farmers, it is important that the Center establishes connections to the advisory system. It was mentioned that the University would be an interested co-operation partner.

The Director added to the comments made by Deputy Director Ringold Arnitis from The State Plant Protection Station on spray certificate for farmers and testing of spray equipment, that they might need next year to co-operate on further development in education of farmers and some kind of starting activities on testing of the spray equipment.

The structure of pesticide registration, monitoring of pesticides in food etc., was not politically decided at the present moment. Therefore, it was difficult to identify the limits between The Ministry of Agriculture and the Ministry of Welfare regarding monitoring and research laboratories. The Director recommended that we continued our dialogue with "Raziba", because it was a contractual laboratory used by The Ministry. The Director would recommend that somebody, maybe a representative from "Raziba", co-operated with us on how to build a monitoring system in Latvia on pesticides in soil and food. This could eventually be done by the same staff member co-operating in other projects. A visit to the Danish Environmental Protection Agency (Miljøstyrelsen) might be useful.
The Director gave his recommendation for co-operation on the issues discussed under our mission in Latvia.

Meeting with Inara Turka, from University of Agriculture, Jelgava

Participants: Ms. Professor Inara Turka, Faculty of Agriculture, Dept. of Plant Protection
Erik Kirknel, DIAS
Bent Bromand, DIAS
Margrethe Høstgaard, DIAS

Inara Turka attempted to validate the NEGFRY model last year in a project with Roland Sigvald from the Swedish University in Uppsala. This year the model will be tested at different farms. Ms. Turka has not had help from Sweden concerning technical problems with the model.

The department also works with a Swedish forecasting model for Septoria in wheat and leaf spot in barley. These models are Excel-based and work on recorded observations.

Ms. Turka has 10 years of collected observation data from blight in potatoes and 3 years from cereal diseases. She would like to collaborate with DIAS concerning NEGFRY and the PC-P Weather module, partly to test the already recorded data and partly to use the models for disease forecasting in winter wheat, barley and potatoes. For this she needs weather stations to supply real time weather data. The department has close collaboration with the Advisory Service in Jelgava and at three trial locations there are competent people who can operate a computer based DSS.

Meeting with The Latvian Agricultural Advisory and Training Centre, Jelgava

Head of Agricultural Department. Ms. Maira Dzelzkaléja came to meet us at the Ministry of Agriculture.

LAAC was established with the help of the Danish Advisory Service in Skejby. It is a non-profit-making limited company, with the Latvian Farmers Federation as co-founder. Finance for the company is based on contracts with the Ministry of Agriculture. Payment is received for services rendered to farmers and other clients as well as from international donors on a project basis. LAAC is establishing demonstration field trials for farmers (made possible through a PHARE project) and publishes trial results from the University and from The State Plant Protection Station.

LAAC would be very interested in participating in testing PC-Plant Protection in collaboration with the University and regional advisers and farmers. They need weather stations and would like to start with NEGFRY for forecasting of potato late blight.
The Advisory Centre is involved in training pesticide dealers in proper use of pesticides on a one week training course. This course could be improved as it has been found extremely useful. Ms. Maira Dzelzkalēja expressed a need for more information to the farmers on the use of pesticides. She was very interested in entering a co-operation with Denmark on an education programme on how to treat and optimise spray equipment and facilities for testing the technical conditions of the spray equipment. She was convinced that the farmers were ready to pay for this test.

2nd Meeting with Latvian State Centre of Plant Protection

Participants: Dr. Tatiana Ipatova (Pesticide laboratory)
Dr. Svetlana Zikova

This pesticide residue laboratory is run only on a commercial basis like similar laboratories in Latvia. It analyses soil and plant samples for the pesticide companies for registration purposes. Approximately 1500 samples per year are analysed for pesticide residues. The laboratory is in contact with the Latvian certification body "Latak" and is preparing accreditation in EN-45.000 in the near future. It was the impression that the laboratory needs support to implementation of EN-45.000. This proposal was met with great interest.

A need for contact with a similar laboratory for becoming familiar with current methods of analysis and apparatus was expressed. Modern methods of analysis will dramatically reduce the volume of organic solvents used. The laboratory could benefit from implementation of a new gas-chromatograph with capillary column systems. The laboratory employs 3 staff members.

Participants:
Potato researchers: Dr. Larisa Davidoik, Cand. Biol.
Irina Afanasjeva, Assistent

The two researchers already have some knowledge about NEGFRY and were informed about a running Internet project including reporting late blight observations in Scandinavia and the Baltic countries. They would like to participate in the NEGFRY Internet project and also to test NEGFRY locally. This could be in collaboration with the University in Jelgava and the later also with the Advisory Centre. The NEGFRY test project would require a local weather station for real time weather data.
Main Conclusions of the mission to Latvia:

Introduction

The missions main objective was to initiate the identification of projects that may be eligible for support from The Danish Ministry of Food, Agriculture and Fisheries within the following areas:

- adaptation and harmonisation of the laws, regulations and procedures for efficacy testing of pesticides and other activities concerning bringing plant protection agents on the market.
- pesticide sprayers certificate, e.g. residue analysis,
- inspection system for spray equipment
- computer based systems for decision making on the use of pesticides in plant protection

The main development objectives of these projects will be to develop safe use of pesticides, both of human and environmental aspects, in agriculture in Latvia.

This report presents the main finding of the project identification mission fielded in February 1998. It summarises the impression on the Danish delegation to be presented to the Latvian counterpart institutions for comments and to be used in the further planning process.

Main Conclusions

A series of meetings were held with relevant institutions in Latvia. It was the impression of the Danish delegation, that the following items had the interest of our Latvian colleagues. The items can be fully recommended for future co-operation:

1. A Nordic/Baltic project: Harmonising and Upgrading Pesticide Efficacy Testing in the Nordic/Baltic Region" was started in 1997. This project includes harmonising to EU directives 91/414 EEC and 93/71 EEC, which means GEP (Good Experimental Practice). 100% of efficacy testing in Latvia is carried out by the State Center of Plant Protection. SCPP is very interested in implementation of GEP in practice. In the future it may be foreseen, that the institute will meet competition from other institutions, which are already now making field trials and it may not be possible to retain the monopoly status for carrying out efficacy trials. Dr. Gundega Micule, Ministry of Agriculture, expressed the opinion about GEP that for the time being there was no immediate need for creating a controlling and certifying body. It was noted, however, that it is important that the quality of efficacy trials is improved by implementing GEP quality specifications. A strong wish to continue and further develop GEP was expressed by the Latvian representatives. From the Danish side it must be stressed, that in order to fulfil the requirements of the EU directives, to document the quality of the efficacy testing and to stand up to mutual recognition it is important that an independent controlling and certifying body is formed to evaluate and inspect the testing units.
2. Residue analysis are carried out at the two laboratories which the mission visited: The State Scientific Production Enterprise, Raziba, and Latvian State Centre of Plant Protection. The general impression was that old equipment is being used. Although this worked according to standard at the time of production, an updating of equipment and training in modern analytical methodology is necessary. This would include full implementation of a quality assurance system. Assistance to set up a monitoring system for pesticide residues in food was expressed.

3. The Plant Protection Law includes spray certificate for sprayers and was evaluated from Latvian side to be implemented satisfactorily. No assistance was requested. Test of spray equipment was not obligatory and no assistance was requested in this area either. This statement was primarily made by The State Plant Protection Station.

4. The use of pesticides has started increasing again. The Latvian State Centre of Plant Protection would like to start working with the Danish PC-Plant Protection system. As they have not many resources, they suggest to start with trials for cereal diseases. They would also like to test the PC-P Weather module, which requires weather stations for real time weather data. The University has the same interest, and would also be able to do the basic scientific work necessary. As this work ideally needs to be done at several locations, collaboration is recommended. When the basic work has been established, collaboration between research and the advisory service will be necessary for testing the models. The Advisory and Training Centre has shown great interest in this as is the case with the State Plant Production Station. All four institutions have expressed interest in working with the NEGFRY model in potatoes.

The first step will be to send scientific participants from the research institutions to the PC-P workshop to be held at DIAS's Research Centre Flakkebjerg from 18th to 20th March. The scientists selected must be able to cover cereal diseases and potato late blight, but must also have knowledge of computers and be able to understand and speak English.
Appendix 1:

Itinerary

Programme for Identification Mission to Latvia, week 8, 1998

Participants: Mr. Erik Kirknel. Researcher, Dept. of Crop Protection at DIAS, Research Centre Flakkebjerg.
Ph.D. Bent Bromand. Senior Scientist, Dept. of Crop Protection, DIAS, Research Centre Flakkebjerg.
Ms. Margrethe Høstgaard, International Projects Manager, International Unit, DIAS.

Monday, 16th Feb.:

09.00: Meeting at Danish Embassy

10.30: Meeting with Jens Kierkegaard, Dept. of Integration and Foreign Relations and Production Quality Management Dept., Ministry of Agriculture

14.00: Meeting with people at Latvian State Centre of Plant Protection, Riga (Director Janis Circens)

Tuesday, 17th Feb.:

09.00 Meeting at State Plant Protection Station, Riga (Deputy Director Ringolds Arnitis)

14.0 Meeting at State Scientific Production Enterprise Raziba, Riga (Director Martins Busmanis.)

Wednesday, 18th Feb.:

09.0 Meeting with Ms. Gundega Micule, Quality management Dept., Ministry of Agriculture.

10.30: Meeting with Ms. Inara Turka, Latvian University of Agriculture, Jelgava.

11.30: Meeting with Ms. Maira Dzelzkaleja, The Latvian Agricultural Advisory and Training Centre, Jelgava.

15.00: Meeting at Latvian State Centre of Plant Protection, Riga.
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Ms. Anna Klavinska, Microbiologist, Cereal diseases  
Ms. Ineta Vanaga, Dipl. agr., Weed control  
Dr. Tatiana Ipatova, Pesticide laboratory
Dr. Svetlana Zikova, Pesticide laboratory
Dr. Larisa Davidoik, Cand. Biol., Potato diseases
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Appendix II

Key Figures Latvian Agriculture (1995 figures when nothing else is mentioned).

Population:

The population of Latvia is 2,566,000.
The average population density is around 40 persons/km².

Total area: 6,400,000 ha.

Area of forest and woodland (44% of total area): 2,900,000 ha.
Area of agricultural land (40% of total area): 2,540,000 ha.
   - Area of arable land (39% of agricultural land) 1,700,000 ha.

Sown area:

Sown area of cereals: 408,000 ha.
Sown area of fodder crops: 413,400 ha.
Sown area of potatoes: 75,100 ha.

Since independence Latvia has pursued a privatisation strategy. In 1995 family farms occupied 47% of the agricultural land, while 32% was occupied by very small farms or by household plots. 17% belonged to 656 "statutory companies".

Farm sizes (average) in Latvia:

Average farm size: 19.9 ha.
Family farms: 20 ha.
Small farms/household plots: 2-4 ha.

Production:

Cereals: 690,000t
Potatoes: 864,000t
Sugar: 250,000t
Vegetables and fruits: 330,000t
Milk: 937,000t
Beef meat: 62,000t
Pig meat: 56,000t
Only production of potatoes and milk was above level of self-sufficiency.

**Approximate volume of pesticides uses in Latvia.**

The use of pesticides in Latvia has decreased since independence mainly due to high prices for quality pesticide imports as compared to pesticide prices before independence. The amount of pesticides used by 600 state farms during the period 1986-1990 reached almost 4,400 tons annually. In 1994 the use of pesticides was at its lowest, only 470.8 tons were used.

1995 and 1996 figures show that the use of pesticides has increased recently, amounting to 630.5 tons in 1996. Total increase from 1994 to 1996: 159.7 tons (+34%)

**Agriculture's contribution to the Latvian economy:**
In the years after independence production decreased and agriculture's contribution to the Gross Domestic Product fell. In 1995 agriculture and forestry accounted for 9.9% of the GDP and over 18% of the employment.